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Cross-cultural adaptation and psychometric properties of the Stroke Social Network Scale in a Chinese population

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Abstract

Objectives: Scientific evidence showed that social networks and support are important for stroke rehabilitation. The Stroke Social Network Scale was developed for people with stroke but is not available in Cantonese. This study aimed to test the psychometric properties of the Cantonese scale (C-SSNS).

Design: A validation study.

Setting: Community settings.

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Main measures: Participants completed the C-SSNS, Multidimensional Scale of Perceived Social Support, Fugl-Meyer Assessment, Geriatric Depression Scale, Fatigue Assessment Scale, and Community Integration Measure. The psychometric properties of the C-SSNS were evaluated.

Results: The C-SSNS had a Cronbach's α of 0.67-0.82 and ICC of 0.78-0.97. The standard error of measurement was 3.65-7.16. The minimal detectable change was 10.11-19.85. Floor effects were only found in the 'relatives' and 'groups' subscales. The item- and scale-level content validity indices were 1.0. In assessing construct validity, all subscores correlated with the overall score (r_s=0.44-0.75). Confirmatory factor analysis supported a 5-factor model. For concurrent validity, the overall score correlated with perceived social support (r_s=0.42, p<0.001). Social network correlated with motor impairment (r_s=0.32, p=0.001), depressive symptoms (r_s=-0.37, p<0.001), fatigue (r_s=-0.24, p=0.015), and community integration (r_s=0.38, p<0.001). Known group differences were demonstrated between stroke participants with moderate to severe impairment and those with no to mild impairment, and those with and without depressive symptoms.

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Running Title

Cantonese Stroke Social Network Scale

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Introduction

Stroke has been found to lead to a reduction in social networks. Social network refers to the web of social relationships with family, friends, neighbours, and others in the social environment, and it is through social networks that social support is provided.[1] Dhand et al.[2] reported that the social networks of people with stroke shrank by 1.25 people over 6 months post-stroke. A study showed that social network density correlated with improvements in arm motor control (r=0.75, p=0.003), while the size of social networks correlated with an improvement in the depressive symptoms (r=0.68, p=0.015) of people with stroke.[3]

The causes of reduced social networks have been documented in the literature. A qualitative study showed that poor mobility, physical symptoms such as difficulty in writing, and reduced energy levels were causes of the loss of friends after a stroke.[4] A qualitative meta-ethnographic synthesis revealed that physical and cognitive disability and fatigue might lower the capacity of people with stroke to socialize, or reduce their level of social participation,[5] while Walsh et al.'s qualitative meta-synthesis[6] showed that support from family members and close friends facilitated community integration. Thus, assessing an individual's social network after a stroke is a crucial first step in stroke rehabilitation.

The Stroke Social Network Scale was developed by Northcott and Hilari[7] specifically for people with stroke, by drawing on three sources, namely, previous research, a literature review, and existing scales. It consists of five factors (satisfaction, children, relatives, friends, and groups) with 19 items, and takes into consideration the size of a stroke individual's network of children, close friends, and close relatives, as well as their wider network, frequency of contact, the proximity of their networks, and their satisfaction with their networks.[7] People with stroke need support from their spouse, children, relatives, and friends; and value social companionship, emotional support, concern, practical support offered with sensitivity, the ability to share their worries, and the receipt of sensitive encouragement.[8] Therefore, The Stroke Social Network Scale, which has an internal consistency of 0.74-0.87,[7] is suitable for use in assessing people with stroke.

To date, the Stroke Social Network Scale is available in English,[7] Norwegian,[9] and Mandarin[10] (the current accepted term for which is Putonghua). Although the Mandarin version[10] can be used in Chinese populations, concepts can be expressed somewhat differently in Mandarin than in Cantonese. Therefore, some rephrasing is needed to convey the nuances of various expressions to speakers of Cantonese. Also, people living in the study region might have difficulties in understanding or estimating the distances mentioned in items C4 and F4. Therefore, this study aimed to evaluate the psychometric properties of a translated Cantonese version of the Stroke Social Network Scale (C-SSNS), including its internal consistency, test-retest reliability, standard error of measurement, minimal detectable change, ceiling and floor effects, content validity, construct validity, concurrent validity; as well as correlations with motor control, depressive symptoms, fatigue, and community integration.

