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Feeling lonely and dissatisfied – understanding social network functioning in stroke survivors

Jia En Kam[1] and Pei Ling Choo[1*]

Abstract

Background Post-stroke social networks are associated with functional recovery. However, there is little information on the social networks of stroke survivors and whether institutionalised and community-dwelling stroke survivors view their social relationships differently.

Purpose To i) examine social networks of stroke survivors and any influencing sociodemographic factors, as well as to ii) compare differences between institutionalised and community-dwelling stroke survivors.

Methods Stroke survivors were recruited from eight healthcare institutions in Singapore. Stroke Social Network Scale (SSNS) was administered to assess the social network functioning. Multidimensional State Boredom Scale (MSBS) was used to evaluate state boredom levels.

Results 160 stroke survivors completed the study. Stroke survivors reported a mean (SD) of 53.7(17.2) on the SSNS total score. Institutionalised stroke survivors reported significantly lower SSNS scores than community-dwelling stroke survivors, ($U = 1856.5$, z=-4.234, $p < .001$). Nearly a third (30.6%, $n = 49$) of the stroke survivors reported feeling lonely. Only 28.1% ($n = 45$) stroke survivors reported being 'Very Satisfied' with their overall social network. Compared to community-dwelling stroke survivors, institutionalised stroke survivors felt more lonely (40.7%) and only 25% were very satisfied with their social network with all $p < .05$. A moderate correlation was found between SSNS 'Satisfaction' subdomain score and MSBS total score, r=-.401, $p < .001$.

Conclusions Stroke survivors had poor functioning social relationships. This study found that the perceived social support of institutionalised stroke survivors was poorer than community dwelling stroke survivors. A large proportion of stroke survivors reported feeling lonely and were not satisfied with their social networks. Identifying those at risk may be a means to prevent loneliness, increase social network satisfaction to improve well-being and quality of life.

Keywords Stroke, Social support, Social network, Loneliness, Boredom

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Introduction

According to the Singapore Stroke Registry 2020 report, there was an increase in annual stroke cases from 5890 in 2020 to 8846 in 2020 [1]. After a stroke, approximately 90% of stroke survivors suffer from some sort of disability [2]. These stroke impairments often impede stroke survivors' abilities to return to their baseline activity levels before the stroke and often experience disruptions in their relationship with their family members [3, 4]. These disruptions caused reduced contact with their wider networks [5–7]. As stroke survivors undergo many changes in their lives, shifts in post-stroke psychological and social functioning was found to be linked to mood disorders, which were prevalent in one-third of stroke [8, 9]. Indeed, post-stroke mood disorders were found to be associated with poor social functioning and quality of life [10]. Social network is defined as "the structure of one's relationships, in terms of both quality and quantity", where different individuals are connected via different types of relationships [11]. Social support is defined as the downstream of social network, and refers to the frequency, extent of support provided by individuals that encompasses one's social network [11]. Social network functioning may encompass size and composition of social network (e.g., number of children, close friends, neighbours), frequency of contact between the different groups of people, number of communities that one is involved in, and proximity (e.g., the location and distance of one between members of the network) [12, 13]. Social support was found to be one of the factors associated with reducing mood disorders like depression [14]. Perceived lack of social connection, also known as loneliness, occurs when an individual view their social connection with others as poor, social needs are inadequate and not satisfactory [15, 16]. Higher levels of loneliness evident in stroke survivors puts them at risk of cognitive decline, high morbidity and mortality [17–19]. Furthermore, social support and engagement was found to be associated with rate of post-stroke functional recovery [20]. Previous research also found that unsatisfactory social needs had an influence on quality of life [21].

Stroke survivors tend to have reduced participation in social activities, and it increased the probability for stroke survivors to be homebound and inactive [22–24]. A decrease in participation was also found to be associated with depression in the post-stroke chronic phase [25–27]. The decrease in participation in social activities was likely attributed to difficulty in maintaining contact with their peers, some experienced strains with their family members and therefore resulted in a reduction social involvement [28]. Withdrawal from social activities was found to be a predisposing factor of boredom in stroke survivor [29]. Identified factors contributing to boredom were personal factors (e.g., physical and cognitive limitations, personality and emotional state) and environmental factors (e.g., rehabilitation environment and social environment).

A previous study also compared the social networks between healthy individuals and stroke survivors using the Stroke Social Network Scale (SSNS) and found that stroke survivors fared significantly much worse than healthy individuals. Stroke survivors with and without aphasia scored 18 and 6.1 points lower than healthy individuals respectively [30]. However, the sample size was small (n=71). These findings further emphasised that social support was a key factor in post-stroke prognosis. All in all, this is an important issue to address as participation in social activities aids in an improved well-being and functional recovery [31–35].

