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An investigation of the psychometric properties of the Chinese (Cantonese) version of Subjective Index of Physical and Social Outcome (SIPSO)

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Abstract

Objective:

The objectives of this study were 1) to translate and make cultural adaptations to the English version of the SIPSO questionnaire to create a Chinese (Cantonese) version, 2) evaluate the internal consistency, test-retest reliability the C-SIPSO questionnaire, and 3) compare the SIPSO-C scores of stroke survivors with different demographic characteristics to establish the discriminant validity of the questionnaire

Design:

Translation of questionnaire, cross sectional study.

Setting:

University-based clinical research laboratory.

Subjects

Community-dwelling chronic stroke survivors.

Interventions:

Not applicable.

Main measures:

Subjective Index of Physical and Social Outcome, Geriatric Depression Scale, 10-metre Walk test.

Results:

Two bilingual professional translators translated the SIPSO questionnaire independently. An expert panel comprising five registered physiotherapists verified the content validity of the final version (C-SIPSO). C-SIPSO demonstrated good internal consistency (Cronbach's $\alpha = 0.83$) and excellent test-retest reliability ($ICC_{3,1} = 0.866$) in ninety-two community dwelling chronic stroke survivors. Stroke survivors scored higher than 10 in the Geriatric Depression Scale ($U = 555.0$, $P < 0.001$) and with the comfortable walking speed lower than $0.8ms^{-1}$ ($U = 726.5$; $P = 0.012$) scored significantly lower on SIPSO-C.

Conclusion:

SIPSO-C is a reliable instrument that can be used to measure the level of community integration in community-dwelling stroke survivors in Hong Kong and southern China. Stroke survivors who were at high risk of minor depression and with limited community ambulation ability demonstrated a lower level of community integration as measured with SIPSO-C

Keywords:

Stroke, community integration, outcome assessment, rehabilitation, social outcome

Introduction

The remarkable levels of physical impairment and functional limitation in patients with stroke can affect their level of community integration. To provide a better understanding and record the level of community integration throughout the rehabilitation process in stroke survivors, a comprehensive measure that evaluates rehabilitative outcomes from the perspective of those survivors is needed.

Divergent interpretations of community integration have led to the development of several instruments to measure the construct. Wilier et al.(1) operationalised the inverse of “handicap” to develop the Community Integration Questionnaire. McColl et al.(2) developed the Community Integration Measure based on a model of community integration derived from groups of survivors with brain injuries. Finally, Wood-Dauphinee et al.(3) developed the Reintegration to Normal Living Index based on the “Activity and Participation” component of the International Classification of Functioning Disability and Health model.

Although all of these instruments have been validated in populations with various neurological deficits, but none of them is perfec. For example, the Community Integration Questionnaire neglected the subjective experience of the target population. In contrast, the Community Integration Measure fails to evaluate the level of engagement in the activities of daily living and social activities. For Reintegration to Normal Living Index, a previous study reported poor scoring agreement between stroke survivors and persons knowledgeable about their condition.(4)

The Subjective Index of Physical and Social Outcome (SIPSO) questionnaire(5, 6) was developed based on the normalisation approach.(7) The normalisation approach advocates that people with disabilities should be able to enjoy patterns and conditions of

life as close as possible to those that prevail in the wider community. The 10-item SIPSO have been reported as a valid and reliable tool for measuring the level of community integration in stroke survivors. (6, 8-10). Besides, the agreement of scoring between stroke survivors and their carer was excellent (ICC = 0.95).

A growing body of clinical research in the West is adopting the SIPSO questionnaire as an outcome measure,(11-20) but it is yet to be translated into Chinese, and neither has its reliability and validity been evaluated in a Chinese community. Culturally adaptation of the questionnaire is necessary as Chinese community might hold a different perspective on post-stroke care. For example, a recent study points out that post-discharge care and rehabilitation are tended to be neglected in policy in China (21). The objectives of the current study were, therefore, to translate and culturally adapt the SIPSO questionnaire to develop a Chinese (Cantonese) version (SIPSO-C) and evaluate the psychometric properties of SIPSO-C for use in assessing the level of community integration amongst community dwelling stroke survivors in Hong Kong and southern China.

