ORIGINAL RESEARCH   ORİJİNAL ARAŞTIRMA

Turkish Adaptation, Validity and Reliability of the Subjective Index of Physical and Social Outcome (SIPSO)

Subjektif Fiziksel ve Sosyal Sonuç İndeksi'nin (SIPSO) Türkçe Adaptasyonu, Geçerlilik ve Güvenilirliği

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ABSTRACT Objective: The Subjective Index of Physical and Social Outcome (SIPSO) has been reported as a valid and reliable tool for measuring the level of community integration in stroke survivors. This study aims to adapt the SIPSO into the Turkish language and to test its reliability and validity in stroke survivors by using modern psychometric analysis (Rasch analysis). **Material and Methods:** The cross-cultural adaptation was performed according to the current recommendations. Internal construct validity was assessed by Rasch analysis, reliability by internal consistency and Person Separation Index (PSI). External construct validity was evaluated by analyzing correlations between the SIPSO and the Beck Depression Scale (BDS), Mini Mental Test, Functional Independence Measure (FIM), Barthel Index (BI), Functional Ambulation Scale (FAS), Rivermead Mobility Index (RMI), and the Stroke Impact Scale 3.0 (SIS 3.0). Test-retest reliability was assessed by intraclass correlation coefficient and Rasch analysis. **Results:** A total of 179 community-dwelling stroke survivors were included. Internal consistency of the SIPSO physical subscale showed good to excellent results with Cronbach's α of 0.92 and PSI of 0.95. The internal consistency of the SIPSO social subscale showed good to excellent with Cronbach's α and PSI of 0.86. External construct validity was highly correlated with BDS, FIM, BI, FAS, RMI, and the SIS 3.0 scales (p<0.001). **Conclusion:** The Turkish version of the SIPSO is a valid and reliable scale for measuring activities and participation in patients with stroke.

Keywords: Rasch analysis; stroke; outcome measures;
                 validity; reliability

ÖZET Amaç: Subjektif Fiziksel ve Sosyal Sonuç İndeksi [Subjective Index of Physical and Social Outcome (SIPSO)], inme hastalarında topluma adaptasyon düzeyini ölçmek için geçerli ve güvenilir bir araç olarak rapor edilmiştir. Bu çalışma, SIPSO'nun Türkçeye uyarlanmasını ve modern psikometrik analiz (Rasch analizi) kullanarak inme geçiren hastalarda güvenilirliğini ve geçerliliğini test etmeyi amaçlamaktadır. **Gereç ve Yöntemler:** Kültürlerarası adaptasyon, güncel önerilere göre yapıldı. İç yapı geçerliliği Rasch analizi, güvenilirlik iç tutarlılık ve Kişiden Ayrılma İndeksi [Person Separation Index (PSI)] ile değerlendirildi. Dış yapı geçerliliği, SIPSO ile Beck Depresyon Ölçeği [Beck Depression Scale (BDS)], Mini Mental Test, Fonksiyonel Bağımsızlık Ölçeği [Functional Independence Measure (FIM)], Barthel İndeksi [Barthel Index (BI)], Fonksiyonel Ambulasyon Ölçeği [Functional Ambulation Scale (FAS)], Rivermead Mobilite İndeksi [Rivermead Mobility Index (RMI)] ve İnme Etki Ölçeği 3.0 [Stroke Impact Scale 3.0 (SIS 3.0)] arasındaki korelasyonlar analiz edilerek değerlendirildi. Test tekrar test güvenilirliği, sınıf içi korelasyon katsayısı ve Rasch analizi ile değerlendirildi. **Bulgular:** Toplumda yaşayan toplam 179 inme hastası dâhil edildi. SIPSO fiziksel alt ölçeğinin iç tutarlılığı, Cronbach's α 0,92 ve PSI 0,95 ile mükemmel sonuç gösterdi. SIPSO sosyal alt ölçeğinin iç tutarlılığı, Cronbach's α ve PSI 0,86 ile mükemmel sonuç gösterdi. Dış yapı geçerliliği, BDS, FIM, BI, FAS, RMI ve SIS 3.0 ölçekleri ile yüksek düzeyde korele idi (p<0,001). **Sonuç:** SIPSO'nun Türkçe versiyonu inmeli hastalarda aktivite ve katılımı ölçmek için geçerli ve güvenilir bir ölçektir.