Given the increase in annual stroke cases in Singapore and the important role that social network plays after stroke, there is a paucity in understanding the current social network in stroke survivors. Stroke studies often comprised either institutionalised stroke survivors or community-dwelling stroke survivors, but no studies thus far have compared both [36–38]. It is crucial for future implementations to target on decreasing risk of losing social network in the vulnerable population. Therefore, it is of paramount importance to explore the social network and relationships of both community-dwelling and institutionalised stroke survivors to fill the research void, considering the restricted social environment in institutions. As part of an extensive and larger study investigating the baseline physical activity, sleep and social interaction patterns in the stroke population, the current paper seeks to offer insight into understanding the social networks of the stroke community. The primary aim of this study was to (i) examine current social networks of stroke survivors. Following this, secondary aims were to (ii) compare differences in social networks between community-dwelling and institutionalised stroke survivors; (iii) identify any demographic factors influencing the perception of social support; as well as to (iv) establish associations between social network and state boredom. Addressing the research aims will allow a deeper understanding on the social needs of stroke survivors and guide healthcare institutions and policy makers to develop targeted strategies in supporting the recovery of stroke. Understanding any underlying factors contributing to risk of disconnection with social networks after stroke may allow healthcare professionals to pay attention to those at heightened risk of feeling isolated. To the authors' knowledge, this was the first study to investigate the concept of 'social network' institutionalised and community-dwelling stroke survivors.

Methods

Study design and ethics

The study adopted a multi-centre, cross-sectional design. This study was approved by the Singapore Institute of Technology-Institutional Review Board (Approval Reference: 2021131). All procedures were in accordance with the latest Declaration of Helsinki. Informed consent was obtained from the participants prior to their enrolment. Data collection took place between November 2021 and April 2023.

Participants

Stroke survivors were recruited from eight healthcare institutions- Kwong Wai Shiu Hospital (KWSH), Ang Mo Kio-Thye Hua Kwan Hospital (AMK-THKH), St. Luke's Hospital (SLH), United Medicare Centre (UMC), Active Global Caregivers (AG), Abilities Beyond Limitations and Expectations (ABLE), Methodist Welfare Services (MWS) and St Luke's ElderCare (SLEC). Stroke survivors were purposefully recruited to capture a wide spectrum of stroke chronicity and stroke severity. All stroke survivors provided written consent and were given a full explanation of the nature and purpose of the study and reminded that their participation was entirely voluntary. They were given sufficient opportunities to raise questions about the study and of what they would be expected to do. All assessments were conducted in Singapore Institute of Technology (SIT), public areas, or the clinical sites that the stroke survivors were with.

Inclusion criteria included people who were (i) aged 21 years old and above; (ii) experienced a confirmed first or recurrent stroke and ii) are medically stable. Stroke survivors were excluded if they (i) were medically unstable; (ii) had conditions that limited limb use prior to stroke; and (iii) were unable to fully participate in the study (i.e., due to conditions like dementia). Stroke survivors who dropped out were replaced.

Demographics and stroke characteristics

Baseline sociodemographic data was collected from the stroke survivors, including age, gender and stroke characteristics. Stroke severity was assessed using the Fugl Meyer Assessment for Upper Extremity (FMA-UE), a widely used tool to assess the paretic upper limb function after stroke [39].This tool had been found to have good intra and inter-rater reliability and was scored out of 66 points [40]. Stratification was based on cut-off scores previously defined with 51–66 (mild), 23–50 (moderate), and 0–22 (severe) [41]. Time since stroke was based on previously defined critical time points after stroke: 1–7 days (acute), 7 days to 3 months (early subacute), 3 to 6 months (late subacute), and more than 6 months (chronic) [42]. For the purpose of this study, statistical tests were done using raw scores of the FMA. Participants were also categorised into different groups of assistance: Independent/Supervision (participants who were able to ambulate independently or with supervision but with no physical assistance from any person), Minimal Assistance (Min A) (participants who were able to ambulate with a bit of physical assistance from one person supporting about a quarter of their body weight), Moderate Assistance (Mod A) (participants who were able to ambulate with some physical assistance from one person supporting about half of their body weight), Maximal Assistance (Max A) (participants who were able to ambulate with a lot of physical assistance from one or more people supporting about three quarters or more of their body weight), and Non-ambulant (participants who were not able to ambulate).

Stroke survivors were required to complete questionnaires pertaining to their sleepiness, sleep quality, fatigue, state boredom and social interaction during a session which lasts for approximately one to two hours. Questionnaires-related data were collected using pen and paper, in the presence of research team members. Participants were assessed using the following questionnaires:

Stroke social network scale (SSNS)

Social network was assessed using the Stroke Social Network Scale to assess social network in the stroke population to measure self-reported post stroke social network functioning [30]. The questionnaire was interview-administered and done using pen-and-paper. The SSNS was developed to assess social network in the stroke population across 5 subdomain scores that made up the component of the SSNS included (1) Size of network, (2) Composition of network, (3) Frequency of contact, (4) Proximity, and (5) Satisfaction with network [30]. Stroke survivors were required to answer questions on the SSNS relating to the past month only and the scores range from 0 to 100. Higher scores indicate better and more social networks. Lower scores reflect lesser social ties. The SSNS has shown to have good internal acceptability, internal consistency, validity and responsiveness to change [30]. The authors also delved into one's satisfaction with the social network, as well as the loneliness frequency.