Methods

Scale translation

After obtaining permission from the original author, the Stroke Social Network Scale was translated from English into Cantonese. Two translators independently forward-translated the English scale into Cantonese. The two Cantonese versions were combined into one, which was then independently translated back into English by two other translators. All four translators were proficient in both English and Cantonese. Five members consisting of translators and healthcare professionals formed a panel to assess the conceptual, experiential, semantic, and idiomatic equivalence of the scale, and rated the relevance of all 19 items (1=irrelevant to 4=highly relevant).

Since the English scale consists of some examples of groups that are not present in the study region and people living in the study region might have difficulties in understanding or estimating how far the distances in items C4 and F4 are, the scale was culturally adapted for users in the study region. In item WN2, ‘Neighbourhood Watch’ was deleted and ‘Women’s institute’ and ‘Townswoman’s Guild’ were replaced with ‘women’s organizations’ for greater cultural relevance.

In the response choices for item C4, the amount of time required to drive particular distances (<5 minutes, 5-10 minutes, 10-25 minutes, 25-75 minutes, >75 minutes) was added as a supplement to explain the distances (within 1 mile, 1-5 miles, 6-15 miles, 16-50 miles, 50+ miles), because people living in the study region might not know how far those distances are. In the choices presented for the response to item F4, 'about 10 minutes' was also added to explain 'within 5 miles'. Key differences between the expressions used in the Mandarin[10] and Cantonese versions are shown in Table 1.

Nine people with stroke participated in a pilot test. They all agreed that the scale was clear and understandable. Thus, face validity was established in this initial stage. The psychometric properties of this C-SSNS could then be further investigated.

Setting and sampling

All participants were recruited through poster advertisements in non-governmental organizations and through social media outreach. Cantonese speakers who had received a diagnosis of stroke ≥6 months ago, were aged ≥50, community-dwelling, and had an Abbreviated Mental Test score[11] of ≥6 were recruited. People who had any other neurological diseases or a history of a transient ischemic attack were excluded.

The sample size required to conduct a confirmatory factor analysis and to achieve test-retest reliability was estimated. The recommended ratio for the number of cases to the number of estimated parameters is 10:1 to 20:1 for a confirmatory factor analysis.[12] With five factors in the scale, 50-100 participants would be required. Since test-retest reliability had not been established, a minimum acceptable intraclass correlation coefficient (ICC) of 0.75 was adopted. With an expected ICC of 0.9, a sample of 33 participants would be required at an α value of 0.05, a β value of 0.2, and two repetitions per participant. Assuming a dropout rate of 15%, a minimum of 39 participants would be needed for test-retest reliability. Test-retest reliability was relevant in this testing of psychometric properties because all of the items in the scale required self-reporting by the respondent and none

required a rater to make subjective judgements.

Data collection

Social network data were assessed using the C-SSNS. Each of the 19 items is scored from 0 to 100. The overall score is the mean of all items, while the subdomain score is the mean of the items under that subdomain. Higher scores suggest the existence of more social ties. Reportedly, its internal consistency in terms of Cronbach's α was 0.85 for the overall score and 0.74-0.87 for the subdomain scores.[7] The original English scale could differentiate between stroke survivors with high versus low perceived social support.[7]

To establish concurrent validity, the Cantonese version of the 12-item Multidimensional Scale of Perceived Social Support[13] was used to quantify the subjective feeling of perceived social support because this is one of the scales most commonly used for appraising social support. The total score is the sum of all items ranging from 12 to 84. Higher scores mean better perceived social support. The internal consistency of the scale was good (Cronbach's α=0.94-0.96) in community-dwelling people with stroke.[14]

