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Validity and reliability of the Turkish version of the patient-specific functional scale in patients with low back pain

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ABSTRACT

Background: The Patient-Specific Functional Scale (PSFS) is among the most used measures to evaluate physical function. The PSFS has not been translated into Turkish to date. The purpose of the present study was to translate and cross-culturally adapt the PSFS into Turkish (PSFS-T) and to *assess* its reliability and validity in patients with low back pain.

Methods: A total of 105 participants completed the PSFS-T, Oswestry Disability Index (ODI), Roland-Morris Disability Questionnaire (RMDQ), and Visual Analogue Scale (VAS) for pain. Sixty-nine participants completed the PSFS-T questionnaire twice in 7 days. The internal consistency of the PSFS-T was assessed using Cronbach's alpha while the Intraclass Correlation Coefficient (ICC) was used to evaluate test-retest reliability. The convergent validity of PSFS-T was determined with ODI, RMDQ, and VAS questionnaires by using Pearson's correlation coefficient analysis.

Results: The PSFS-T demonstrated acceptable internal consistency (Cronbach's $\alpha = 0.79$) and good test-retest reliability ($ICC_{2,1} = 0.75$) with no floor or ceiling issues. The PSFS-T showed a moderate correlation with ODI (Rp =0 .49, $p<0.001$) and RMDQ (Rp =0 .46, $p<0.001$). A poor correlation was found between PSFS-T and VAS (Rp = 0.36, $p< 0.001$). Standard Error of Measurement (SEM) and Minimal Detectable Change (MDC) for the PSFS-T scores were 0.69 and 1.91 respectively

Conclusion: The Turkish version of PSFS is a valid and reliable instrument for the assessment of low back patients. It may be considered a preferable scale for clinical assessment of Turkish-speaking patients with low back pain.

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Back pain; patient-specific functional scale; outcome measures; reliability; validity

Introduction

Low back pain is a widespread problem that affects 40% of the general population. Female gender, older age, lower education, and rural areas were reported as risk factors for low back pain. Chronic low back pain is associated with significantly reduced quality of life (Husky et al., 2018). Self-report outcome measures are widely used by clinicians and researchers for evaluating the health status or outcome of treatment in patients with low back pain. Selecting the best measure is difficult given a large number of measures available (Costa, Maher, and Latimer, 2007; Grotle, Brox, and Vøllestad, 2005). The current studies and guidelines have recommended: Roland-Morris Disability Questionnaire (RMDQ); Oswestry Disability Index (ODI); Core Outcome Measure Index (COMI); and the Patient-Specific Functional Scale (PSFS) in the assessment process (Chiarotto et al., 2018; Maughan and Lewis, 2010). Limitations of condition-specific measures of disability such as the RMDQ, ODI, and the COMI are that they contain multiple items, so they are longer to complete and score, and that they can only be used for patients with low back pain (Fairbank and Pynsent, 2000; Roland and Morris, 1983). In addition, administration of some patient-reported outcome measures (i.e. ODI) verbally could be difficult due to their length and sensitive questions (e.g. sex life). In contrast, the PSFS is brief (only three items), easy to understand, comprehensive, and simple to score which addresses issues that are often missed in other outcome measures with set content (Nicholas, Hefford, and Tumilty, 2012). It is patient-generated and considers activities important at an individual level, it can be administered verbally and does not require patients to be literate (Streiner and Norman, 2003). Compared to other scales, PSFS is quite practical to fill with an average of 4 minutes duration to complete

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(Jolles, Buchbinder, and Beaton, 2005). Moreover, it can be used for a wide range of health problems such as: knee pain (Chatman et al., 1997); cervical radiculopathy (Cleland, Fritz, Whitman, and Palmer, 2006); low back pain (Pengel, Refshauge, and Maher, 2004); and neck pain (Stewart et al., 2007). Additionally, the PSFS is more responsive than other longer measures of disability in low back pain (Costa et al., 2008).