Methodology

The standard forward-backward translation procedure described by Beaton et al.(22) was adopted to translate the original English version of the SIPSO questionnaire into Cantonese, the Chinese variety spoken in southern China and Hong Kong. Two bilingual translators whose mother tongue is Cantonese produced two independent translated the SIPSO. One of the translators was a registered physiotherapist, and the other was a professional translator who had received no training in the fields of medicine or rehabilitation. Back-translated was conducted by another two professional translators.

Afterward, an expert panel comprising five registered physiotherapists was established. to review the translated version of SIPSO. A pilot version of SIPSO-C was

produced after consensus had been reached amongst the panel members. Finally, five community-dwelling chronic stroke survivors were invited to complete the pilot version of SIPSO-C, the final version of SIPCO-C was then confirmed with reference to the feedback received from these survivors.

Participants

Stroke survivors were recruited from local self-help groups for individuals with cerebral vascular disease via a poster advertisement. Stroke survivors were eligible for this study if they 1) were aged > 55; 2) had received a stroke diagnosis at least 12 months previously; 3) were living in the community; and 4) had an Abbreviated Mental Test Score of 7 or above.(23) Stroke survivors with cognitive impairment were excluded to ensure all participants could follow the study protocol.

Stroke survivors were excluded if they were 1) medically unstable; 2) unable to give written informed consent; and/or 3) suffering from a comorbid neurological disease such as Parkinson's disease, multiple sclerosis or traumatic brain injury. Stroke survivors who suffered from expressive dysphasia were not excluded given that they could give written consent.

The ethics committee of The Hong Kong Polytechnic University approved the study's protocol, and the study was conducted in accordance with the principles of the Declaration of Helsinki for human experiments. The study's objectives and procedures were explained to the participating stroke survivors, all of whom provided informed written consent before study commencement.

Assessment procedure

Eligible stroke survivors were invited to come to the Balance and Neural Control Laboratory of The Hong Kong Polytechnic University for the first assessment. All assessments were conducted by a registered physiotherapist (KWH). Twenty-five

participants were randomly selected to revisit the laboratory after a one-week interval through the drawing of lots. The relatively short period minimized the chance that real changes of the stroke survivors' condition or significant events in their life occurred. These 25 stroke survivors completed the SIPSO-C questionnaire a second time to establish its test-retest reliability. The same rater interviewed the stroke survivors and filled out the SIPSO on both occasions.

Outcome measures

Demographic characteristics, including age, sex, post-stroke duration, type of stroke, hemiplegic side and use of aids for outdoor ambulation were recorded. Participants' level of community integration was measured using the SIPSO-C questionnaire which translated from the original SIPSO(5, 6) as mentioned. The SIPSO questionnaire was developed from the perspective of those survivors. In the first phase of SIPSO's development, a qualitative study involving in-depth interviews with 30 community-dwelling stroke survivors was conducted,(5) with the questionnaire items based on the results. Final item selection was then based on the comments and responses of another 100 community-dwelling chronic stroke survivors.(6) These procedures ensured that all items were relevant to the concerns of this population. The SIPSO questionnaire comprises 10 items. Items 1-5 belong to the physical integration subscale, and items 6-10 to the social integration subscale.(6, 8-10) Each item is rated on a 5-point scale (0-4). The maximum total score is 40, and higher scores indicate a better level of community integration. The SIPSO and SIPSO-C questionnaire are available in appendix 1.

Two studies(8, 9) reported an excellent test-retest reliability of the English version of SIPSO (ICC = 0.96) in 128(8) and 32(9) chronic stroke survivors, respectively. In addition, the degree of scoring agreement between 48 stroke survivors and their caregivers was high (ICC = 0.962).(8, 9) The construct validity of the SIPSO has been established by its significant correlation with Reintegration to Normal Living Index

scores (r = 0.651-0.758)(8) and the Barthel Index (r = 0.730),(6) Frenchay Activities Index (r = 0.801)(6) and Nottingham Health Profile (r = 0.671).(6) The SIPSO questionnaire and its subscale scores have also been shown to be responsive to a change in chronic stroke survivor status over time, with an effect size of 0.240 to 0.267.(8)