Correlates of social network were also examined. In addition to upper limb motor control, lower limb motor control likely also plays a role in the size of social networks. The correlation with both upper and lower limb motor impairment was therefore investigated. Motor impairment was assessed using the Fugl-Meyer Assessment[15] because the assessment is stroke-specific. The assessment contains 33 and 17 items assessing upper and lower limb motor control, respectively, with each item rated 0-2.[15] A score of ≤79 indicates moderate to severe impairment while ≥80 indicates no to mild impairment.[16] The test-retest reliability of the assessment in terms of ICC was 0.97 in the upper limbs[17] and 0.94 in the lower limbs[18] of people with stroke.

To determine the correlation with depressive symptoms, depressive symptoms were assessed using the Cantonese version of the 15-item Geriatric Depression Scale,[19] as suggested by the American Heart Association's Classification of Stroke Outcome Task Force.[20] Total scores range

from 0 to 15. A score of ≥8 indicates the presence of depressive symptoms. In people with stroke, the Cronbach's alpha of the scale was 0.78.[21]

To determine the correlation with fatigue, which might lower a person's capacity to socialize,[5] fatigue was assessed using the Cantonese 10-item Fatigue Assessment Scale.[22] This scale was selected because it covers both physical and mental fatigue. Total scores range from 10 to 50. Higher scores indicate higher levels of fatigue. In people with stroke, the scale had good internal consistency (Cronbach's α=0.82) and test–retest reliability (ICC=0.92).[22]

The correlation with community integration was also determined. Community integration was assessed using the Cantonese 10-item Community Integration Measure[23] because the scale makes no assumptions about possible links between community integration and the extent of a person's independence.[24] Total scores range from 10 to 50. Higher scores indicate better integration into the community. In relation to people with stroke, the scale had good internal consistency (Cronbach's α=0.84) and test-retest reliability (ICC=0.84).[23]

Ethical considerations

Ethical approval was obtained from The Hong Kong Polytechnic University (Reference Number: HSEARS20210110002). After the purposes and procedures of this study were explained, written informed consent was obtained from the participants. Confidentiality and anonymity were ensured. This study adhered to the Declaration of Helsinki.

Procedures

Eligible participants were invited to undergo an assessment, which took about 50-60 minutes. Socio-demographic data were collected. All participants were assessed using the abovementioned scales either by a nurse with over 10 years of research experience or by a well-trained research assistant with over a year of experience in stroke research. Thirty-nine participants were randomly drawn by computer for a second assessment to take place 7 days later, conducted by either one of the

two assessors.

Statistical analysis

Measurement properties were evaluated in accordance with the COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) checklist.[25] The Statistical Package for the Social Sciences (SPSS) software program version 26.0 was used to analyse the data. Demographic characteristics were summarized using descriptive statistics.

With regard to reliability and responsiveness, Cronbach's α was used to assess internal consistency. $ICC_{3,1}$ was used to assess test-retest reliability. The standard error of measurement was calculated using SD x $\sqrt{1 - ICC}$,[26] while minimal detectable change at the 95% confidence interval was calculated using SD x 1.96 x $\sqrt{2(1 - ICC)}$,[27] in which SD denotes the standard deviation of the score at the first assessment and ICC refers to the test-retest reliability coefficient. A standard error of measurement relative to the total score of ≤5% is considered very good, and >5% to ≤10% is considered good.[28] A minimal detectable change of <30% is commonly considered acceptable, while <10% is considered excellent.[29] When >15% of the participants attained the highest or lowest possible scores, ceiling and floor effects were considered to be present.[30]

Content validity was evaluated. Both item-level and scale-level indices were calculated using the percentage of items rated 3 or 4 by all members of the panel.