Anahtar Kelimeler: Rasch analizi; inme; sonuç ölçütleri;
                        geçerlilik; güvenilirlik

Stroke is one of the leading causes of disability worldwide.[1] It not only leads to physical impairments, but also causes dependency in daily living activities and deterioration in social participation.[2] The World Health Organization published the International Classification of Functioning, Disability and Health (ICF), an "international classification of function, disability and health" to make standardized functional assessments and to create a common terminology. The ICF describes 3 functional levels which are body functions and structures, activities, and participation.[3] Despite being handled in the same category, activity and participation are 2 separate assessment criteria. All evaluation scales in neurologic rehabilitation are assessed based on the ICF basic structural model.

The main goal of stroke rehabilitation is adaptation of individuals to the society and enhance their participation in social life. However, since social participation is a novel concept worldwide, it is evaluated less frequently compared to body structure, functions, and activities. Therefore, it is of great importance to choose the scale for evaluation of social participation in patients with stroke. When the literature is reviewed, it is seen that there are several studies on functional impairments and activity limitation, and several tools have been developed to determine these disabilities, whereas adequate attention was not paid for comprehensive evaluation of the social participation.[4-8]

The Subjective Index of Physical and Social Outcome (SIPSO) which is among the scales to assess post-stroke physical and social participation in public life was developed by Trigg et al. England.[9] The SIPSO is an easily applicable, short-lasting, useful tool to evaluate participation of individuals with functional disability due to stroke in their daily and social lives. It was specifically developed for stroke patients and it involves activity and participation categories of the ICF.[10] The SIPSO was adapted to Chinese and its validity and reliability was proven.[11]

This study aims to create Turkish version of the SIPSO and determine its validity and reliability in stroke patients.

MATERIAL AND METHODS

ADAPTATION PROCEDURE

Prior to the study, a permission for the adaptation process was obtained from Dr. Richard Trigg, inventor of the scale, via an e-mail. For the translation procedure, the guideline by Beaton et al. was followed.[12] First at all, three bilingual persons whose native language is Turkish (two rehabilitation specialists and one translator) independently translated the scale into Turkish (initial translation). A common translation text was formed by eliminating some inconsistencies to enhance understandability by the translators (synthesis of the translations). The term "moving around all areas of the home" in the second question roof was translated as "walking around the house". The expression "move around your local neighbourhood" in the fifth question roof was translated as "moving around your close neighborhood". The term "how satisfied are you with the level of interests and activities you share with your friends/associates" in the sixth question roof was rearranged expanding the "friends/associates" as "neighbors/relatives/family", and "activities" as "going out, gardening, and going out for worship".

The Turkish version of the SIPSO was re-translated into English (back translation) by two native English people with fluent Turkish who did not have knowledge about the original version of the SIPSO and any medical background. The original and back translation texts were compared and a Turkish preform (prefinal version) was created to eliminate all inconsistencies between the original and re-translated versions by making necessary alterations by an expert panel comprising of two physical medicine and rehabilitation specialists. The pre-final version was administered to 30 patients with stroke to test for its clarity (test of the prefinal version). Patients were asked what they thought about the questions and feedback was obtained on how the questions could be improved. Afterwards, the scale was assessed by the panel in terms of understandability and the final version was formed to be tested on patients. These procedures enabled the test easily applicable on stroke patients.

PARTICIPANTS

Inclusion criteria:

1. Diagnosis of stroke due to a vascular lesion by means of clinical assessment and computerized tomography and/or magnetic resonance imaging of the brain,

2. Male and female patients aged 18-80 years with stable medical status who had a stroke at least 6 months before enrollment, 3. Patients who were discharged from the hospital and returned to the social life (community dwelling).

Exclusion criteria:

1. Severe cognitive impairment abstaining the patient from understanding and answering the questionnaire,

2. Other neurologic disorders except the stroke,

3. Transient ischemic attack,

4. Non-vascular stroke (e.g. traumatic brain injury, brain tumor, infections),

5. Patients with Mini Mental Test (MMT) scores above 15 points,

6. Aphasia,

7. Anosognosia or neglect phenomenon,

8. Visual or hearing loss,

9. Patients whose native language is not Turkish.

ASSESSMENT PROCEDURE

This study included a total of 179 stroke patients followed in Kırıkkale University Faculty of Medicine, Physical Medicine and Rehabilitation Department. The ethics committee approval was obtained from Kırıkkale University Non-Interventional Studies Ethics Committee with date and number of March 20, 2019 and 2019.03.05 and followed all relevant dictates of the Helsinki Declaration. All participants filled written informed consents. All scales were performed by the same researcher using the face-to-face technique. To determine the test-retest reliability of the SIPSO, 45 patients were re-administered the scale 2 weeks later and the aggreement between these measurements was evaluated. The period of time between the two tests was determined as to diminish the clinical changes and the risk to remember the prior responses.

