RESEARCH ARTICLE

Translation and validation of the Bahasa Malaysia version of the Patient-Specific Functional Scale (PSFS)

Akehsan Dahlan*, Muhammad Danial Mohd Yasin, Zati Izni Achmy

Centre of Occupational Therapy, Faculty of Health Sciences, Universiti Teknologi MARA, Cawangan Selangor Kampus Puncak Alam, 42300 Puncak Alam, Selangor, Malaysia

***Corresponding Author**

Akehsan Dahllan
Email: akehsan@uitm.edu.my

Abstract:

Purpose This study aimed to translate and culturally validate the Patient-Specific Functional Scale (PSFS) into the Bahasa Malaysia version to the elderly with sarcopenia. *Methods* The PSFS underwent an established process of translation and cross-cultural adaptation from a published guideline. A total of 94 community living elderly participated in this study. The investigated psychometric properties of the PSFS-BM included concurrent validity, convergent validity, and test-retest reliability. The elderly completed the English version of PSFS and the PSFS-BM for the evaluation of the concurrent validity. The convergent validity was assessed by comparing the PSFS-BM with the Canadian Occupational Performance Measure (COPM). A two weeks interval was set to assess test-retest reliability. *Results* Pearson correlation coefficient of 0.97 indicated that a strong positive correlation exists between the English version of PSFS and the PSFS-BM. The Pearson correlation coefficient with the r value of 0.78 and 0.69 also reflect a strong relationship of the PSFS-BM with the COPM. The test-retest reliability was good with the intraclass correlation coefficient of 0.84. The standard error of measurement and the minimal detectable change was 0.6 and 1.4, respectively. The Bland-Altman plot indicated a good agreement between the initial test and retest scores. A strong correlation of the initial test and retest scores was also observed using the Pearson correlation coefficient. *Conclusion* The PSFS-BM is a valid and reliable instrument to assess the functional ability of the community living elderly with the possibilities of sarcopenia.

Keywords: Elderly, Patient-Specific Functional Scale, Sarcopenia, Translation, Cultural adaptation, Psychometric testing

1. INTRODUCTION

The world's population is aging rapidly, which means older people will constitute a more substantial proportion of the world's population. Many countries are now becoming an aging country or are expected to be one. In 2050, the percentage of the elderly population aged 60 years and older in the United States will ascend from the current figure of about 20% to 27% [1]. In conjunction with the increasing aging population in other developing countries, the prevalence of the aging population in Malaysia is also expected to be increasing [2]. Two factors contribute to the rise of the elderly population, which include decreasing the fertility rate and increasing longevity of the aging population [1].

Some of the problems experienced by the elderly population would include cognitive impairments, psychological issues, and physical problems. These problems are common among elderly because the increase in age or aging is usually associated with reduced health status [3]. A study conducted in the rural community of Sepang in Selangor revealed that cognitive impairment was markedly higher in the elderly 70 years old and above [2]. The study also shows that 8% to 20% of elderly living in the community have depression [4]. A higher prevalence of depression was also observed in the urban than in the rural elderly population [5]. Other than cognitive and psychological problems, physical problems such as sarcopenia are also one of the noticeable issues among them.

Sarcopenia is an age-related disease that causes involuntary loss of skeletal muscle mass and strength [6]. Elderly with sarcopenia may have a functional disability in standing, walking, stairs climbing, lifting, carrying, routine needs, meal preparation, and home management [7]. The underlying cause of reduced functional ability and an increase in functional impairment among the elderly with sarcopenia is due to low relative muscle mass [7]. There are associations between sarcopenia, reduced functional ability, and an increase in physical impairment [7].

Naturally, there is a relationship between disability and what a person does in terms of engagement in occupations. Low functional ability in occupational areas among the elderly with sarcopenia may affect their quality of life [8]. Therefore, the occupational therapist role in the elderly population is becoming more prominent in providing care and support in the form of rehabilitative services. In occupational therapy, assessment is one of the fundamental measures to quantify the functional ability in order to plan and implement an intervention. One of the most common and practical instruments used to assess performance in occupational activities among patients is the Patient-Specific Functional Scale (PSFS).

PSFS was designed to measure functional changes, especially in patients with musculoskeletal disorders [9]. It was already validated and widely used in English speaking countries [10-11]. However, there is still no existing form of Bahasa Malaysia version of PSFS, hence no validity and reliability evaluation of it has been undertaken. This study aimed to translate and validate a Bahasa Malaysia version of the PSFS by evaluating its concurrent validity, convergent validity, and test-retest reliability in the elderly with the possibilities of sarcopenia.