The scale was developed by Stratford, Gill, Westaway, and Binkley (1995) and the authors demonstrated that the PSFS is a valid and reliable tool for evaluating low back pain. In the PSFS, patients list three activities that they are unable to perform or are having difficulty with because of their problem and rate each of these activities on a scale of 0–10. Clinical guidelines strongly recommend using the PSFS to evaluate patients with low back pain (Costa et al., 2008; Hall et al., 2011). PSFS was validated in different languages including: Brazilian-Portuguese (Costa et al., 2008); Finnish (Lehtola et al., 2013); Japanese (Nakamaru, Aizawa, Koyama, and Nitta, 2015); Swedish (Rosengren and Brodin, 2013); and Nepali (Sharma, Palanchoke, and Abbott, 2018). To the best of our knowledge, transcultural adaptation and validation of the PSFS into Turkish in patients with low back pain have not been carried out yet. Therefore, the purpose of the present study was to translate and cross-culturally adapt the PSFS into Turkish (PSFS-T) and to assess its reliability and validity in patients with low back pain.

Methods

The required permission has been obtained from the original author of the scale (Paul Stratford) via e-mail. Ethical approval was obtained from the Noninvasive Research Ethics Committee of Aydin Adnan Menderes University (Number: 30/12/2019-E.81369) before the study and all procedures were conducted according to the Declaration of Helsinki. The signed informed consent was obtained from all participants before the study.

Patients

One hundred and five (105) patients with low back pain were recruited consecutively from outpatient physiotherapy and rehabilitation clinics. The inclusion criteria were determined as follows: age between 18 and 65; ability to read and understand the Turkish language; and presence of low back pain. Exclusion criteria were set as having: red flag medical conditions (e.g. tumors, vertebral fractures, and traumatic injuries); psychiatric disorders; undergone spinal surgery; and an ongoing physical therapy program. All patients were asked to complete the PSFS-T and Visual Analogue Scale (VAS), ODI, RMDQ at the initial assessment. Sixty-nine patients were also asked to complete the PSFS-T again 7 days after the initial assessment.

Translation and cultural adaptation process

The translation and cultural adaptation were carried out according to internationally accepted guidelines (Beaton, Bombardier, Guillemin, and Ferraz, 2000). Two independent physio-therapists who were proficient in both the Turkish and English languages translated the PSFS into the Turkish version (forward translation). Both Turkish versions of the PSFS were discussed among the two physiotherapists to obtain consensus. Backward translation of this consensus version was done by another two translators that were both unaware of the English version of the PSFS. An expert review committee including the authors, all translators, and another two experienced physiotherapists reviewed all the translations, and one pre-final version of PSFS-T was developed. This pre-final version was tested on 15 participants with low back pain to ensure all translations were clear and understandable. General impressions and feedback on the wording and instructions were gathered. All comments were evaluated by the expert committee and the final version of PSFS-T was developed without any modifications needed.

Outcome measures

Visual analogue scale (VAS)

The pain severity during rest and activity was evaluated by using a VAS (10 cm length and a horizontal line). There were two anchors in the tips of the VAS and while the zero represented "no pain," 10 indicated "worst pain." The length from zero to the marked point was recorded in cm (Karabicak et al., 2020).

Patient specific functional scale (PSFS)

PSFS was developed by Stratford et al. for evaluating patient-specific functional disability levels and have good reliability and validity. We added an example list of 20 activities to the PSFS-T to assist patients in choosing 3 activities. We chose these activities from several validated low back pain-specific questionnaires of which Turkish-language versions were available (i.e. ODI, RMDQ, Back Pain Functional Scale, JOA Back Pain Evaluation Questionnaire, and Bournemouth Questionnaire). Patients were allowed to select activities not included in the list. Patients were asked to list three activities that cause the most difficulty related to their back pain. Then, each activity was scored between 0 (unable to perform the

activity) and 10 (able to perform the activity at the same level as before the onset of symptoms) (Stratford, Gill, Westaway, and Binkley, 1995). The total PSFS-T score was determined by averaging the three activity scores. At the test-retest assessment, patients were asked again to rate each of their identified activities at the initial assessment on a separate assessment sheet.