Construct validity between the overall score and all subscores was determined by a moderate (0.40–0.69) to high correlation (0.70 -1.00).[31] It was expected that the subdomains of kin and non-kin factors would not be correlated.[7] The Kolmogorov–Smirnov test of normality showed that not all of the data were normally distributed; thus, Spearman's correlation coefficients were used. Pairwise deletion was adopted when data were missing. A confirmatory factor analysis with maximum likelihood was performed to determine how well the original five factors fit the data. The modification index was used to guide the addition of paths to improve the model fit. Goodness-of-fit

was confirmed by an X^2/df value of ≤3, a Comparative Fit Index score of ≥0.95, and a root mean square error of approximation value of ≤0.06.

Concurrent validity was also evaluated with perceived social support. The correlation with motor impairment, depressive symptoms, fatigue, and community integration was also examined using Spearman's correlation coefficients. A correlation coefficient of 0.10-0.39 and 0.40-0.69 suggests weak and moderate correlation, respectively.[31] With previously established evidence about the relationship between social networks and motor control[3] and between social networks and depressive symptoms,[3, 32] known group differences between participants with moderate to severe impairment and no to mild impairment, and between participants with and without depressive symptoms were also evaluated using the Mann–Whitney U test. All *p*-values of <0.05 were regarded as significant.

Results

Demographic characteristics of the participants

Table 2 summarizes the demographic characteristics of the 100 participants (age: 64.00±6.18; post-stroke duration: 6.76±4.44 years). The overall C-SSNS score was 55.33±13.85. The Fugl-Meyer Assessment score was 70.76±21.30. The Geriatric Depression Scale score was 5.00±3.98. Forty of the participants completed the retest. Fugl-Meyer Assessment data were missing for one participant.

Reliability and responsiveness

The Cronbach's α and the ICC of the subscores and the overall score were 0.67-0.82 and 0.78-0.97, respectively. The standard error of measurement and the minimal detectable change in the subscores and the overall score were 3.65-7.16 and 10.11-19.85, respectively. There were no ceiling effects. Floor effects were found in the relatives and groups subscales (Table 3).

Validity and correlation

The item-level content validity index of all 19 items was 1.00. The scale-level content validity index was 1.00.

Regarding construct validity between the overall score and all subscores, all subscores were found to correlate with the overall score (r_s=0.44-0.75). Correlations between subscores ranged from 0.07 to 0.36 (Table 3). The model in the confirmatory factor analysis fit the data after the addition of paths suggested by the modification index (χ^2=158.52, p=0.073, χ^2/df=1.18, root mean square error of approximation value=0.04, and Comparative Fit Index=0.96, Figure 1).

Regarding concurrent validity, the C-SSNS overall score correlated with the Multidimensional Scale of Perceived Social Support total score (r_s=0.42, p<0.001). All C-SSNS subscores, with the exception of the children subscore, correlated with the respective subscores of the Multidimensional Scale of Perceived Social Support (Table 3). Regarding the correlation with other measures, the C-SSNS overall score correlated with motor impairment (r_s=0.32, p=0.001), depressive symptoms (r_s=-0.37, p<0.001), fatigue (r_s=-0.24, p=0.015), and community integration (r_s=0.38, p<0.001).

Known group differences were established. Stroke survivors with moderate to severe motor impairment had lower C-SSNS overall scores than those with no to mild motor impairment (median 58.00, interquartile range 31.00 vs median 65.00, interquartile range 23.00, p=0.012). Those with a Geriatric Depression Scale score of ≥8 had lower C-SSNS overall scores than those with a Geriatric Depression Scale score of <8 (median 50.55, interquartile range 14.38 vs median 59.21, interquartile range 19.05, p=0.002).