2. MATERIALS AND METHODS

2.1 Patient-Specific Functional Scale

The PSFS is a patient-specific measure that can be used to assess functional changes in clinical presentation [10]. This instrument only consists of one form of a printed page, as it is a brief functional assessment that is simple and easy to administer within a short period. To conduct this assessment, patients need to identify at least three essential activities they are unable to do or are having difficulty with due to their physical conditions [11]. Then, the patients need to rate their ability to perform those activities on a continuous scale of 0-10, where 0 is unable to perform the activity, and 10 is able to perform the activity at the same level as before injury or problem [11]. At reassessment, patients are asked again to rate the same activities by using the same scale. The average scores of the three activities identified by the patients can be considered as the final PSFS score [12].

2.2 Canadian Occupational Performance Measure

The Canadian Occupational Performance Measure (COPM) is an instrument developed to help patients identify, prioritize, and evaluate their performance and satisfaction on important occupations [15]. The COPM consists of three areas of occupational functioning, which are occupational performance, productivity, and leisure. Initially, the patients need to identify occupations they wanted to do, need to do, or are expected to do. Then, they need to rate each identified occupation in terms of its importance on a 1-10 scale [16]. After that, the clinician needs to confirm with the patients the five most essential occupations, and record them in the scoring section. Lastly, the patients need to rate each of the occupations chosen in terms of their current performance and satisfaction, on a 10-point scale. Scores for performance and satisfaction could vary from 1 to 10, with higher scores indicate better performance and satisfaction of the identified occupations. To get the final score of COPM, the total performance or satisfaction scores need to be divided by the number of identified important occupations. Additionally, the same top five important occupations identified by patients can be reassessed by using the same scale for the performance and satisfaction scores [17].

2.3 Translation

To translate and culturally adapt the PSFS into the Bahasa Malaysia version, permission was obtained from the original developer, Professor Paul Stratford. Several experts participated in the translation process. The original English version of PSFS undergone three steps of translation, which were forward translation, backward translation, and discussion with the expert committee, following the publish guideline [18].

Initially, the assessment was translated by two independent translators who have a certificate of bachelor's degree in Teaching English as Second Language (TESL). They produced two different Bahasa Malaysia version of PSFS. Hence, discrepancies between the two translators were discussed and resolved with the researchers' involvement to produce only one translated version of PSFS-BM. Later in backward translation, the questionnaire was translated back from Bahasa Malaysia to English by another two independent translators, who also respectively have a bachelor's degree in TESL. They produced two English versions of PSFS. As in the forward translation, discrepancies between the two translators were discussed and resolved with the researchers' involvement to produce only one English version of PSFS. Throughout this process, there were no misunderstandings or unclear wordings identified from the initial translation, which suggest good accuracy of both forward and backward translation.

The final process in the translation phase of the PSFS was the discussion with the expert committee. Other than those four certified translators, the expert committee also involved three occupational therapists and one physiotherapist in determining whether the translated version of PSFS has achieved semantic, idiomatic, experiential, and conceptual equivalence. Members of the expert committee have finally reached an agreement on the instruction, the wording, and the overall assessment, which finally produce the harmonized and pre-final version of the PSFS-BM. This pre-final version of the PSFS-BM was finally ready to be pilot tested.

2.4 Pilot study

The pre-final version of the PSFS-BM was administered to 40 community living elderly aged 60 years old and above. These participants completed the pre-final version and were asked to document their perception and understanding of it. For this purpose, participants were also given a feedback form about the pre-final version of the PSFS-BM, and they were asked whether they understand the assessment, their level of understanding, the clarity of instructions, and also suggestions for correction if there was any.

The participants involved were 18 males and 22 females (mean age 68.1 ± 66.5 years old, range 60 – 83 years old). The feedback form distributed to the participants were analysed. Most participants understood the pre-final version of the PSFS-BM and can complete the assessment correctly. Out of forty participants, only one participant recommended modifying a sentence from the scoring section. However, after a discussion with the expert committee, the recommendation has to be eliminated because it may lead to a different meaning and has no semantic equivalence with the initial translation. Thus, no correction and modification was done for the pre-final version of the PSFS-BM. A final version was successfully developed after the completion of the pilot study.