DEMOGRAPHIC AND CLINICAL VARIABLES

The demographic data including age, gender, marital status, occupation, and the body mass index were recorded. Clinical data including Brunnstrom stage, time from the stroke, type of the lesion (ischemic/hemorrhagic), dominant extremity, hemiplegic side, smoking or alcohol consumption, work status after stroke, caregivers and the household, level of mobility, use of out-of-home assistive devices or orthoses were noted.

OUTCOME MEASURES

The cognitive status was evaluated using the MMT. The Beck Depression Scale (BDS) was employed to determine the emotional status. The Functional Independence Measure (FIM) and Barthel Index (BI) were used to evaluate functionality. Ambulation was evaluated using the Functional Ambulation Scale (FAS) and Rivermead Mobility Index (RMI). Daily living activities and quality of life were assessed using the Stroke Impact Scale 3.0 (SIS 3.0). Turkish version of the SIPSO scale adapted from its original version was used for assessment of social participation.

The SIPSO has two sub-scales; physical and social. The scale consists of 10 items with 5 point-Likert scales for each item. Items 1-5 and 6-10 constitute the physical and social sub-scales respectively. The physical sub-scale evaluates physical functions and mobility while the social sub-scale assesses social functions and emotional state. All sub-scales range from 0-20 points leading to a sum of 0-40 pts. The higher scores indicate increased participation in social life both physically and socially.[10] The scale may be filled by the patient himself or administered by a researcher.

Brunnstrom grading is a 6-stage specific examination method to evaluate the motor recovery of patients with stroke. It is assessed for the hand, upper extremity, and the lower extremity. Higher scores indicate better motor development and recovery.[13]

The BDS is a 21-item scale to evaluate the emotional state of patients. Higher results correspond to more depressive mood.[14]

The FIM is a comprehensive scale evaluating motor (self-care, sphincter control, transfer, locomo-

tion, ladder) and cognitive (communication and social cognition) functions. Higher scores indicate increasing functional independency status.[15]

The BI is a 10-item scale assessing independency of patients with stroke regarding mobility and dailiy living activities. Increasing scores indicate higher functional independency.[16]

The FAS evaluates the ability of ambulation. Zero corresponds to bed level while 5 corresponds to complete independency for ambulation.[17]

The RMI is a scale developed for determination of mobility in stroke patients. Higher scores indicate higher mobilization.[18]

The SIS is a multi-dimensional scale to assess the quality of life after stroke. It consists of sub-scales such as strength, hand function, daily living activities, mobility, communication, emotion, memory, and social participation.[19]

STATISTICAL ANALYSIS

The psychometric properties for the physical and social subscales of SIPSO were evaluated through both internal and external construct validity.

Internal construct validity of the SIPSO was assessed by fit of the data to the Rasch model.[20] As the categories of SIPSO are polytomous, partial credit model was selected for the analyses. The Rasch analysis includes the following sequential steps.[21,22]

Rescoring of SIPSO items that demonstrated "disordered thresholds".

Firstly, items showing "disordered thresholds" were identified from the threshold map. Disordered thresholds were corrected by collapsing adjacent response categories for the problematic items.

Deletion of the misfitting items, analysis for overall model and individual item fit.

After all items showed orderly thresholds, individual items were deleted one at a time and overall fit was reexamined after each item deletion. Fit was determined by a number of fit statistics. At the scale level, summary fit statistics included item- and person-residuals which, with perfect fit, would have a mean of zero, and a standard deviation of 1. A chi-square interaction fit statistic should be non-signifi-cant, to show lack of deviation from model expectations. At the individual item level, fit residuals should be between ±2.5; and chi square statistics should be non-significant (>0.05 Bonferroni adjusted).

Examination for differential item functioning (DIF) for gender, age and topography.

DIF, examined for gender (male/female), age (<=65/>65) and education (illiterate, primary school, middle school, high school and university), duration of stroke (<=6, 7-13, 14-36, >36 months) should show nonsignificant differences between groups (Bonferroni adjusted).

Test for unidimensionality and local dependency.

To test unidimensionality, the sample is divided into class intervals. For each item, the degree of similarity between the observed responses in each class interval and the expected responses predicted by the model is computed through a standardized residual and a c^2 fit statistic. The assumption of local independency was tested by inspection of residual correlation matrix. If a pair of items had a residual correlation of 0.30 or more, one of the items that showed a higher accumulated residual correlation with the remaining items was eliminated.