Discussion

The C-SSNS overall score showed good reliability and validity and acceptable responsiveness. This study supplemented the psychometric properties testing of the original scale by adding test-retest reliability and testing on people who had stroke ≥6 months prior to the study. It also supplemented the reliability and validity of a previously published Chinese scale tested with the Item Response Theory model[10] by using the classical test theory. The mean overall C-SSNS scores in this

study were similar to those in Northcott and Hilari's study (3 months post-stroke: 58.04, 6 months post-stroke: 56.78),[7] but slightly higher than those in Tamilmaran et al.'s study (before COVID-19: 49.3; during COVID-19: 45.3).[33]

The Cronbach's α coefficients of the overall score and of the children, groups, and satisfaction subscores were good but barely reached the level of acceptable in the relatives and friends subdomains. During the collecting of data, some participants mentioned that their face-to-face contact with other people was limited due to the COVID-19 pandemic. Even if the participants had close relatives or friends, they might not have been meeting physically. All Cronbach's α coefficients were slightly lower than those in the original scale.[7] It is probable that the participants' response to the item (frequency of face-to-face contact) was not correlated with their response to the remaining items, particularly in the relatives and friends subdomains.

The ICC of the satisfaction subscore was good, while the ICCs of the overall score and the remaining subscores were excellent. This indicated that the items and response choices were clear, allowing for consistent responses from the participants. The standard error of measurement was good to very good. Such findings support the view that the scale is reliable for assessing changes in the social networks of Chinese stroke populations over time. The minimal detectable changes in the overall score and all subscores were acceptable. The findings suggest stability across repeated assessments.

Floor effects were found in the relatives and groups subdomains, and marginally found in the friends subdomain, implying that these subdomains lacked sensitivity in detecting changes at the bottom end of the scale, although the scale was effective at detecting changes at the upper end. This might be because some of our participants had few close relatives or friends, or did not join any groups. Instead, our participants mainly had contact with their children, as reflected by the children subscore, which was higher than the relatives, friends, and groups subscores.

The correlations among overall scores and subscores in the C-SSNS differed from those in the original English scale. When comparing these correlations with the original scale (children 0.71;

relatives 0.62; friends 0.56; groups 0.30; satisfaction 0.74),[7] the results suggested that kin factors were more strongly associated with social networks among the British in the original scale, while non-kin factors showed a stronger relationship among the Chinese in this study. In addition, the children and friends subscores correlated in this study, but not the original scale. Based on their findings, Northcott and Hilari[7] concluded that people with strong family ties might have fewer friendship ties. However, Qiu et al.[34] found that the Chinese often regard close friends as family members. This may explain why the children and friends subscores correlated among the Chinese participants, diverging from the original expectation of Northcott and Hilari.[7] The factor structure of the C-SSNS was consistent with that of the original scale,[7] indicating that the Chinese translation was an accurate rendition of the original scale. The findings thus support the use of the C-SSNS in stroke populations.

Concurrent validity between the C-SSNS overall score and the Multidimensional Scale of Perceived Social Support total score, and between the C-SSNS friends subscore and the Multidimensional Scale of Perceived Social Support friends and significant others subscores was shown because the constructs matched well. Unexpectedly, the C-SSNS children subdomain did not correlate with the Multidimensional Scale of Perceived Social Support family subdomain. This might be because the C-SSNS children subdomain focuses only on children, while the family subdomain can include children, the spouse, and other people living together.

Social network weakly correlated with motor control. Similar to Podury et al.'s study,[3] which showed a positive correlation between social network density and improvements in arm motor control ($r=0.75$, $p=0.003$), in this study social network correlated with motor control ($r_s=0.32$, $p=0.001$), although the correlation was weaker than that in Podury et al.'s study.[3] This was probably because only upper limbs were investigated in Podury et al.'s study,[3] while both upper and lower limbs were considered in this study. Nevertheless, the positive relationship between social network and motor control could reflect the impact of motor impairment on social activities.[4] This could also explain the higher social network scores of those with no to mild impairment compared to those with

moderate to severe impairment.

Social network also weakly correlated with depressive symptoms (r_s=-0.37, p<0.001) in this study. This finding was consistent with that in a previous study, which also showed a negative correlation between social network and depressive symptoms (r=-0.51, p<0.001).[32] In this study, there was also a significant difference in social network scores between stroke participants with and without depressive symptoms. The probable reason for this result is that social networks may mediate depressive symptoms by buffering the effects of stigma caused by disability after a stroke. [32] Further studies are needed to investigate the reasons for the weaker correlation in our study population.