2.5 Psychometric testing

The psychometric evaluation of the final version of the PSFS-BM was conducted in 54 community living elderly with the possibilities of sarcopenia. They were recruited from several districts in Kelantan and Perak to evaluate the concurrent validity, the convergent validity, and the test-retest reliability of the PSFS-BM. These elderly were screened for any possibilities of sarcopenia by using a self-reported assessment called SARC-F. A total score equal to or greater than four is predictive of sarcopenia and at risk for adverse outcomes [19]. Notably, the target population for evaluating the concurrent validity in this study was ≥the 60-year-old elderly who could communicate and comprehend English and Bahasa Malaysia languages. This is because they were required to complete the PSFS-BM and its criterion measure, the English version of the PSFS. For the evaluation of the convergent validity and the test-retest reliability, the ≥60-year-old elderly who were screened earlier by using the SARC-F were only required to be able to speak in Bahasa Malaysia language. The exclusion criteria consist of the elderly with dementia, visual impairment, and hearing impairment. The elderly were also excluded if they were bedridden, using a wheelchair for mobility, and were categorized as Independent or slightly dependent by the Modified Barthel Index (MBI) with a score of 91-100.

The evaluation of the concurrent validity of the PSFS-BM was conducted with the English version of the PSFS as its criterion measure. The elderly was also asked to complete the PSFS-BM and the COPM to evaluate convergent validity. In addition, the data and scores of the PSFS-BM obtained at the evaluation of the convergent validity were also used as their baseline score for the test-retest reliability. Hence, they were again asked to complete the PSFS-BM, two weeks after their baseline measurements were recorded.

The ethical approval for this study was obtained from the UiTM Research Ethics Committee. The participants were carefully informed about their rights before they agree to participate in this study. All information was kept confidential by investigators and was not made public unless disclosure is required by law.

2.6 Data Analysis

The concurrent validity was examined by correlating the scores of the PSFS-BM with the scores of the English version of the PSFS. Pearson correlation coefficient was conducted to measure the strength of the linear relationship between the two quantitative variables. The strength of association was interpreted based on the criteria suggested by Cohen as follows: $r<0.3$ for weak correlation, $r=0.30$-0.49 for medium correlation, and $r>0.5$ for strong correlation [20]. There are no strict criteria available in the establishment of concurrent validity [21]. However, for the PSFS-BM to be concurrently valid with the English version of PSFS, the score of the measurements should be similar, and they should correlate strongly [21].

Convergent validity refers to how closely a new scale is related to other measures of the same construct [22]. In this study, the evaluation of the convergent validity was conducted by using the PSFS-BM and the COPM. The COPM was chosen because it has the same construct as the PSFS-BM. Both assessments are conducted via a semi-structured interview, in which the respondent are asked to identify the occupational performance they are having difficulty with. The scoring systems are also quite similar since both instruments use a continuous scale for the respondent to rate their difficulty in identified occupations or activities. To statistically analyse the convergent validity, the scores of the PSFS-BM and the COPM were examined and correlate using the Pearson correlation coefficient. The r-value was interpreted as in the concurrent validity. The accepted value for convergent validity would be 0.7 and above, as recommended in a previous study [23].

Several methods were used to examine test-retest reliability. This includes the Bland-Altman plot, the Pearson correlation coefficient, and the intraclass correlation coefficient (ICC). Firstly, the test and retest score from PSFS-BM was used to construct a Bland-Altman plot. This plot was introduced by Bland and Altman to describe the agreement between two quantitative measurements by constructing limits of agreement [24]. In the context of test-retest reliability, the resulting graph is a scatter plot XY, in which the difference between the two measurements (Time 1 – Time 2), was plotted against the average of these measures [(Time 1 + Time 2) / 2]. The Bland-Altman plot can be judge according to the scatter dispersion. The PSFS-BM score for test and retest would have a good agreement if the scattering of points is lessened, and the points lie relatively close to the line, which represents mean bias [25].

Other than that, the Pearson correlation coefficient r was also conducted to measure the strength of the linear relationship of two quantitative variables for test-retest reliability. The test and retest scores of the PSFS-BM was analysed for any correlation, and the r-value was also interpreted based on the criteria suggested [20], as in the concurrent and convergent validity.

The most desirable method was the ICC because it reflects both degrees of correlation and agreement between measurements [26]. The ICC selection process in this study is based on the published guideline [26]. The two-way mixed-effects model was selected because repeated measurements in the test-retest reliability study cannot be regarded as a randomized sample [26-27]. Since PSFS-BM is used based on a single measurement protocol, and not based on the mean of multiple measurements, the "single measurement" type is selected. For the definition, the absolute agreement was chosen because measurements would be pointless if there is no agreement between repeated measurements [26]. The following classification was used to interpret the value of ICC: <0.5, poor reliability; between 0.5 and 0.75, moderate reliability; between 0.75 and 0.9, good reliability; more than 0.9, excellent reliability [27].