Roland-Morris disability questionnaire (RMDQ)

The RMDQ is a 24-item patient-reported outcome measure that inquiries about pain-related disability resulting from back pain. Items are scored 0 if left blank or 1 if endorsed, for a total RMDQ score ranging from 0 to 24; higher scores reflect higher levels of pain-related disability (Roland and Fairbank, 2000). The Turkish version of the RMDQ was found to be valid and reliable (Kucukdeveci, Tennant, Elhan, and Niyazoglu, 2001).

Oswestry disability index (ODI)

ODI comprises 10 items addressing different aspects of function in patients with back pain. Each item scored from 0 to 5. The total score is calculated by multiplying the sum of the scores by 2, giving a range of 0 to 100. In the ODI, higher scores represent a worse condition (Fairbank, Couper, Davies, and O'Brien, 1980). The Turkish version of the ODI was reported to be valid and reliable (Yakut et al., 2004).

Statistical analyses

All statistical analyses were done using IBM SPSS 25 (IBM Corp., Armonk, NY, USA). Data were tested for normality using the Shapiro-Wilk test and the p-value was set at <0.05. Participants' demographics and characteristics were illustrated using descriptive statistics. Each item and total scores for the first and second completion of PSFS-T were calculated using mean and standard deviations (SD).

Reliability

Internal consistency, test-retest reliability, and measurement errors were used to determine reliability in this study. Internal consistency of the PSFS-T was assessed using Cronbach's α and α value higher than 0.8 was deemed to be good-excellent (Schellingerhout et al., 2011). Intraclass Correlation Coefficient (ICC) and Bland and Altman method were used to calculate test-retest reliability. ICC (2, 1) model was chosen as the primary reliability measure with a two-way random-effects model of variance, and absolute agreement definition reporting single measures, as participants completed the PSFS-T only once per session (Shrout and Fleiss, 1979). ICC values less than 0.5, between 0.5 and 0.75, between 0.75 and 0.9, and greater than 0.9 are indicative of poor, moderate, good, and excellent reliability, respectively (Portney and Watkins, 2009). A Bland and Altman plot was used to compare the difference in scores between the test and retest scores for each individual. It is expected that 95% of the differences to be less than two SD (Bland and Altman, 1975). A sample size of >100 subjects is considered adequate for assessing internal consistency and test-retest reliability (Mokkink et al., 2019). Measurement errors were determined by calculating the standard error of measurement (SEM) and the minimal detectable change (MDC).

Validity

Convergent validity analysis was determined by performing the Pearson correlation analysis of PSFS-T and ODI, RMDQ, and VAS. The level of correlation was interpreted as: 0–0.20 – No correlation; 0.21–0.40 – poor correlation; 0.41–0.60 – Good correlation; 0.61 to 0.80 – very good correlation; and 0.81 to 1.0 – excellent correlation (Feise and Michael Menke, 2001).

Floor and ceiling effects

Floor and ceiling effects were examined by measuring the percentages of patients with minimum scores or maximum scores on the PSFS for all three activities and total scores. If more than 15% of the respondents achieved a minimum or maximum score, floor and ceiling effects were considered present (Terwee et al., 2007).

Results

The translation and cross-cultural adaptation of the PSFS to Turkish was successfully complete. A total of 105 low back pain patients were included in this study. The demographics and clinical characteristics of the participants are summarized in Table 1. The total score of the PSFS-T was 6.01 ± 1.57 at the initial assessment and 5.59 ± 1.57 at the test-retest assessment. PSFS-T is a personalized questionnaire for low back pain and patients reported difficulties in 18 different activities. The three most frequently reported activities were lifting heavy weights (63.8%), standing (31.4%), and working routine (21%).

Reliability

Sixty-nine (69) participants who did not receive treatment were included in the test-retest analysis with an interval of 7 days. Cronbach's α for the PSFS-T was 0.79 indicating acceptable internal consistency. ICC value was 0.77 for the first activity, 0.76 for the second activity, 0.60 for the third activity, and 0.75 for the total scores,

Table 1. Description of the participants.