External construct validity for the physical and social subscales of SIPSO was assessed by testing for expected associations of Rasch transformed SIPSO score with scores from BDS, FAS, RMI, BI, SIS 3.0 ve FIM scales through the process of convergent construct validity. The degree of associations with these outcome measures was analyzed by Spearman's correlation coefficient.

The reliability of the SIPSO was examined by both internal consistency and test-retest reliability. An estimate of the internal consistency reliability of the SIPSO was tested by Person Separation Index (PSI).[23] This is equivalent to Cronbach's alpha but has the linear transformation from the Rasch model.[24] The acceptable values of PSI vary depending on the number of groups to be statistically differentiated. While 0.70 value is acceptable for two groups, this value is 0.90 for 4 groups. For test-retest reliability of SIPSO, intraclass correlation coefficient (ICC) (with its 95% confidence interval) between first and second assessment Rasch scores was calculated.

Data were analyzed using a Rasch-Model Computer program RUMM2020 (David Andrich, Australia).[25]

RESULTS

A total of 179 patients with stroke were enrolled. The mean age was 62.54±10.31 years and the mean disease duration was 28.78±34.31 months. Of the patients, 87 (48.6%) were women and 92 (51.4%) were men. Ninety nine (55.3%) were below 65 years, while 80 (44.7%) were above 65 years. The demographic and clinical characteristics of patients were given in Table 1 and scores of scales employed were presented in Table 2.

INTERNAL CONSTRUCT VALIDITY

"SIPSO-Physical" Subscale

After collapsing categories of item 5 that had disordered thresholds, all items were found to fit the model (Table 3). Overall mean item fit residual was 0 [standard deviation (SD) 1.904] and mean person fit residual was 0.399 (SD 3.699). Item-trait interaction was non-significant, supporting the invariance of items (chi-square 19.39, p=0.04).

When the internal consistency reliability of SIPSO-physical subscale was examined, the PSI and Cronbach's a were good (0.95 and 0.92, respectively) indicating the ability of the scale to differentiate between 4 groups of patients. When the reliability was examined in terms of test-retest reliability, ICC was obtained as 0.980 (95% confidence interval: 0.965-0.989). None of the items showed DIF by the mentioned variables given in statistical analysis.

All 5 items define a unidimensional scale for the SIPSO'physical subscale since there were no significant differences between observed and expected scores in terms of p values. When the assumption of local independence was examined, there was no pair of items which had a residual correlation of 0.30 or more.

Overall, the targeting of the final 5-item subscale was shown in Figure 1 that shows that patients on average have lower "physical disability" levels (mean person score: 0.399) than the average difficulty of the subscale items (mean item score: 0).

TABLE 1: Demographic and clinical characteristics of patients (n=179).	
Variables	**X̄±SD (minimum-maximum)**
Age (years)	62.54±10.31 (32-80)
Time from stroke (months)	28.78±34.31 (6-192)
	n (%)
Gender (female/male)	87 (48.6%)/92 (51.4%)
Age (≤65/>65)	99 (55.3%)/80 (44.7%)
Marital status	
Married	148 (82.7%)
Single/divorced	31 (17.3%)
Educational status	
Illiterate	35 (19.6%)
Primary school (5 years)	77 (43%)
Primary school (8 years)	30 (16.8%)
High school and university (11 years)	37 (20.6%)
Type of lesion	
Ischemic	143 (79.9%)
Hemorrhagic	36 (21.11%)
Side of stroke	
Left hemiplegia	86 (48.0%)
Right hemiplegia	93 (52.0%)
Employment status after stroke	
Patients who did not work actively before stroke	149 (83.2%)
Still work same hours	4 (2.2%)
Reduced hours or changed job	9 (5.0%)
Give up working	17 (9.4%)
Level of mobility	
Able to walk 10 m and able to walk outside without help	95 (53.1%)
Able to walk 10 m but unable to walk outside without help	50 (27.9%)
Unable to walk 10 meters (or outside)	34 (19.0%)
Support outside	
Wheelchair	33 (18.4%)
Assistive device (cane, tripod, walker)	97 (54.1%)
No support	49 (27.4%)

SD: Standard deviation.

"SIPSO-Social" Subscale

After collapsing categories of item 8 that had disordered thresholds, all items were found to fit the model (Table 4). Overall mean item fit residual was 0 (SD 0.463) and mean person fit residual was 0.784 (SD 1.737). Item-trait interaction was non-significant, supporting the invariance of items (chi-square 18.32, p=0.05).