Multidimensional state boredom scale (MSBS)

Boredom was assessed using the Multidimensional State Boredom Scale (MSBS), a 29-item scale, which includes measures of five dimensions, comprising (i) disengagement; (ii) high arousal; (iii) inattention; (iv) low arousal; and (v) time perception [43]. It utilises a 7-point Likert scale, ranging from 1('strongly disagree) to 7('strongly agree). Higher total scores indicated more state boredom experienced by one in that present moment [43, 44]. Similarly, higher scores on each of the dimensions

(disengagement, high arousal, inattention, low arousal and time perception), reflect elevated levels of disengagement, high arousal, inattention, low arousal. The MSBS has shown good internal consistency as well as good construct validity [45].

Data analysis

Statistical analysis was performed using the IBM Statistical Package for the Social Sciences (SPSS) (Version 29.0). Descriptive statistics were used to describe the sociodemographic data and SSNS scores of all 160 stroke survivors. Normality of the data was assessed using the Shapiro-Wilk test as the total sample size was less than 2000 ($n=160$). Non-parametric tests were conducted for non-normal data distributions. Mann Whitney U was used to assess for any differences in SSNS scores between the institutionalised and community-dwelling stroke survivors. Spearman's rank correlation coefficient evaluated the association between SSNS and MSBS scores. Strength of the correlations were interpreted as follows: values between 0 and +0.3 indicate a weak relationship, +0.3 and +0.7 indicate a moderate relationship, +0.7 and 1.0 indicate a strong relationship [46]. All findings were reported at a statistical significance of $p<.05$.

Results

A total of 160 stroke survivors, including 96 community-dwelling stroke survivors and 64 institutionalised stroke survivors, completed this study. One stroke survivor dropped out from the study due to an early transfer to another hospital. Demographic data are reported in Table 1. Majority of the stroke survivors were males (62.5%, $n=100$). Stroke survivors had a mean age of 65.7 and ranged from 24 to 64 years old (SD=12.8). Mean FMA-UE score was 40.3 (SD=20.5). Most of the stroke survivors were in the chronic phase of stroke (80%, $n=128$). 54% of the stroke survivors ambulated independently (54.4%, $n=87$).

Table 1 Participant characteristics

	Community-dwelling ($n=96$)	Institutionalized ($n=64$)	All ($n=160$)
Age			
Mean (SD)	59.8 (13.2)	67.0 (11.0)	65.7 (12.8)
Range	24–88	37–87	24–64
Gender			
Female	36(37.5%)	24 (37.5%)	60 (37.5%)
Male	60 (62.5%)	40 (62.5%)	100 (62.5%)
Stroke type			
Haemorrhagic	44 (45.8%)	19 (29.7%)	63 (39.4%)
Ischemic	48 (50.0%)	37 (57.8%)	85 (53.1%)
Both*	1 (1.0%)	4 (6.3%)	5 (3.1%)
Not determined	3 (3.1%)	4 (6.3%)	7 (4.4%)
Hemisphere affected			
Left	40 (41.7%)	20 (31.3%)	60 (37.5%)
Right	52 (54.2%)	36 (56.3%)	88 (55.0%)
Bilateral	4 (4.2%)	8 (12.5%)	12 (7.5%)
Fugl Meyer Assessment (FMA) Score			
Mean (SD)	40.9 (19.8)	39.4 (21.5)	40.3 (20.5)
Range	8–66	5–66	5–66
Time since stroke			
Acute	-	1 (1.6%)	1 (0.6%)
Early subacute	2 (2.1%)	19 (29.7%)	21 (13.1%)
Late subacute	2 (2.1%)	8 (12.5%)	10 (6.3%)
Chronic	92 (95.8%)	36 (56.3%)	128 (80.0%)
Level of walking assistance			
Independently	80 (83.3%)	7 (10.9%)	87 (54.4%)
Supervision	14 (14.6)	10 (15.6%)	24 (15.0%)
Min A	1 (1.0%)	18 (28.1%)	19 (11.9%)
Mod A	-	4 (6.3%)	4 (2.5%)
Max A	1 (1.0%)	15 (23.4%)	16 (10.0%)
Non-ambulant	-	10 (15.6%)	10 (6.3%)

*Both = Stroke survivors who have suffered multiple strokes of both haemorrhagic and ischaemic strokes or suffered a haemorrhagic to ischemic stroke conversion.
SD = Standard deviation, *n* = Sample size

Table 2 presents stroke survivors' scores on the SSNS. Mean(SD) SSNS total scores indicating size, composition, frequency of contact, proximity and satisfaction with social network ($n=160$) were 53.7(17.2) out of 100. Mean subdomain scores were as follows: 'Children' subdomain scores of 59.3 (SD=33.18), 'Relatives' subdomain scores of 35.9 (SD=28.3), 'Friends' subdomain scores of 35.6 (SD=28), 'Groups' subdomain scores of 35.1 (SD=36), and 'Satisfaction with social network' subdomain scores' of 77.2 (SD=18.9). These results indicated that stroke survivors had .likely had few or no children, relatives, friends and groups, and had low frequency of contact with them. They likely had more distal or no networks, and were likely dissatisfied with their social network.