Comfortable walking speed was also measured to quantify the mobility level of the participating stroke survivors using the 10-metre walk test. A 14-metre walkway was used, with 2 m allowed at the start and end of the 2-m test distance for acceleration and deceleration. Travel time was recorded with a stopwatch.(24)

The Chinese version of the Geriatric Depression Scale (25) was used to assess participants' level of depressive symptoms. The scale comprises 30 dichotomous (yes or no) questions, for a total score of 30, with a higher score indicating a higher level of depressive symptoms. A Geriatric Depression Scale score higher than 10 indicates a high risk of minor depression in stroke survivors (sensitivity = 0.69, specificity = 0.75).(26) Good test-retest reliability has been demonstrated for the Chinese version of the Geriatric Depression Scale in a sample of 461 elderly participants (ICC = 0.85).(25)

Statistical analysis

Descriptive statistics (mean, median and frequency) were used to summarise the participating stroke survivors' demographic characteristics and responses to each individual item of the SIPSO-C questionnaire. The internal consistency of the questionnaire and its subscales was assessed by Cronbach's α coefficients, ICC were used to assess their test-retest reliability. the statistical model $ICC_{3,1}$ was selected because this model is suitable to measure the consistency of scoring between two occasions with the rater is fixed. (27)The kappa statistic was adopted to evaluate the agreement in item

scores between the two rating occasions for the 25 participants asked to complete the SIPSO-C questionnaire twice.

The Mann-Whitney U test was performed to compare the SIPSO-C scores of stroke survivors with different demographic characteristics, including sex, hemiplegic side, age group, walking speed and risk of minor depression (based on Geriatric Depression Scale score). A cut-off of 65 years was used to divide the stroke survivors into two age groups, thus allowing the results of the current study to be compared with those of a previous study.(8) For the walking speed, a 10-meter Walk test speed of $0.8ms^{-1}$ was adopted as the cut-off speed, since a speed lower than $0.8\ ms^{-1}$ indicated a limited community walking ability in stroke survivors. (28) (29) The Statistical Package for Social Science (SPSS version 22.0) was used to conduct all of the statistical analyses. *P* values ≤ 0.05 were considered to be statistically significant.

Results

Ninety-two community-dwelling stroke survivors were recruited between May 2014 and December 2015. Demographic characteristics of the stroke survivors was summarised in Table 1. Twelve participants were classified as household ambulators ($\leq 0.4\ ms^{-1}$), 40 as limited community ambulators ($0.4\text{-}0.8\ ms^{-1}$) and 40 as community ambulators ($> 0.8\ ms^{-1}$). (28) (29) Thirty-eight of the participating stroke survivors had a Geriatric Depression Scale score higher than 10, indicating that they were at high risk of minor depression.(26)

The median total SIPSO-C score was 28, five of the stroke survivors scored the maximum of 40 (Table 1). With regard to individual item scoring, the mean score of item 9 was the lowest and item 2 was the highest. Distribution of Item 2,5,10 was highly skewed with the skewness value lower than -1.0. (30) . (Table 2).

The SIPSO-C questionnaire demonstrated a high level of internal consistency, (Cronbach's $\alpha = 0.83$). (Table 3). Both the SIPSO-C total score and physical and social integration subscale scores demonstrated excellent reliability (ICC > 0.8),(31) The kappa statistic revealed that for all items, the level of agreement between the two assessment occasions was unlikely to be the result of chance ($P < 0.001$) However, a fair level of agreement (kappa: 0.21-0.40) for item 8 was found.(32) (Table 4). The characteristics of the subsample were comparable to the total sample. The summarized demographic characteristics are available in appendix 2.

The Mann-Whitney U test results revealed that the stroke survivors at high risk of minor depression (Geriatric Depression Scale > 10;$U = 555.0$, $P \leq 0.001$) and with limited community walking ability (10-metre Walk test speed ≤ 0.8; $U = 726.5$, $P = 0.012$) scored significantly lower on the SIPSO-C questionnaire. No significant differences in SIPSO-C scores were found amongst the different sex ($U = 861.5$, $P = 0.361$), hemiplegic side ($U = 957.5$, $p = 0.489$) and age groups (< 65 vs ≥ 65) ($U = 878$, $P = 0.765$) (Table 5).