When the internal consistency reliability of SIPSO-social subscale was examined, the PSI and Cronbach's a were good with 0.86 indicating the abil-

TABLE 2: Mean±SD, minimum-maximum scores of evaluation scales.		
Scales	**X̄±SD**	**Minimum-maximum**
MMT	21.84±3.54	16-30
BDS	19.53±12.74	3-57
BI	66.59±31.54	0-100
RMI	9.56±4.68	1-15
FAS	3.19±1.79	0-5
SIS-strenght	59.39±26.62	20-100
SIS-memory	78.10±19.38	28-100
SIS-emotion	64.70±15.89	35-97
SIS-communication	80.36±21.20	31-100
SIS-daily living activities	62.58±22.50	24-100
SIS-mobily	69.69±27.17	20-100
SIS-hand functions	52.53±30.60	20-100
SIS-social participation	56.55±22.73	18-100
SIS-recovery	54.05±26.81	10-100
SIS-total score	65.89±20.16	22-98
FIM-self care	25.61±10.81	6-42
FIM-sphincter control	11.22±3.66	2-14
FIM-transfer	14.20±6.10	2-21
FIM-locomotion	9.33±3.99	2-14
FIM-communication	11.47±3.03	3-14
FIM-social participation	15.35±4.75	3-21
FIM-motor score	60.46±23.61	14-91
FIM-cognitive score	26.84±7.58	7-35
FIM-total score	86.74±30.97	11-126

SD: Standard deviation; MMT: Mini Mental Test; BDS: Beck Depression Scale; BI: Barthel Index; RMI: Rivermead Mobility Index; FAS: Functional Ambulation Scale; SIS: Stroke Impact Scale; FIM: Functional Independence Measure.

ity of the scale to differentiate between 3 groups of patients. When the reliability was examined in terms of test-retest reliability, ICC was obtained as 0.964 (95% confidence interval: 0.936-0.980). None of the items showed DIF by the mentioned variables given in statistical analysis.

All 5 items define a unidimensional scale for the SIPSO-social subscale since there were no significant differences between observed and expected scores in terms of p values. When the assumption of local independence was examined, there was no pair of items which had a residual correlation of 0.30 or more.

Overall, the targeting of the final 5-item subscale was shown in Figure 2 that shows that patients on average have lower "social disability" levels (mean person score: 0.784) than the average difficulty of the subscale items (mean item score: 0).

EXTERNAL CONSTRUCT VALIDITY

The correlations between SIPSO physical and social sub-scales and the BDS, BI, RMI, FAS, FIM, and SIS 3.0 were presented in Table 5. Strong correlations were detected between the SIPSO physical and social sub-scales, and total and sub-dimensional scores of all other scales (p<0.001).

SIPSO physical and social sub-scales had strong correlations with all SIS sub-dimensions and FIM-sub-dimensions (p<0.001) (Table 6).

DISCUSSION

The Turkish adaptation of the SIPSO resulted in good reliability, internal and external construct validity, which supports its use as a measure of participation in community-living stroke patients in Türkiye. Reliability and validity results are in concordance with previous reports.

Rasch analysis, a modern psychometric method, have been widely used in development and evaluation of scales in the rehabilitation field.[26] We used the