After obtaining the value of ICC, the standard error of measurement (SEM) was calculated because the reliability coefficient cannot determine the effect of measurement error on the obtained test score of an individual participant. The SEM can be used as an indication of the expected measurement error in a single individual's score [29]. To obtain the value of SEM, the following formula can be utilized: $SEM = SD_{pooled} \times \sqrt{1 - ICC}$ [28-29].

Following the SEM value, the minimal detectable change (MDC) can next be calculated. The MDC calculation was included in this study because it would benefit clinicians and therapists to determine whether a change in the PSFS-BM score of an individual is a meaningful change or not. The MDC for PSFS-BM was calculated at 90% confidence interval, which is suitable for evaluating change for routine clinical use [31] and also in accordance with previous studies [29-30]. The equation used for calculation MDC90 can be expressed as $MDC_{90} = SEM \times 1.65 \times \sqrt{2}$ [30].

All statistical analyses in this study were conducted using the Statistical Package for Social Sciences version 25.

3. RESULT AND DISCUSSION

3.1 Participants

There were 30 elderly participated in the evaluation of the concurrent validity of the PSFS-BM. The elderly involved were 11 males and 19 females with the mean age of 68.0 ± 68.2 years old, ranging from 60 to 89 years old.

As for the convergent validity and the test-retest reliability, 24 elderly participated with 7 males and 17 females, precisely. Their mean age was 74.1 for males and 70.7 for females, ranging from 61 to 83 years old.

3.2 Concurrent validity

The data for concurrent validity appears to meet all of the assumptions of the Pearson correlation coefficient. There was a strong or large relative strength of association between the total score of the PSFS-BM and the total score of the English version of PSFS with Pearson's $r = 0.97$, $p<0.001$. Pearson's correlation coefficient of each activity and its total score are shown in table 1.

Table 1: Pearson correlation coefficient, for each activity and total score

Activities	Pearson correlation coefficient (r)	Strength of relationship (Cohen's)	P value
Activity 1	0.97	Strong	P < 0.001
Activity 2	0.97	Strong	P < 0.001
Activity 3	0.87	Strong	P < 0.001
Activity 4	0.98	Strong	P < 0.001
Activity 5	0.99	Strong	P < 0.001
Total Score	0.97	Strong	P < 0.001

Pearson correlation coefficient, with the r-value of 0.97, has indicated that the PSFS-BM has a strong correlation with the English version of PSFS. This value of r can be noted as a higher correlation than any other previously established concurrent validity of PSFS. In a past study, the concurrent validity of PSFS in patients with upper extremity musculoskeletal problems have been established by using two other gold-standard measurements, which were the Upper Extremity Functional Index (UEFI) and the Numeric Pain Rating Scale (NPRS) [13]. The authors found that the PSFS has a moderate correlation with UEFI and NPRS as the correlation coefficients obtained was 0.59 and 0.51, respectively [13].

The higher correlation coefficient obtained for the concurrent validity of the PSFS-BM in this study was probably due to the selection of the gold standard measurement. Since we took the measurement of the PSFS-BM with its original English version of PSFS, the correlation coefficient was near to 1 because the original English version of PSFS was not only acting as the criterion measure, but it was also in fact, the same assessment conducted in a different language.

3.3 Convergent validity

As the variables are normally distributed, the correlation analysis was conducted using Pearson's correlation coefficient. The result indicated that PSFS-BM and COPM were strongly correlated. There were two correlation coefficient produced in the evaluation of the convergent validity because we correlate the score of the PSFS-BM with the performance score and satisfaction score of COPM. Hence, the significant correlation coefficient obtained was 0.78, $p<0.001$ and 0.69, $p<0.001$ for the correlation with the performance score of COPM and satisfaction score of COPM, respectively.

This strong correlation may have occurred because both PSFS-BM and COPM-ENG have the same construct, which, in both assessments, the respondent needs to define the activities that they have issues with and rate the level of difficulty for each activity by using their respective Likert scale. Another possible explanation of the strong correlation may be related to the study sample, which was the elderly group with the possibilities of sarcopenia. The elderly population mostly have the common issues or difficulties which lead to the similar activities listed. If the study was conducted in various population, the responses would be more heterogeneous, which subsequently affect the strength of the correlation.

This strong correlation is expected, as the previous study on the English version of PSFS also yielded good convergent validity. The study conducted in patients with cervical radiculopathy produced good convergent validity between changes score of the PSFS and the Global rating of change (GROC) as the Pearson's r was 0.82 [33]. Meanwhile, the Pearson correlation coefficient between the PSFS and the Numerical Pain Rating Scale (NPRS) was found to be 0.80 [33]. However, a prior study also found a lower correlation [34]. The authors found the value of r for the correlation between PSFS with Functional Rating Index (FRI), Roland-Morris Disability Questionnaire (RMDQ), Global Perceived Effect (GPE) and Numeric Pain Rating Scale (NPRS) at baseline were -0.53, -0.51, 0.33 and -0.45, respectively [34].