Discussion

This is the first study to translate and culturally adapt the Chinese (Cantonese) version of the SIPSO questionnaire. The satisfactory internal consistency and excellent test-retest reliability of SIPSO-C had been demonstrated. Subgroup comparison based on Geriatric Depression Scale score and walking speed indicated that stroke survivors at high risk of minor depression and with limited community ambulation ability scored significantly lower on the SIPSO-C questionnaire. The study's results suggest that the SIPSO-C questionnaire is a reliable instrument for measuring the level of community integration in Cantonese-speaking community-dwelling stroke survivors.

The Cronbach α values for the SIPSO-C questionnaire and subscales fell within the acceptable range of 0.75 to 0.90.(33) None exceeded 0.9, indicating that none of the questionnaire items was likely to be redundant. The excellent test-retest reliability demonstrated by the SIPSO-C questionnaire and its subscales indicated that the questionnaire is a reliable instrument for recording stroke survivors' level of community integration throughout the rehabilitation process. Having the same raters conduct the assessment on two occasions within a week rendered the chances of a real change in condition very low.

The strength of the agreement amongst the item scores ranged from moderate to high (kappa = 0.47-0.78) for all items except item 8 (kappa = 0.38). Item 8 (How satisfied are you with the level of interests and activities you share with your friends/associates?) may be considered less concrete than the other items. Moreover, this item does not ask respondents to consider a specific time frame, and thus their responses may have been overly influenced by recent experiences. For example, a pleasurable social gathering within the one-week interval between assessments could have influenced their perception of the degree of satisfaction in question.

The median SIPSO-C questionnaire score in the present study (28 ± 10) was higher than those (19.8 to 26) reported in previous studies using SIPSO.(8, 9, 16, 18, 20) Lord et al.(18) reported a mean SIPSO questionnaire score of 21.0-21.5, whereas McKenna et al.(16) reported a mean score of 19.82-23.69. These two studies investigated the efficacy of novel community rehabilitation services for stroke survivors in the sub-acute phase, and their results indicate that stroke survivors who are newly returned to the community exhibit lower levels of community integration. There are several explanations for the discrepancies in these findings. First, physical capacity is generally poorer within the first three months post-stroke for stroke survivors with moderate to severe stroke.(34)Second, compensatory strategies for and confidence in independent living in the community may take time to develop.

Two studies with larger sample sizes (261(8) and 315(9) chronic stroke survivors) reported a median SIPSO questionnaire score of 26. Both of those studies distributed the questionnaire to stroke survivors in accordance with records provided by health service agencies. Thus, stroke survivors who were isolated and had poor community ambulation ability could be recruited. For example, 24% of the 315 stroke survivors examined by Kersten et al. were unable to walk independently in the 10-metre walk test.(9) In addition, some of those recruited by Trigg and Wood lived in residential care accommodation.(8) Subgroup analysis showed the participants receiving residential care service to score significantly lower on the SIPSO questionnaire (16.5 versus 27, $P = 0.03$) (8) relative to those not receiving such care. The stroke survivors in our study, in contrast, were active members of local self-help groups, and it thus not surprising that they would exhibit better community integration.

The physical integration subscale scores in the current study were higher than those for the social integration subscale. Teale et al.(12) suggested that a subscale score higher than or equal to 15 is indicative of a good level of integration. We found that distribution of scoring was negatively skewed in all items of the physical integration subscale. In addition, 60.9% had achieved a good level of physical integration. Of the five items in that subscale, four are partially influenced by respondents' mobility, namely, item 2 (difficulties moving at home), item 3 (satisfaction in performing daily activities), item 4 (difficulties in shopping) and item 5 (independence in outdoor ambulation). Personal factors such as good mobility may explain the satisfactory levels of physical integration in this study. A disability-friendly community can also facilitate community integration in stroke survivors. For example, metro stations in Hong Kong are all equipped with lifts, allowing stroke survivors to move from the railway platform to street level with little difficulty.