Institutionalised stroke survivors had significantly lower total scores on the SSNS than community dwelling-stroke survivors, (U=1856.5, z=-4.234, $p<.001$) (see Fig. 1). Institutionalised stroke survivors scored significantly lower than community-dwelling stroke survivors for 'children' subdomain (U=2139.5, z=-3.255, $p=.001$, z=-3.255), 'relatives' subdomain (U=2388.5, z=-2.401, $p=.016$), 'friends' subdomain (U=2304, z=-2.701, $p=.007$), 'groups' subdomain (U=2282, z=-2.914, p=.004), and 'satisfaction' domain (U=2261, z=-2.827 p=.005) with all p-values<.05. This difference meant that institutionalised stroke survivors had significantly lesser social ties compared to community-dwelling stroke survivors.

30.6% ($n=49$) of the stroke survivors reported feeling lonely 'Some of the time', 'Most of the Time' and 'All of the Time'. Only 28.1% ($n=45$) of the stroke survivors reported being 'Very satisfied' with their social network. The results indicated that despite the minority of stroke survivors feeling lonely for a great proportion of time

Table 2 SSNS score for Community-dwelling, Institutionalized, and all stroke survivors

	Community-dwelling ($n=96$)	Institutionalized ($n=64$)	All ($n=160$)
SSNS total score			
Mean (SD)	58.8 (12.9), p<.001**	46.1 (19.9), p<.001**	53.7 (17.2)
Range	20.8–83	0-92.4	0-92.4
'Children' subdomain			
Mean (SD)	65.9 (32.1), p=.001*	49.3 (32.6), p=.001*	59.3 (33.2)
Median (IQR)	75 (55.3)	50 (32.6)	71.3 (62.5)
'Relatives' subdomain			
Mean (SD)	39.7 (26.1), p=.016*	30.1 (30.7), p=.016*	35.9 (28.3)
Median (IQR)	44.3 (44.3)	25 (50)	37.7 (56.4)
'Friends' subdomain			
Mean	40.7 (25.9), p=.007*	27.9 (29.4), p=.007*	35.6 (28.0)
Median (IQR)	42.4 (40.9)	20.9 (53.1)	38.5 (56.0)
'Groups' subdomain			
Mean	42 (24.7), p=.004*	35.4 (34.5), p=.004*	35.1 (36.0)
Median	50 (67.0)	0 (62.4)	33 (66.5)
'Satisfaction' subdomain			
Mean	81.3 (14.1), p=.005*	71 (23.1), p=.005*	77.2 (18.9)
Median	83.3 (16.7)	75.4 (22.3)	82.1 (20.0)
Loneliness frequency			
Never lonely	45 (46.9%)	24 (37.5%)	69 (43.1%)
A little of the time	28 (29.2%)	14 (21.9%)	42 (26.3%)
Some of the time	15 (15.6%)	14 (21.9%)	29 (18.1%)
Most of the time	6 (6.3%)	6 (9.4%)	12 (7.5%)
All of the Time	2 (2.1%)	6 (9.4%)	8 (5.0%)
Satisfaction with social network			
Very satisfied	29 (30.2%)	16 (25.0%)	45 (28.1%)
Fairly satisfied	45 (46.9%)	26 (40.6%)	71 (44.4%)
A little satisfied	17 (17.7%)	12 (18.8%)	29 (18.1%)
A little dissatisfied	4 (4.2%)	3 (4.7%)	7 (4.4%)
Fairly dissatisfied	1 (1.0%)	2 (3.1%)	3 (1.9%)
Very dissatisfied	-	5 (7.8%)	5 (3.1%)