Variable		Value
Age (X± SD) (years)		38.63 ± 13.08
Body Mass Index (X± SD) (kg/m^2)		25.17 ± 5.12
Gender (n) (%)		
	Female	78 (74.3)
	Male	27 (25.7)
Diagnose (n) (%)		
	Lumbar disc herniation	35 (33.3)
	Mechanical back pain	27 (25.8)
	Lumbar spinal stenosis	10 (9.5)
	Sacroiliac dysfunction	10 (9.5)
	Spondylolysis	9 (8.6)
	Other	14 (13.3)
Pain duration (n) (%)		
	0–6 week	29 (27.6)
	6–12 week	11 (10.5)
	>12 week	65 (61.9)
Employment Status (n) (%)		
	Employed	65 (61.9)
	Retired	8 (7.6)
	Housewife	7 (6.7)
	Student	25 (23.8)
Smoking (n) (%)		
	Yes	36 (34.3)
	No	69 (65.7)
Questionnaire scores (X± SD)		
	PSFS-T	6.01 ± 1.57
	ODI	33.69 ± 16.19
	RMDQ	9.63 ± 6.13

indicating moderate reliability. Test-retest results, ICC scores, Confidence Intervals (CI) are summarized in Table 2. The Bland-Altman plot is shown in Figure 1. SEM and MDC for the PSFS-T scores were 0.69 and 1.91, respectively.

Validity

A moderate correlation was found between PSFS-T and ODI (Rp =0.49, p< 0.001) and RMDQ (Rp =0 .46, p<0 .001). The PSFS-T showed a poor correlation with VAS (Rp = .36, p <0 .001).

Floor and ceiling effects

No significant floor or ceiling effects were found for each activity and the total PSFS-T score (Table 3).

Discussion

The present study aimed to translate and culturally adapt the PSFS into Turkish and to assess its reliability and validity in patients with back pain. Translation and cross-cultural adaptation were completed, and analyses showed that the PSFS-T is a valid and reliable measurement tool for Turkish-speaking patients with low back pain.

PSFS is a person-specific measurement tool that patients list three activities that are most affected by their conditions and rate each of these activities on a scale of 0–10 (Stratford, Gill, Westaway, and Binkley, 1995). Cleland, Fritz, Whitman, and Palmer (2006) listed the most reported activities for neck pain using the PSFS as: driving a car (50%); sleeping (50%); and using the computer (40%). Gross, Battié, and Asante (2008) reported the most difficult activities for various musculoskeletal disorders using the PSFS as: lifting (20%); household chores (15%); and sports (14%). In the present study, lifting heavy weights (63.8%), standing (31.4%), and working routine (21%) were reported as difficult activities related to back pain. Fairbairn et al. (2012) reported that 2911 different activity items were collected via PSFS, and they suggested that these items were 100% matched with the International Classification of Functioning Disability and Health (ICF). These results reveal that PSFS might be able to cover the ICF which aims to build a common language system for health.

Internal consistency of PSFS-T was acceptable and good with Cronbach's α = 0.79, which is comparable with previous studies with values ranging from 0.75 to 0.90 (Beaton, Bombardier, Guillemin, and Ferraz, 2000; Sharma, Palanchoke, and Abbott, 2018). The test-retest reliability of the PSFS-T was good with (95% confidence interval 0.75). Where previous studies reported higher ICC values ranging from 0.79 to 0.98 (Beaton, Bombardier, Guillemin, and Ferraz, 2000; Nakamaru, Aizawa, Koyama, and Nitta, 2015; Rosengren and Brodin, 2013; Sharma, Palanchoke, and Abbott, 2018). The test-retest duration vary which may explain the differences in ICC

Table 2. Test-retest reliability of PSFS-T.