In contrast to the generally positive physical integration results, only 22.8% of the stroke survivors in this study reported a good level of social integration (social integration subscale score > 15), and median score of item 9 (How often do you visit friends/others?) was 1 only. Most of the participants said that they were usually visited by friends or relatives, rather than vice versa, which may explain the low scores for this item.

With regard to between-group differences, stroke survivors at high risk of minor depression (Geriatric Depression Scale >10) were found to score significantly lower on the SIPSO-C questionnaire. Several cross-sectional studies have also reported depression levels to be significantly associated with or able to predict the level of community integration in stroke survivors.(35-37) For example, Geriatric Depression Scale score was reported to be a predictor of London Handicap Scale, in 188 chronic stroke survivors (β = -0.27, $P < 0.001$).(35) The Hamilton Depression Scale score was also shown to be significantly correlated with Reintegration to Normal Living Index score (r = -0.373, P = 0.006) and to be one of its independent predictors (β = -0.255, P = 0.008) in 90 community-dwelling chronic stroke survivors.(36) Finally, a study of 63 community-dwelling chronic stroke survivors showed Geriatric Depression Scale score to be an independent predictor of Reintegration to Normal Living Index score (β = -0.404, $P \leq$ 0.001).(37)

Stroke survivors who walked slower than $0.8ms^{-1}$ were also found to were found to score significantly lower on the SIPSO-C questionnaire. The selection of the cut-off speed of $0.8ms^{-1}$ was based on Perry et.al. study (28) which showed that the stroke survivors with an average walking speed above $0.8ms^{-1}$ were predicted to be independent community ambulator. Little study has reported the influence of walking capacity on the level of community integration in stroke survivors. A previous study has reported that walking endurance measured with 6-minute walk test predicted the level of community integration measures RNLI(38). However, neither the strength of association nor the R^2 value of the model was reported(38). Results of the current study revealed that

comfortable walking speed have an influence on the level of community integration in community-dwelling stroke survivors. The high predictive power of walking speed in community ambulation ability might explain the result.

No significant differences in SIPSO-C scores were found amongst the stroke survivors in the different sex, hemiplegic side and age groups. Amongst the 315 chronic stroke survivors involved in Trigg and Wood's study,(8) no significant differences in SIPSO questionnaire or subscale scores were found in the different sex and age groups (< 65 or 65-74) ($P > 0.05$). Similarly, Kersten et al. also reported no difference between the SIPSO questionnaire scores of men and women amongst 372 chronic stroke survivors ($P = 0.29$).

The results of this study should be considered in light of several limitations. First, the participants were recruited from self-help groups for stroke survivors. The sample was thus self-selecting and likely to have a higher level of community integration. It is recommended that relatively isolated stroke survivors be recruited in future studies using the SIPSO-C questionnaire. Second, the convergent and predictive validity of SIPSO-C could not be established. Finally, the test-retest reliability of SIPSO-C was evaluated with only a one-week interval between the assessments. This relatively short interval minimised the chances of a real change in the participating stroke survivors' status, but it is possible that the memory effect influenced the results.

Clinical Messages

- The Chinese (Cantonese) version of SIPSO is a reliable instrument to measure the level of community integration in stroke survivors.
- Stroke survivors who scored more than 10 on the Geriatric Depression