Social network also weakly correlated with fatigue and community integration in this study. The finding on the correlation between social network and fatigue was similar to that in a previous qualitative meta-ethnographic synthesis.[5] Social network correlated with fatigue probably because fatigue made socializing with other people less attractive,[4] resulting in a reduced social network. The correlation between social network and community integration in people with stroke was a new finding in this study, and might be explained by social support. Social network was found to correlate with social support in this study. With a greater social network, a person with stroke may have a higher level of social support. Social support has been found to explain 12.2% of the variance in community participation after a stroke.[35] As a new finding, further studies are needed to examine the reasons for such a correlation.

Culture may affect social networks. The reasons for this need to be further investigated. The children subscores in this study were higher than those in Northcott and Hilari's study.[7] It is possible that under the influence of Confucian notions of filial piety, children in a Chinese society perceived that providing care to their parents was an obligation.[34] Our participants also had higher group subscores than those in the study of Northcott and Hilari.[7] A possible reason for this was that about four-fifths of our participants were drawn from self-help groups or organizations. Yet the friends subscores and satisfaction subscores in this study were lower than those in Northcott and Hilari's

study.[7] The participants mentioned that the social distancing measures implemented during the COVID-19 pandemic limited their contact to people whom they had to meet. This might have led to lower friends and satisfaction subscores.

This study has some limitations. The sample size was small, with limited diversity. For example, people with aphasia could not be recruited. This limits the generalizability of the findings. In addition, the data were collected during the COVID-19 pandemic, which might have affected the social networks of the participants. Thus, caution should be taken when interpreting the findings. Furthermore, participation in rehabilitation programmes may facilitate recovery from motor impairment, but such data were not collected. Last, inter-rater reliability was not assessed.

This study has some implications for research. First, future studies with a larger sample size and a diverse population are needed to verify the application of the tool in clinical settings. Second, future studies should also be conducted to explore the nuances of the role of culture in understanding social networks. This element became more pronounced when comparing the original scale with observations made when validating the Cantonese version. Third, inter-rater reliability may be tested in the future. Fourth, further studies are warranted to examine the reasons for the weak correlations between social network and motor control, depressive symptoms, fatigue, and community integration.

The C-SSNS is applicable in clinical settings. With a reliable and valid scale, an individual's social networks can be identified and appropriate interventions can be provided. In addition, healthcare providers may also use the C-SSNS to monitor the effect of interventions, because maintaining social networks is important in stroke rehabilitation.

In conclusion, the C-SSNS was found to be a reliable and valid scale for measuring the social networks of Chinese stroke populations. This study provided support for its use in clinical settings, especially in the community. How cultural issues affect the social networks of people with stroke requires further investigation.

Clinical Messages

- The Cantonese version of the Stroke Social Network Scale has been found to be reliable and valid for measuring the social networks of community-dwelling people with stroke.
- The Cantonese version of the Stroke Social Network Scale is suitable for evaluating the effect of interventions.

Declaration of conflicting interests

None.

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Table 1 Key differences between the expressions used in the Mandarin and Cantonese versions

Items	Mandarin version[10]	Cantonese version
S1, 2, 3, 4 frequency of contact	联系频率	聯絡的頻密程度
S1-5 fairly	中度	頗
S1-5 a little	一点点	有點
L1 lonely	孤独	寂寞
C2, C3, R2, R3, F2, F3 a week	一周	一星期
WN3	积极	活躍
C3, F3, R3	WeChat, which was not present in the original version, was added for the study region	WeChat was not added for the study region
C4, F4	Changed distance from miles to kilometers	Kept the original distance in miles and add the amount of time required to drive that particular distance, because people living in the study region usually use the time required for driving when talking about distance