	Initial assessment (X± SD)	Retest assessment (X± SD)	$ICC_{2,1}$ (95% CI)	SEM	MDC_{95}
First activity	6.27 ± 1.87	5.30 ± 1.81	0.77 (0.61–0.86)	0.84	2.32
Second activity	5.88 ± 1.83	5.65 ± 1.90	0.76 (0.59–0.85)	0.85	2.35
Third activity	5.87 ± 1.90	5.84 ± 1.62	0.60 (0.36–0.75)	1.17	3.24
PSFS-T total score	6.01 ± 1.57	5.59 ± 1.57	0.75 (0.59–0.84)	0.69	1.91

PSFS: Patient-Specific Functional Scale-Turkish version, $ICC_{2,1}$: Intraclass Correlation Coefficient (Two-way mixed), SEM: Standard Error of Measurement, MDC: Minimal Detectable Change.

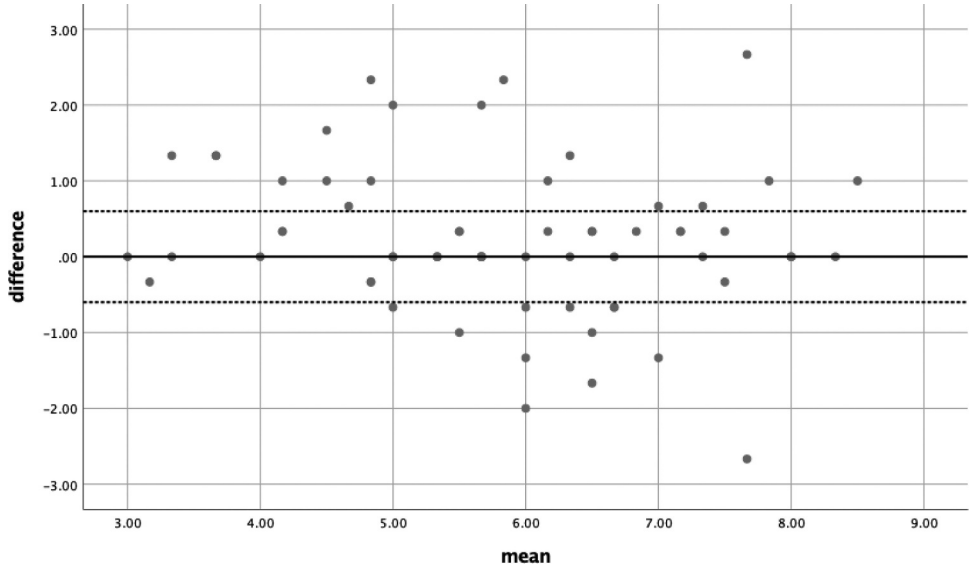


Figure 1. Bland-Altman plot illustrating the test-retest reliability of the PSFS-T. The central line represents the mean difference between test and retest scores, and the outer reference lines represent the 95% limits of agreement.

Table 3. Floor and ceiling effects of PSFS-T.

PSFS-T	Floor-ceiling effect
First activity	0%–1.9%
Second activity	0%–1.0%
Third activity	0%–5.7%
PSFS-T total score	0%–1.0%

PSFS-T: Patient-Specific Functional Scale-Turkish version.

values obtained. The test-retest interval was 15 minutes for the: Finnish version (Lehtola et al., 2013); 24 hours for the Brazilian-Portuguese version (Costa et al., 2008); 7 days for the Japanese version (Nakamaru, Aizawa, Koyama, and Nitta, 2015); and 2 weeks for Nepali version (Sharma, Palanchoke, and Abbott, 2018). In the present study, we selected a 7-day time interval for test-retest reliability. In addition to this, we did not give any baseline information to the patients on the second assessment, which may have decreased the reliability. In the Japanese version, test-retest reliability evaluates whether the same results are obtained when repeated responses are provided by patients with stable conditions on the patient's global impression of change scale (Nakamaru, Aizawa, Koyama, and Nitta, 2015). Another possible reason for the lower ICC values is that low back pain complaints may change in a short time for patients with acute pain which may lead to fluctuation in the scores of participants. Young, Cleland, Michener, and Brown (2010) reported a very low test-retest value (ICC: 0.17) for the PSFS. They concluded that ICC scores may be affected by the dynamic symptom distribution of the tested population. The results of SEM in this study were similar to other studies, which reported at 0.69–1.17 (Nakamaru, Aizawa, Koyama, and Nitta, 2015; Sharma, Palanchoke, and Abbott, 2018). Our study found that the MDC value of the PSFS-T was comparable with previous studies.