382 Scale and walked slower than 0.8 ms^{-1} were found to have a lower level
383 of community integration.
384

385 **Conflict of interest**

386 The Authors declare that there is no conflict of interest.

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References

1. Wilier B, Ottenbacher KJ, Coad ML. The Community Integration Questionnaire: a comparative examination. Am J Phys Med Rehabil. 1994;73(2):103-11.
2. McColl MA, Davies D, Carlson P, Johnston J, Minnes P. The community integration measure: development and preliminary validation. Arch Phys Med Rehabil. 2001;82(4):429-34.
3. Wood-Dauphinee SL, Opzoomer MA, Williams JI, Marchand B, Spitzer WO. Assessment of global function: The Reintegration to Normal Living Index. Arch Phys Med Rehabil. 1988;69(8):583-90.
4. Tooth L, McKenna K, Smith M, O'Rourke P. Reliability of scores between stroke patients and significant others on the Reintegration to Normal Living (RNL) Index. Disability and rehabilitation. 2003;25(9):433-40.
5. Trigg R, Wood VA, Hewer RL. Social reintegration after stroke: the first stages in the development of the Subjective Index of Physical and Social Outcome (SIPSO). Clinical rehabilitation. 1999;13(4):341-53.
6. Trigg R, Wood VA. The Subjective Index of Physical and Social Outcome (SIPSO): a new measure for use with stroke patients. Clinical rehabilitation. 2000;14(3):288-99.
7. Wolfenberger W. Normalization: the principal of normalization in human services. Toronto, Canada: The National Institute on Mental Retardation. 1972.
8. Trigg R, Wood VA. The validation of the Subjective Index of Physical and Social Outcome (SIPSO). Clinical rehabilitation. 2003;17(3):283-9.
9. Kersten P, George S, Low J, Ashburn A, McLellan L. The Subjective Index of Physical and Social Outcome: its usefulness in a younger stroke population. Int J Rehabil Res. 2004;27(1):59-63.
10. Kersten P, Ashburn A, George S, Low J. The Subjective Index for Physical and Social Outcome (SIPSO) in stroke: investigation of its subscale structure. BMC

Neurol. 2010;10:26.
11. Harrington R, Taylor G, Hollinghurst S, Reed M, Kay H, Wood VA. A community-based exercise and education scheme for stroke survivors: a randomized controlled trial and economic evaluation. Clin Rehabil. 2009;24(1):3-15.
12. Teale E, Young J, Dennis M, Sheldon T. Predicting patient-reported stroke outcomes: a validation of the six simple variable prognostic model. Cerebrovasc Dis Extra. 2013;3(1):97-102.
13. Fogg-Rogers L, Buetow S, Talmage A, McCann CM, Leao SH, Tippett L, et al. Choral singing therapy following stroke or Parkinson's disease: an exploration of participants' experiences. Disability and rehabilitation. 2016;38(10):952-62.
14. Baseman S, Fisher K, Ward L, Bhattacharya A. The relationship of physical function to social integration after stroke. J Neurosci Nurs. 2010;42(5):237-44.
15. Plummer P, Villalobos RM, Vayda MS, Moser M, Johnson E. Feasibility of dual-task gait training for community-dwelling adults after stroke: a case series. Stroke Res Treat. 2014;2014:538602.
16. McKenna S, Jones F, Glenfield P, Lennon S. Bridges self-management program for people with stroke in the community: A feasibility randomized controlled trial. Int J Stroke. 2015;10(5):697-704.
17. Kersten P, Low J, Ashburn A, George S, McLellan D. The unmet needs of young people who have had a stroke: results of a national UK survey. Disabil Rehabil. 2002;24(16):860-6.
18. Lord S, McPherson KM, McNaughton HK, Rochester L, Weatherall M. How feasible is the attainment of community ambulation after stroke? A pilot randomized controlled trial to evaluate community-based physiotherapy in subacute stroke. Clinical rehabilitation. 2008;22(3):215-25.
19. Okoye EC, Odole AC, Odunaiya NA, Akosile CO, Akinpelu AO. Cross-cultural adaptation and validation of the Maleka stroke Community Reintegration Measure among Igbo stroke survivors. International Journal of Health Sciences and Research 2016;6(1):254-63.
20. Kilbride C, Norris M, Theis N, Mohagheghi AA. Action for Rehabilitation from Neurological Injury (ARNI): A pragmatic study of functional training for stroke