3.4 Test-retest reliability

The ICC estimates and their 95% confidence intervals were calculated based on a single measurement, absolute-agreement, 2-way mixed-effects model. Test-retest reliability of the PSFS-BM was good with the ICC value of 0.84 (95%, CI = 0.66, 0.93) as shown in table 2.

Table 2: Test-retest reliability of PSFS-BM (n = 24)

	Baseline mean score (SD)	Retest mean score (SD)	ICC (95% CI)
PSFS-BM	4.55 (1.35)	4.86 (1.61)	0.84 (0.66, 0.93)

This result is supported by a previous study because the ICC value obtained was also quite similar, which showed the reliability of 0.82 when evaluated in a sample population of community-dwelling older adults [14]. The ICC value did not reach an excellent level of reliability because we did not mention the initial test score to the participants, as conducted by a prior study of the Japanese version of the PSFS with the obtained ICC value of above 0.98 [12].

The standard error of measurement (SEM) calculated for the average score of the PSFS-BM was found to be 0.6 and it quantifies measurement error in the same units as the original measurement. The minimal detectable change (MDC) at 90% confidence level for the average score of the PSFS-BM was found to be 1.4 points. This means that any changes greater than 1.4 can be viewed as evidence that a patient has achieved a meaningful change, rather than just being a change due to the error of measurement.

These findings are also supported by a previous study of the PSFS in patients with chronic low back pain, with the calculated value of SEM and MDC as 0.5 and 1.4, respectively [35].

The Bland-Altman plot showed the mean bias ± SD between PSFS-BM score for test and retest as -0.3104 ± 0.80152. The lower LoA was -1.88138 and the upper LoA was 1.260579. Two out of 24 values (8.3%) were outside the LoA. There were a total of 24 respondents involved in this phase of the study. However, two respondents obtained the same difference and mean total score of PSFS-BM, for test and retest, which makes the Bland-Altman plot looks like it only comprises of 23 values instead of 24.

Through visual judgment and assessment of the Bland-Altman plot as shown in figure 1, it can be established that the PSFS-BM score between test and retest have a good agreement because the scattering of the point is diminished and the points lie relatively close to the line which represents mean bias.

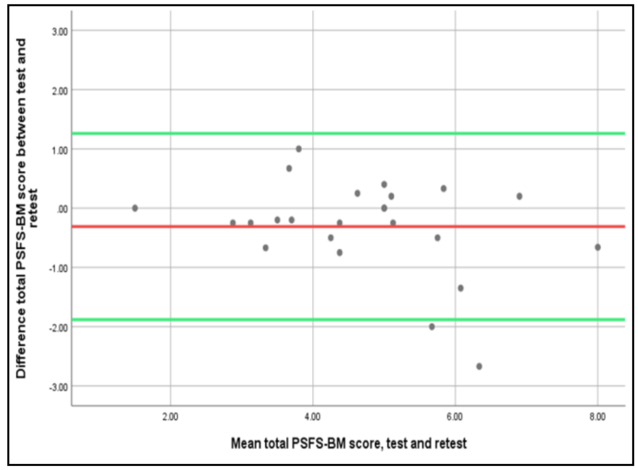

Figure 1: Bland-Altman plot for total PSFS-BM score

The advantage of using the Bland-Altman plot is that researchers can describe the agreement between two quantitative measurements by constructing limits of agreement [24]. Unfortunately, only one prior study utilized the Bland-Altman plot to assess the test-retest reliability of the PSFS [14]. In this study, the good agreement visualized through the plot is probably because the PSFS-BM is easy to be understood by the participants with patient-nominated items rather than using a fixed list of items [32].

Other than the ICC and the Bland-Altman plot, the Pearson correlation coefficient also showed strong relative strength of association between the PSFS-BM score for test and retest with Pearson's r = 0.87, p < 0.001. This strong correlation is expected as we did use the same scoring method between the initial tests and retest measurement, which were easy to be determined by the participants.

4. CONCLUSION

We evaluated the psychometric properties of the PSFS-BM. The results from this study confirmed that PSFS-BM has adequate concurrent validity, convergent validity and test-retest reliability. Hence, it can be used as an instrument for clinical and research purposes in the elderly population with the possibilities of sarcopenia.

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