The convergent validity of PSFS-T was measured by correlating the PSFS-T scores with the ODI, RMDQ, and VAS. According to the statistical analysis result, PSFS-T showed a moderate correlation with ODI and RMDQ, which is consistent with previous studies (Costa et al., 2008; Sharma, Palanchoke, and Abbott, 2018; Stratford, Gill, Westaway, and Binkley, 1995). However, a poor correlation was found between PSFS-T and VAS. These results were lower than the Brazilian-Portuguese version study (Costa et al., 2008) and consistent with the Nepali version study (Sharma, Palanchoke, and Abbott, 2018). We postulate that patients having back pain do not only suffer from pain but also functional disability and that is why VAS was not sensitive enough to show the symptoms of the patients (Sharma, Palanchoke, and Abbott, 2018). That was the main reason why we used both ODI and RMDQ to show the validity of PSFS-T.

Floor and ceiling effects were considered present if more than 15% of the patients received the minimum or maximum scores, respectively (Terwee et al., 2007). No floor and ceiling effects were observed in this study similar to the findings of the: Japanese (Nakamaru, Aizawa, Koyama, and Nitta, 2015); Brazilian (Costa et al., 2008);

and Arabic versions (Alnahdi et al., 2021). The absence of floor or ceiling effect confirms the reliability and content validity of the Turkish version of the PSFS.

Patient-reported outcome measures (PROM) and performance-based functional tests have been extensively used in the field of rehabilitation science (Bobos, MacDermid, Nazari, and Furtado, 2019; Bobos, Nazari, Lu, and MacDermid, 2020; Nazari et al., 2020a; Nazari, Lu, and MacDermid, 2020b). The PSFS is a PROM that assesses primarily the functional change in patients with musculoskeletal injuries/disorders. The primary purpose of the PSFS questionnaire usage is to determine how patients perceive functional loss and how reliable and valid it is in detecting the loss of function in the patients, rather than detecting pathology-specific loss of function. Therefore, in some of the adaptation and validation studies of PSFS in other languages, a body region was selected and included all patients who had a loss of function in that region, regardless of pathology. Nakamaru, Aizawa, Koyama, and Nitta (2015) measured the responsiveness, validity, and reliability of the Japanese version of PSFS in neck patients and included 103 patients with neck pain. In addition, Alnahdi et al. (2021) examined the cultural adaptation and measurement properties of the Arabic version of PSFS in patients with lower extremity musculoskeletal problems. In that study, 116 patients who had hip, knee, and ankle problems separately or together were included. In addition to these studies, 104 individuals with musculoskeletal pain participated in the Nepali version of PSFS, which was reported by Sharma, Palanchoke, and Abbott (2018). These individuals felt pain in the low back, knee, shoulder, neck, and elbow regions were included in the study regardless of pathology and region. In our study, we included patients with different pathologies suffering from low back pain to select a population similar to other studies. However, conducting a study in which a special pathology group will make a different contribution to the literature.

To the best of our knowledge, this study is the first to culturally adapt the PSFS into a Turkish language and evaluate its reliability and validity in patients with low back pain. However, the present study has several limitations that should be pointed out. The lack of responsiveness analysis is one of the limitations of this study and it should be analyzed in future research. Factor analysis was also not evaluated in the present study. Finally, the order of administration of the questionnaires was not randomized. The fact that the first filled questionnaires are long may have affected the motivation of the patients.

Conclusion

The PSFS has been successfully translated and cross-culturally adapted into Turkish. The PSFS-T is a reliable and valid measurement tool of pain and functional ability in Turkish-speaking patients with low back pain. It is short, easy to apply, and needs a short time to complete. So, it may be considered as a preferable scale for clinical and research settings.

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