448 survivors. Open Journal of Therapy and Rehabilitation. 2013;01(02):40-51.
449 21. Chen L, Sit JW, Shen X. Quasi-experimental evaluation of a home care model
450 for patients with stroke in China. Disability and rehabilitation. 2016;38(23):2271-6.
451 22. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process
452 of cross-cultural adaptation of self-report measures. Spine (Phila Pa 1976).
453 2000;25(24):3186-91.
454 23. Chu L, Pei C, Ho M, Chan P. Validation of the Abbreviated Mental Test (Hong
455 Kong version) in the elderly medical patient. Hong Kong Medical Journal.
456 1995;1(3):207-11.
457 24. Green J, Forster A, Young J. Reliability of gait speed measured by a timed
458 walking test in patients one year after stroke. Clinical rehabilitation.
459 2002;16(3):306-14.
460 25. Chan AC. Clinical validation of the Geriatric Depression Scale (GDS): Chinese
461 version. Journal of aging and health. 1996;8(2):238-53.
462 26. Sivrioglu EY, Sivrioglu K, Ertan T, Ertan FS, Cankurtaran E, Aki O, et al.
463 Reliability and validity of the Geriatric Depression Scale in detection of poststroke
464 minor depression. J Clin Exp Neuropsychol. 2009;31(8):999-1006.
465 27. Shrout PE, Fleiss JL. Intraclass correlations: uses in assessing rater reliability.
466 Psychol Bull. 1979;86(2):420-8.
467 28. Perry J, Garrett M, Gronley JK, Mulroy SJ. Classification of walking handicap in
468 the stroke population. Stroke. 1995;26(6):982-9.
469 29. Bowden MG, Balasubramanian CK, Behrman AL, Kautz SA. Validation of a
470 speed-based classification system using quantitative measures of walking
471 performance poststroke. Neurorehabil Neural Repair. 2008;22(6):672-5.
472 30. Bulmer MG. Principles of statistics: Courier Corporation; 2012.
473 31. Portney LG, Watkins MP. Foundations of clinical research: applications to
474 practice: Prentice Hall Upper Saddle River, NJ; 2000.
475 32. Viera AJ, Garrett JM. Understanding interobserver agreement: the kappa
476 statistic. Fam Med. 2005;37(5):360-3.
477 33. Tavakol M, Dennick R. Making sense of Cronbach's alpha. Int J Med Educ.
478 2011;2:53-5.

34. Jorgensen HS, Nakayama H, Raaschou HO, Olsen TS. Recovery of walking function in stroke patients: the Copenhagen Stroke Study. Arch Phys Med Rehabil. 1995;76(1):27-32.

35. Chau JP, Thompson DR, Twinn S, Chang AM, Woo J. Determinants of participation restriction among community dwelling stroke survivors: a path analysis. BMC Neurol. 2009;9(1):49.

36. Obembe A, Mapayi B, Johnson O, Agunbiade T, Emechete A. Community reintegration in stroke survivors: relationship with motor function and depression. Hong Kong Physiotherapy Journal. 2013;31(2):69-74.

37. Pang MY, Eng JJ, Miller WC. Determinants of satisfaction with community reintegration in older adults with chronic stroke: role of balance self-efficacy. Phys Ther. 2007;87(3):282-91.

38. Mayo NE, Wood-Dauphinee S, Ahmed S, Gordon C, Higgins J, McEwen S, et al. Disablement following stroke. Disability and rehabilitation. 1999;21(5-6):258-68.

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496 Table 1: Demographic characteristics of stroke survivors (n = 92)

Characteristics	Mean ± SD (range)
Age (yr)	62.3 ± 5.6 (55-79)
Post-stroke duration (yr)	6.6 ± 5.0 (1-24)
BMI (kg/m^2)	24.2 ± 3.0 (18.0-32.4)
Comfortable walking speed (ms^{-1})	0.76 ± 0.32 (0.09-1.89)
	Median ± IQR (range)
SIPSO total score	28 ± 10 (10-40)
Physical functioning subscale score	17 ± 6 (3-20)
Social functioning subscale score	12 ± 7 (2-20)
Geriatric Depression Scale score	8 ± 8 (0-28)
	Number (%)
Sex	
Male/Female	59 (64.1)/33 (35.9)
Hemiplegic side	
Left/Right	41 (44.6)/51 (55.4)
Type of stroke	
Ischaemic	54 (58.7)
Haemorrhagic	35 (38.0)
Mixed/Unknown	3 (3.3)
Use of walking aid outdoors	

Unaided	36 (39.1)
Stick/quadripod	53 (57.6)
Wheelchair	3 (3.3)

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Table 2: Central tendency, variation, skewness and floor and ceiling effects of SIPSO-C and its items score (n=92).