Table 2 Demographic characteristics of the participants

	Mean±Standard deviation
Age	64.00±6.18
Time since stroke (years)	6.76±4.44
Stroke Social Network Scale	
Overall score	55.33±13.85
Children subscore	66.94±30.19
Relatives subscore	35.55±25.43
Friends subscore	35.60±22.75
Groups subscore	49.51±28.94
Satisfaction subscore	72.56±14.73
Multidimensional Scale of Perceived Social Support	
Total score	60.74±17.91
Family subscore	22.01±6.17
Friends subscore	19.30±7.17
Significant others subscore	19.43±7.10
Fugl-Meyer Assessment	70.76±21.30
Geriatric Depression Scale	5.00±3.98
Fatigue Assessment Scale	22.40±6.71
Community Integration Measure	40.46±7.04
	N (%)
Gender	
Female / Male	42 (42.0) / 58 (58.0)
Marital status	
Married / Others	75 (75.0) / 25 (25.0)
Living alone	
Yes / No	10 (10.0) / 90 (90.0)
Working status	
With a job / Without a job	3 (3.0) / 97 (97.0)

Table 3 Internal consistency, test-retest reliability, standard error of measurement, minimal detectable change, ceiling and floor effects, and the construct validity of the Cantonese version of the Stroke Social Network Scale

		Subdomains				
	Overall	**Children**	**Relatives**	**Friends**	**Groups**	**Satisfaction**
Internal consistency (Cronbach's α)	0.78	0.80	0.67	0.67	0.76	0.82
Test-retest reliability (ICCs [95% CI])	0.93 (0.88-0.96)	0.97 (0.94-0.98)	0.95 (0.90-0.97)	0.92 (0.86-0.96)	0.95 (0.91-0.97)	0.78 (0.62-0.88)
Standard error of measurement	3.65	4.92	6.99	6.60	7.15	7.16
Minimal detectable change	10.11	13.63	19.39	18.28	19.83	19.85
Ceiling effects (%)	0.0	13.0	0.0	0.0	5.0	0.0
Floor effects (%)	0.0	3.0	18.0	15.0	17.0	0.0
Correlations with overall score (r_s)		0.67**	0.46**	0.75**	0.49**	0.44**
Correlations between subscores (r_s)	Children and relatives: 0.07 Children and friends: 0.32** Children and groups: 0.10			Relatives and friends: 0.27* Relatives and groups: 0.13 Friends and groups: 0.36**		
Correlations with Multidimensional Scale of Perceived Social Support						
Total score	0.42**					
Family subscore		0.05				
Friends subscore				0.41**		

	Significant others subscore	0.34**

CI, confidence interval; ICC, intra-class correlation coefficient.