*SSNS=Stroke Social Network Scale

SD=standard deviation, n=sample size, IQR=Interquartile range

*$p<.05$, **$p<.001$

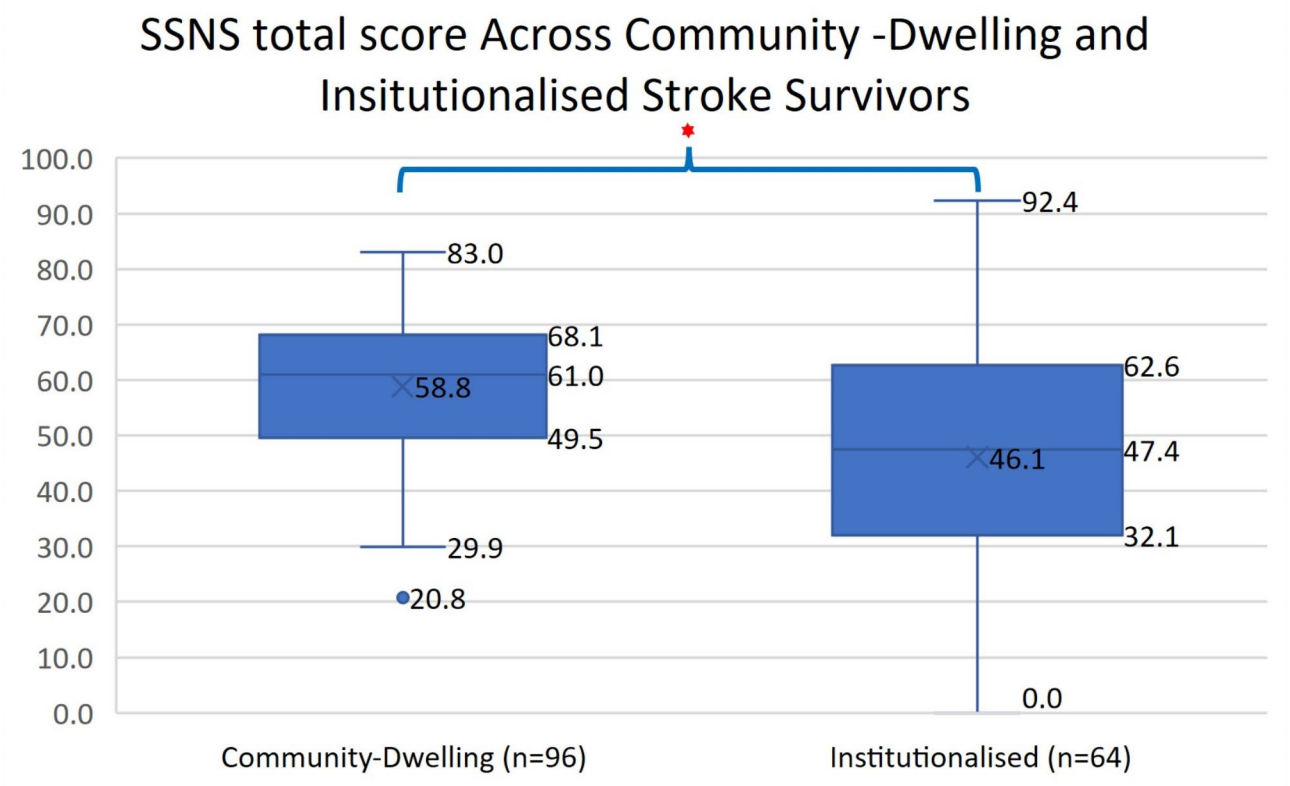

Fig. 1 SSNS total score across community-dwelling and institutionalized stroke survivors

and most of them were dissatisfied with their social network.40.7% of institutionalised stroke survivors and 24% of community-dwelling stroke survivors reported feeling lonely 'Some of the time', 'Most of the time', and 'All of the time'. 30.2% of institutionalised stroke survivors and 25.0% of community-dwelling stroke survivors were 'Very satisfied' with their social network. A Mann-Whitney *U* test revealed a significant difference in the frequency of loneliness between community-dwelling and institutionalised stroke survivors, *2535* (Z=[-1.977]), $p=.048$. A significant difference in the Satisfaction domain was also found between the two groups, *2261*=([Z=-2.827]), $p=.005$. These results indicated that a greater proportion of institutionalised stroke survivors were found to be lonely more often and were less satisfied with their social networks than community-dwelling stroke survivors.

SSNS total scores and its subdomains did not differ significantly across stroke chronicity, stroke severities and other demographic factors. However, a significant difference in SSNS 'group' subdomain scores for all 160 stroke survivors was found between male and female stroke survivors, [U=2343.5, z =-2.451, $r=-.19$, $p=.014$]. Male stroke survivors had significantly lower SSNS 'group' subdomain scores (mean rank of 74.0) compared to females (mean rank of 91.4). This meant that female stroke survivors reported significantly higher 'group' subdomain scores than males. A significantly moderate correlation was found between age and 'friends' subdomain scores ($r=-.305$, $p<.001$). This suggested that as age increased, 'friends' subdomain scores decreased.

Significant differences in the SSNS total score were also observed between the different groups of level of assistance in ambulation, x^2 [4]=21.208, $p<.001$ (see Fig. 2). Post-hoc pairwise comparisons revealed a significant difference in SSNS scores between stroke survivors who ambulated independently/with supervision and those who ambulated with maximal assistance, z=-2.350, $p=.019$. A significant difference was also shown between stroke survivors who ambulated independently/with supervision and those who were non-ambulatory, z=-4.189, $p<.001$. These results indicated that stroke survivors who ambulated with maximal assistance or those who were non-ambulant had significantly lower SSNS total scores than stroke survivors who ambulated independently/with supervision.