Item	Mean (SD)	Median (IQR)	Skewness	Number (%) of minimum score	Number (%) of maximum score
1	3.0 (0.9)	3 (2)	-0.76	2 (2.2)	36 (39.1)
2	3.5 (0.7)	4 (1)	-1.26	1 (1.1)	55 (59.8)
3	3.0 (0.9)	3 (2)	-0.59	0 (0.0)	29 (31.5)
4	3.0 (1.1)	3 (2)	-0.92	2 (2.2)	34 (37.0)
5	3.4 (1.0)	4 (1)	-1.66	1 (1.1)	47 (51.1)
6	2.8 (1.1)	3 (2)	-0.59	1 (1.1)	21 (22.8)
7	2.2 (1.1)	2 (2)	0.13	6 (6.5)	12 (13.0)
8	2.6 (0.9)	3 (1)	-0.06	0 (0.0)	13 (14.1)
9	1.7 (1.3)	1 (2)	0.53	18 (19.6)	10 (10.9)
10	3.1 (0.8)	3 (1)	-1.31	2 (2.2)	24 (26.1)
SIPSO-C total score	28.3 (6.6)	28 (10)	-0.30	0 (0)	4 (4.4)

503 Table 3: Internal consistency of SIPSO-C (n = 92)

	Item	Corrected item-total correlation	Cronbach's alpha if item deleted
1	How much difficulty do you have in dressing yourself fully?	0.45	0.82
2	How much difficulty do you have moving around all areas of the home?	0.45	0.82
3	How satisfied are you with your overall ability to perform daily activities in and around the home?	0.53	0.82
4	How much difficulty do you have shopping for and carrying a few items (1 bag of shopping or less) when at the shops?	0.50	0.82
5	How independent are you in your ability to move around your local neighbourhood?	0.50	0.82
6	How often do you feel bored in your free time at home?	0.64	0.80
7	How would you describe the amount of communication between you and your friends/associates?	0.63	0.81
8	How satisfied are you with the level of interests and activities you share with your friends/associates?	0.64	0.83
9	How often do you visit friends/others?	0.46	0.83
10	How do you feel about your appearance when out in public?	0.46	0.82

Scale	Cronbach's alpha
SIPSO-C	0.83
Physical integration subscale	0.76
Social integration subscale	0.80

505 Table 4: Test-retest reliability of SIPSO-C (n = 25)

Item	Kappa statistic	*P*-value	
1	0.63	< 0.001	
2	0.78	< 0.001	
3	0.71	< 0.001	
4	0.47	< 0.001	
5	0.53	< 0.001	
6	0.53	< 0.001	
7	0.57	< 0.001	
8	0.38	< 0.001	
9	0.60	< 0.001	
10	0.68	< 0.001	
	ICC (3,1)	95% CI	
		Upper	Lower
Total score	0.866	0.720	0.939
Physical functioning subscale	0.850	0.689	0.931
Social functioning subscale	0.898	0.782	0.954

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507 Note: ICC: intra-class correlation coefficient

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509 Table 5: Results of Mann-Whitney U test: Comparison of SIPSO-C scores of subjects
510 with different characteristics (n=92)

Characteristics		Number of stroke survivors	Median (IQR)	Mann-Whitney U	*Z*	*P* value
Sex	Male	49	28 (10)	861.5	-0.913	0.361
	Female	33	30 (10)			
Hemiplegic side	Left	41	29 (11)	957.5	-0.693	0.489
	Right	51	28 (9)			
Age	< 65	63	28 (10)	878	-0.299	0.765
	≥ 65	29	29 (11)			
Geriatric Depression Scale > 10	Yes	38	24 (9)	555.0	-3.742	> 0.001
	No	54	31 (9)			
Comfortable walking speed ≤ 0.8 ms^{-1}	Yes	52	25 (12)	726.5	-2.379	0.017
	No	40	30 (10)			

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