$P<0.05$

**$P<0.01$*

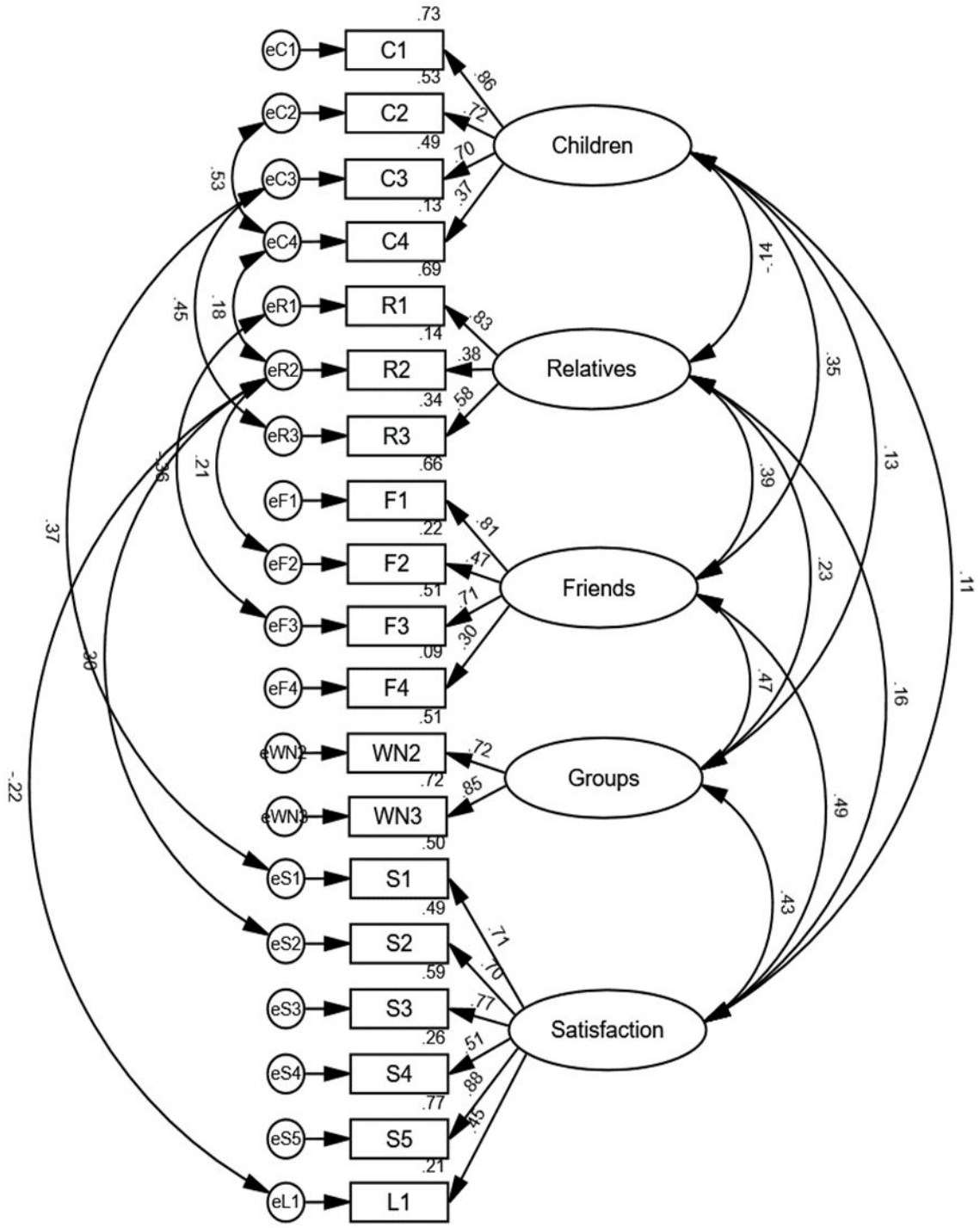

Figure 1 Confirmatory factor analysis of the Cantonese version of the Stroke Social Network Scale. Rectangles represent items in the scale, with C denoting children, F friends, L loneliness, R relatives, S satisfaction, and WN denoting a wider network. The figure on top of the rectangle is a squared multiple correlation. Circles represent measurement errors corresponding to the item. Ellipses represent latent factors. The figure on the curved line is the correlation between the two latent factors or two measurement errors. The figure on the straight line is a standardized regression weight.

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STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5-6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	6
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7-8
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7-8
Bias	9	Describe any efforts to address potential sources of bias	NA
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9-10
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	NA
		(*b*) Describe any methods used to examine subgroups and interactions	10
		(*c*) Explain how missing data were addressed	9
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	NA
		(*e*) Describe any sensitivity analyses	NA

Continued on next page

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10
		(b) Indicate number of participants with missing data for each variable of interest	10
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	NA
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	NA
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	NA
		Cross-sectional study—Report numbers of outcome events or summary measures	10-11
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-11
		(*b*) Report category boundaries when continuous variables were categorized	11
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	11
Discussion			
Key results	18	Summarise key results with reference to study objectives	11-12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	12-15
Generalisability	21	Discuss the generalisability (external validity) of the study results	15
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	NA

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.