An association between SSNS and MSBS total scores revealed a weak correlation between SSNS total score and MSBS total score ($r=-.262$, $p<.001$) (see Fig. 3).

A moderate correlation was found between SSNS 'Satisfaction' Subdomain Score and MSBS total score, $r=-.401$, $p<.001$ (see Fig. 4).

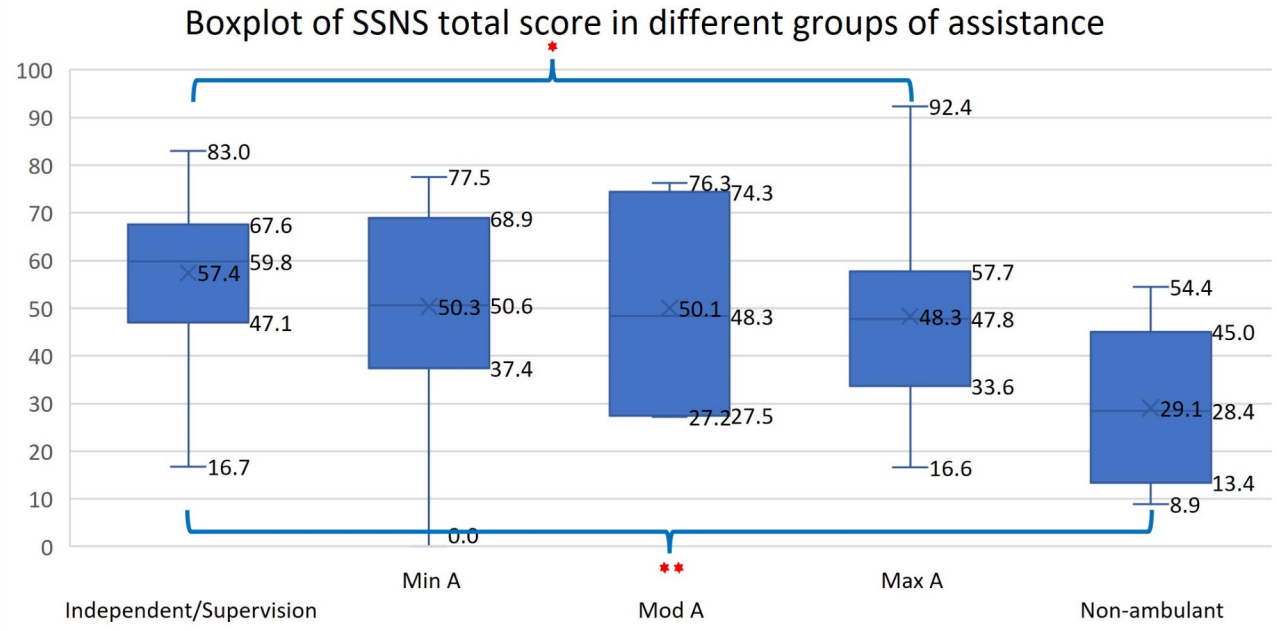

Fig. 2 Boxplot of SSNS total score in different groups of assistance, *=$p < .05$, **=$p < .001$