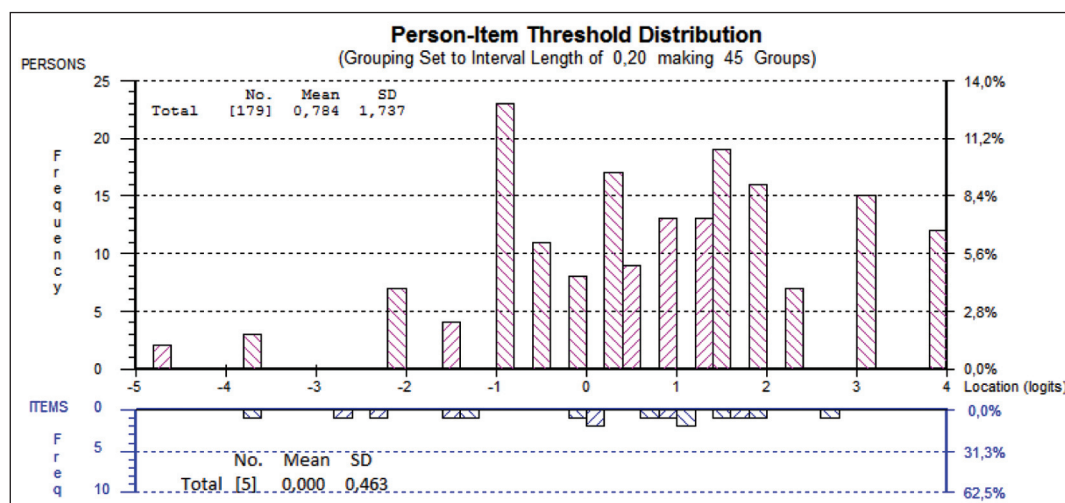| **TABLE 3:** Fit of SIPSO-physical subscale to Rasch model.					
Item	**Location**	**Standard error**	**Individual item fit residual**	**Chi-square test statistics**	**p value**
Since your stroke, how much difficulty do you have dressing yourself fully?	0.624	0.142	1.268	1.536	0.464
Since your stroke, how much difficulty do you have moving around all areas of the home?	-2.918	0.237	-1.378	3.641	0.162
Since your stroke, how satisfied are you with your averall ability to perform daily activities in and around the home?	0.765	0.157	2.299	9.216	0.010
Since your stroke, how much difficulty do you have shopping for and carrying a few items (1 bag of shopping or less) when at the shops?	2.151	0.166	-1.613	4.027	0.134
Since your stroke, how much independent are you in your ability to move around your local neighbourhood?	-0.621	0.141	-1.505	0.975	0.614

SIPSO: Subjective Index of Physical and Social Outcome.
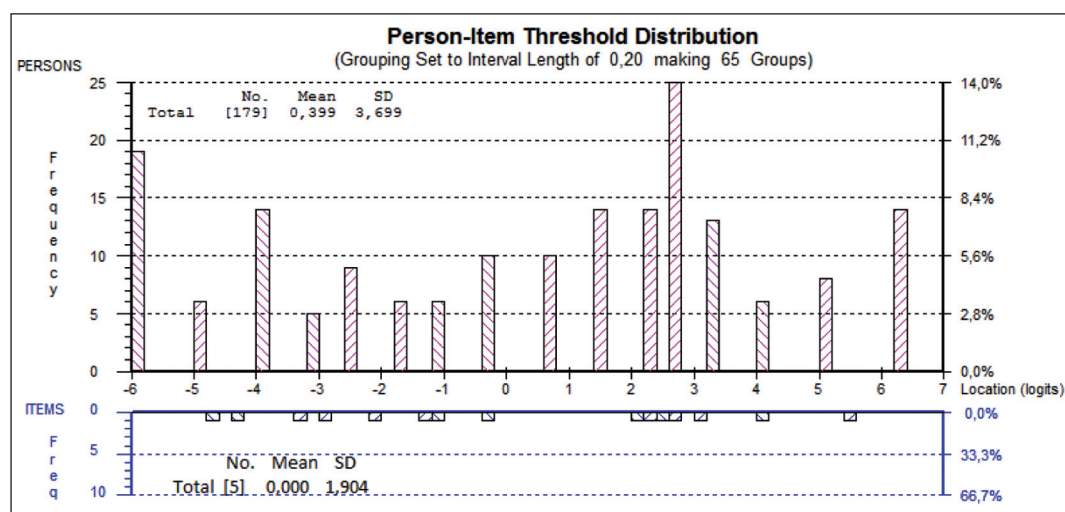
FIGURE 1: Targetting of SIPSO-physical subscale to patients.
SIPSO: Subjective Index of Physical and Social Outcome; SD: Standard deviation.

Item	Location	Standard error	Individual item fit residual	Chi-square test statistics	p value
TABLE 4: Fit of SIPSO-social subscale to Rasch model.					
Since your stroke, how often do you feel bored with your free time at home?	0.285	0.129	0.958	2.028	0.363
Since your stroke, how would you describe the amount of communication between you and your friends/associates?	-0.759	0.127	-0.138	3.812	0.149
Since your stroke, how satisfied are you with the level of interests and activities you share with your friends/associates?	0.157	0.098	-1.146	3.114	0.211
Since your stroke, how often do you visit friends/others?	0.408	0.114	-1.252	5.855	0.054
Since your stroke, how do you feel about your appearance when out in public?	-0.091	0.111	0.323	3.506	0.173

SIPSO: Subjective Index of Physical and Social Outcome.

FIGURE 2: Targetting of SIPSO-social subscale to patients.
SIPSO: Subjective Index of Physical and Social Outcome; SD: Standard deviation.