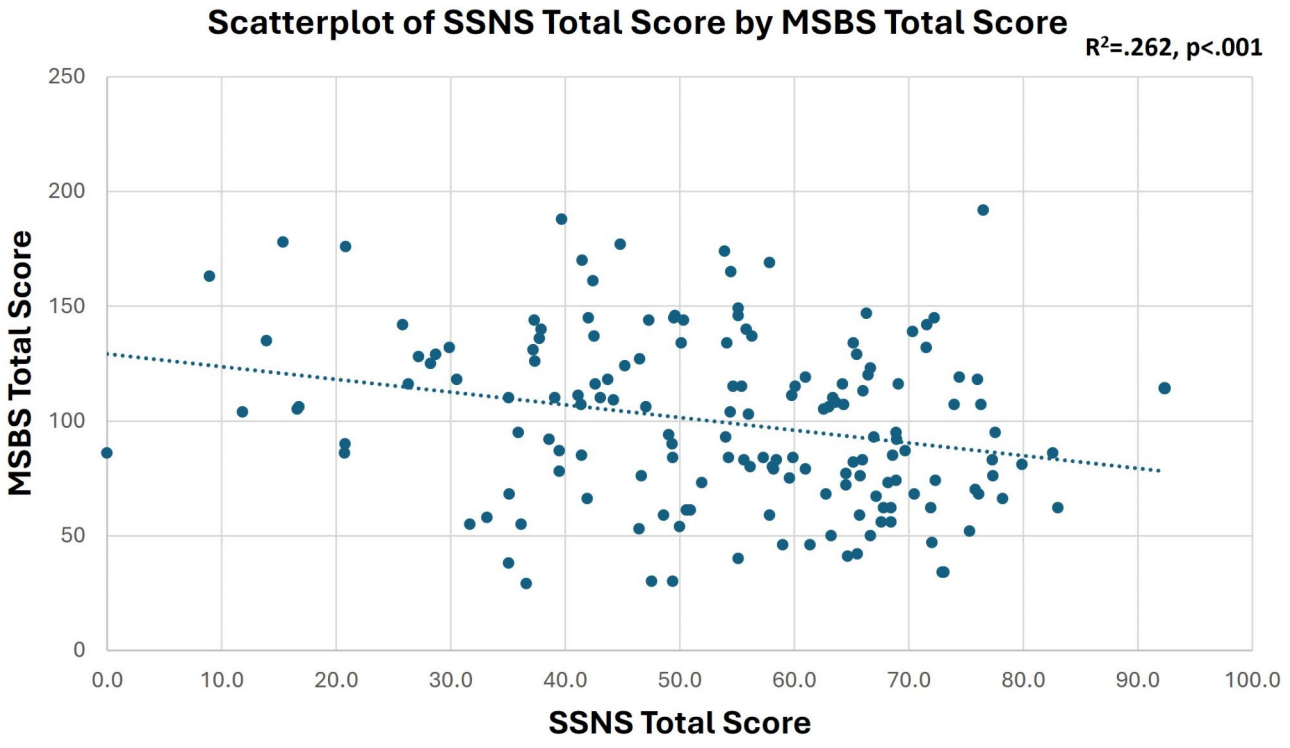

Fig. 3 Scatterplot of SSNS total score with MSBS total score

Discussion

The current study compared the social network functioning of community dwelling stroke survivors and institutionalised stroke survivors. This study was required as there was little information about social networks after stroke, and no studies attempted to compare the social network between institutionalised and community-dwelling stroke survivors. To the authors' knowledge, this was the first study to compare the SSNS scores across institutionalised and community-dwelling stroke survivors and assess the differences in perception of social support between the two groups.

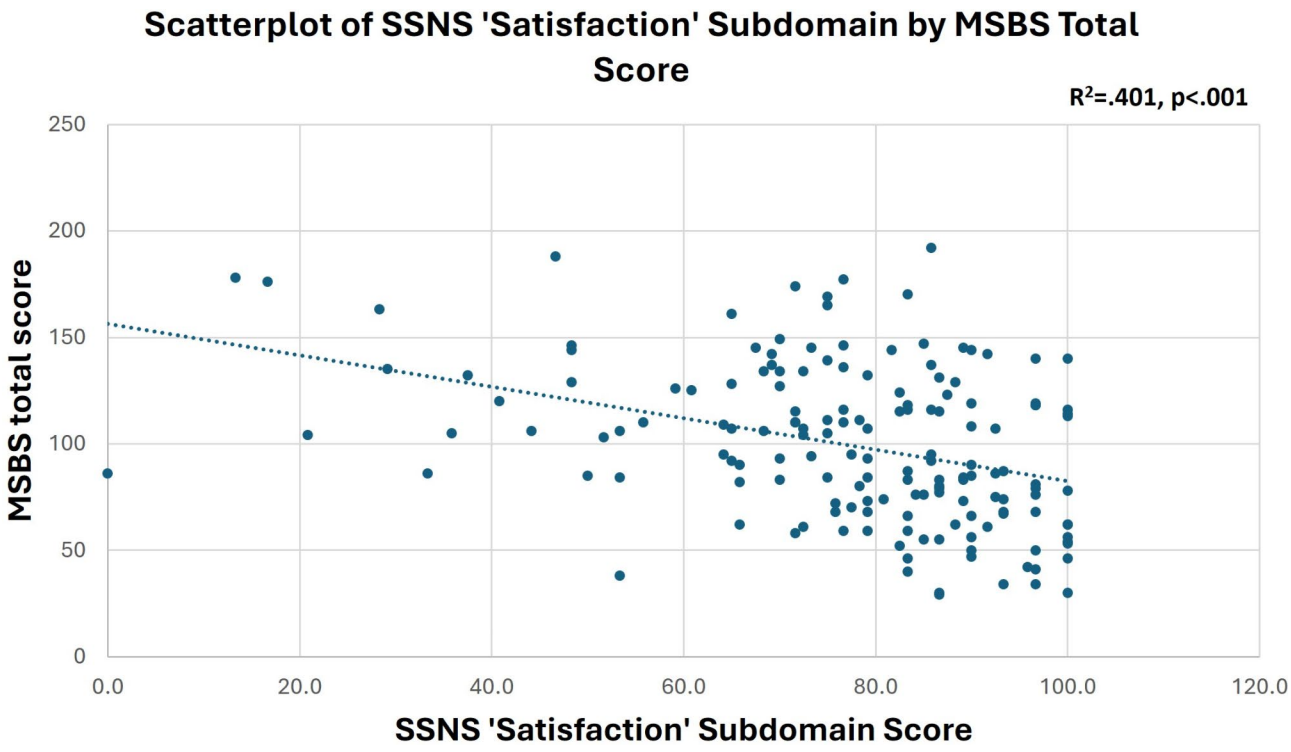

Fig. 4 Scatterplot of SSNS satisfaction subdomain score with MSBS total score

One of the key findings of this study was that the means of SSNS total score and subdomain scores for all 160 stroke survivors were low. When comparing the results of the SSNS scores in this study with previous research investigating SSNS scores between healthy individuals and those with stroke (with or without aphasia), stroke survivors consistently had lower SSNS scores healthy controls, across all components (Children, Relatives, Friends, Groups and Satisfaction) [47].