TABLE 5: The correlation of physical and social sub-scales of the SIPSO and BDS, BI, RMI, and FAS.

	SIPSO-physical sub-scale		SIPSO-social sub-scale	
	r value	p value	r value	p value
BDS	-0.648	0.000*	-0.740	0.000*
BI	0.933	0.000*	0.859	0.000*
FAS	0.915	0.000*	0.826	0.000*
RMI	0.920	0.000*	0.856	0.000*

r: Correlation coefficient; *high correlation; p<0.001; SIPSO: Subjective Index of Physical and Social Outcome; BDS: Beck Depression Scale; BI: Barthel Index; RMI: Rivermead Mobility Index; FAS: Functional Ambulation Scale.

TABLE 6: The correlation of physical and social sub-scales of the SIPSO and SIS sub-dimensions and the FIM-sub-dimensions.

	SIPSO-physical sub-scale		SIPSO-social sub-scale	
	r value	p value	r value	p value
SIS-strengtht	0.906	0.000*	0.827	0.000*
SIS-memory	0.762	0.000*	0.772	0.000*
SIS-emotion	0.721	0.000*	0.750	0.000*
SIS-communication	0.747	0.000*	0.769	0.000*
SIS-daily living activities	0.901	0.000*	0.821	0.000*
SIS-mobily	0.922	0.000*	0.816	0.000*
SIS-hand functions	0.851	0.000*	0.806	0.000*
SIS-social participation	0.791	0.000*	0.788	0.000*
SIS-recovery	0.824	0.000*	0.836	0.000*
SIS-total score	0.939	0.000*	0.893	0.000*
FIM-self care	0.928	0.000*	0.839	0.000*
FIM-sphincter control	0.859	0.000*	0.817	0.000*
FIM-transfer	0.877	0.000*	0.762	0.000*
FIM-locomotion	0.884	0.000*	0.777	0.000*
FIM-communication	0.786	0.000*	0.761	0.000*
FIM-social participation	0.841	0.000*	0.845	0.000*
FIM-motor score	0.940	0.000*	0.828	0.000*
FIM-cognitive score	0.843	0.000*	0.839	0.000*
FIM-total score	0.923	0.000*	0.842	0.000*

r: Correlation coefficient; *high correlation; p<0.001; SIPSO: Subjective Index of Physical and Social Outcome; SIS: Stroke Impact Scale; FIM: Functional Independence Measure.

Rasch analysis for psychometric assessment of sub-scales of the SIPSO in the current study.

In our study, when the compatibility of the SIPSO with Rasch model was evaluated using the category combination method, all questions except for the 5th question in physical sub-scale and 8th question of the social sub-scale were found to be compatible. In unidimensional Rasch analysis of the 10-item SIPSO scale, questions were handled in 2 categories as physical and social as in the original version.[9,10] When the SIPSO physical and social sub-scales were investigated whether they are unidimensional or not, there were no structures to impair unidimensionality assumption. Thus, analysis results provided incremental evidence of the 2 subscales, but not the total SIPSO. Similarly, other studies have emphasised that the total score of 10-item SIPSO scale did not fit to Rasch model while physical and social subscales did fit.[27,28]

The internal consistency analysis yielded a Cronbach a coefficient of 0.92 and BAI of 0.95 for SIPSO- physical subscale and a Cronbach a coeffi-

cient and BAI of 0.86 for the SIPSO- social subscale. Therefore, we can conclude that our results are in accordance with other studies and the SIPSO has high validity and reliability. Similarly, Kersten et al. used the Rasch analysis for evaluation of the SIPSO sub-scales and found Cronbach a coefficient and PSI score of 0.93 for SIPSO- physical subscale and a Cronbach a coefficient and PSI of 0.82 for the SIPSO- social subscale.[27] In another study by Trigg and Wood using the item-total correlation analysis instead of the Rasch analysis, Cronbach a coefficients of 0.92, 0.94, and 0.85 were reported for total SIPSO, physical, and social sub-scales respectively. When they tested if the results changed after removal of the items, no change in alpha coefficients was observed.[10] In another study by Kersten et al. on young patients with stroke, internal consistency analysis yielded Cronbach a coefficients of 0.91, 0.93, and 0.82 were reported for total SIPSO, physical, and social sub-scales respectively.[29] In a similar way, Kwong et al. reported a Cronbach a coefficient of 0.83 for internal consistency of the Chinese version of the SIPSO noting high internal consistency.[11]

When test-retest reliability was assessed, ICC scores of 0.980 and 0.964 were obtained for SIPSO-physical and SIPSO- social sub-scales propounding high reliability. The test-retest reliability of the development study of the original SIPSO revealed kappa scores of 0.909, 0.914, and 0.912 for total SIPSO, SIPSO-physical, and SIPSO-social sub-scales respectively.[10] Similarly, Kwong et al. reported an ICC of 0.866 for test re-test reliability of the SIPSO in their adaptation study to Chinese language.[11] In another study by Kersten et al. on young patients with stroke, test re-test analysis yielded ICC coefficients of 0.96, 0.94, and 0.95 for total SIPSO, physical, and social sub-scales respectively propounding that SIPSO is a valid and reliable tool for evaluation of young stroke patients.[29] Our results match up with previous reports in terms of test re-test outcomes.

When correlation analyses to test construct validity were performed, physical and social sub-scales of the SIPSO had strong correlations with the BI, RMI, FAS, SIS 3.0, and the FIM. We consider that social participation increases as the muscle strength, functional status, independence in daily living activities, and mobilization get better.

The high correlation between the SIPSO physical sub-scale and RMI and FAS which both evaluate mobilization, substantiates that patients with better ambulation have higher participation in the society. According to a review about post-stroke outcome scales, the FIM was determined to be the most commonly used scale. Similarly, another multidimensional scale to evaluate post-stroke quality of life is the SIS v3.0. A striking result of our study is the strong correlation between the SIPSO and multidimensional scales such as FIM and SIS. This condition propounds that SIPSO reflects the data obtained from FIM and SIS which are scales requiring quite long time to be applied. We conclude that patients with less muscle strength, higher depression risk, and limited in-society ambulation, and who are dependent in daily living activities have lower social participation.

Similar to our results, the original manuscript of the SIPSO evaluated construct validity of the scale using its correlations with Frenchay Activity Index (FAI), Nottingham Health Profile (NHP), Wakefield Depression Inventory (WDI), and the BI. The strongest correlation was remarked between the SIPSO and FAI. When we consider the sub-scales, the physical sub-scale was reported to show strong correlations with the BI, FAI, and mobility dimension of the NHP. There was significant but weak correlation between SIPSO-physical sub-scale, WDI, and energy and pain sub-dimensions of the NHP. The social sub-scale of the SIPSO had highest correlations with WDI and emotion and social sub-dimensions of the NHP. There were weak correlations between SIPSO-social sub-scale, energy and sleep dimensions of the NHP, and the FAI.[10]

We express the neurophysiological developmental steps and motor levels of patients with stroke using the Brunnstrom staging. Mean Brunnstrom levels of our patients was 3.68±1.94 for the upper extremity and 4.28±1.68 for the lower extremity. Hypothetically, higher Brunnstrom scores, namely advanced motor examination entail better ambulation in society and more independency in

daily living. However, real life experience does not confirm this. The best example of this condition according to the current study is the finding that only 4 patients (13.3%) could maintain their previous occupation. The patients requiring assistive devices such as cane or tripods, and ones dependent to wheel-chair constitute 72.6% of all patients. The patients not needing any assistive devices make for one quarter of the group. Only 4.5% were able to sustain their lives on their own while the rest needed a care-giver such as a spouse, sibling, or a relative. Therefore, we consider that evaluating patients only in physical aspect is not adequate for social participation. Because, stroke patients have not only motor deficits, but also cognitive impairment, disturbances in balance and coordination, sight, fine skills, and proprioception, and urinary incontinence, which all impede with the social participation. Even if a hempilegic upper extremity has good motor strength, the coordination and skills may be weak. Since patients prefer to hold the assistive device with the intact extremity, they have difficulty in carrying bags and driving using the hemiplegic limb. Also, there are environmental factors negatively affecting the social adaptation such as absence of handles outdoors, height of the steps, structure of the floor, and living either in an apartment or a detached house. Community-based rehabilitation necessitates to account for all of these elements and examine them comprehensively.

The most prominent superiority of our study over others is having performed all scales to all patients by the same observer using the face to face technique. Other studies have used methods of phone contacts or mails to reach patients.

CONCLUSION

This study concludes that the SIPSO can be used for evaluation of social participation of patients with stroke in our country. The most important feature of the SIPSO is assessing "social participation", one of the main goals of stroke rehabilitation, and being developed specifically for social participation in context of the ICF. Consisting of 10 questions enables it to be easily and rapidly applicable. The SIPSO itself reflects the data obtained from other time consuming scales in addition to being specifically developed for stroke and evaluating physical functions and activity.

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