[47]Nevertheless, the low scores observed in this study were concerning as it suggested that stroke survivors had vulnerable social networks and low perceived social support. This finding was comparable with previous research that stroke survivors were prone to having decreased contact with their social network [5, 6]. A previous research found that over half of the stroke survivors in Singapore reported being dissatisfied with their social relationships, feeling lonely and longed for more contact with their children [48]. Stroke survivors were found to be at least 70% more susceptible to feeling lonelier than healthy individuals [17]. This was not surprising as stroke survivors experience shifts in their social network, which might indicate a heightened risk to lose social connections after stroke [49].

Compared to community-dwelling stroke survivors, a key finding was that institutionalised stroke survivors had poorer social networks. Less than one-third of stroke survivors were very satisfied with their social network. Previous research suggested that following a stroke, admission into an institution removes the stroke survivor from their familiar environments and this may induce loneliness, reduced contact with their social network [47, 50]. Patients typically spend more than half of their day being alone and interactions with hospital staff were brief, infrequent and recovery oriented [51, 52]. This suggested that institutionalised stroke survivors were more susceptible to feeling disconnected with more extensive social relationships during their inpatient stay. The differences between instutionalised and community stroke survivors in perception of social network further highlighted that future research studies need to understand them as two separate groups. There is a need to focus on building and maintaining social networks of stroke survivors to increase satisfaction, reduce loneliness and boredom. Such strategies may include encouraging more social interactions in rehabilitation centres or institutions, in hopes of increasing social participation. While more focus had been placed on physical recovery, stroke services can incorporate more activities associated with social, emotional and mental well-being and this finding further emphasized the importance of paying attention to the more vulnerable stroke survivors.

[17, 48].

Stroke survivors who were ambulating independently or with supervision had significantly better social network functioning than stroke survivors who ambulated

with maximal assistance and those who were non-ambulant. In addition, previous research attempted to explain the rationale behind changes in a person's network type and identified that the ability to leave the house was one of the factors in enabling stroke survivors to maintain contact with people [53]. This suggested that mobility statuses affected the maintenance of social relationships. Having a reduction in more extensive social contact was a significant factor in increasing the risk of depression. More focus needs to be placed on those who are less mobile to encourage more social engagements despite their mobility statuses.

Key findings from this study supported previous that stroke survivors had decreased contact and felt dissatisfied with their relationships [5, 6]. Maintaining social relationships had been found to be one of the key factors in raising health related quality of life and improving post-stroke functional recovery [54]. Developing strategies to increase post-stroke social engagement is imperative, even more so in institutionalised stroke survivors. Given that social support influences post-stroke recovery, strategies can focus on encouraging the maintenance of social relationships in hopes of improving functional recovery, well-being and quality of life after stroke [54].

Study strengths and limitations

A significant strength of this study included the participant pool from both institutions as well as community-dwelling. To the authors' knowledge, there had been no stroke studies investigating the social network scores in the stroke population of both institutionalised and community-dwelling stroke survivors. This can pave the way for future stroke research targeted towards different stroke populations to cater to their different needs. This study highlighted that institutionalised and community-dwelling stroke survivors should be viewed as two separate groups, which may fuel future research in developing strategies to improve the social engagements of those who are more susceptible to feeling disconnected.

As with all questionnaires, the answers on the SSNS were self-reported by the stroke survivors and may be subject to response bias. If stroke survivors in the current study provided inaccurate responses to conform to social norms, the results from our study may not be accurate. Another limitation included the absence of participants' marital statuses. Previous research showed that marital status is one of the factors in influencing an individual's views on their social relationships [55, 56]. Another limitation of the study included the lack of an age and gender-matched healthy control group, which could have allowed for more accurate comparisons between various demographic factors. In addition, this study was conducted over the COVID-19 period. Lower scores observed could be attributed to the rules and regulations set by the relevant government bodies which was exceptionally more stringent in institutions to curb the spread of the virus and may be a confounding factor.

Conclusion and clinical implications

This study demonstrated that stroke survivors had low SSNS scores, which may indicate poor social networks. This meant that stroke survivors are at risk of feeling disconnected with their social networks after stroke, most of them with few or no children, relatives, friends and groups, and had low frequency of contact with them. They likely had more distal or no networks, and were likely dissatisfied with their social network.

Institutionalised stroke survivors had lower SSNS total scores as compared to community-dwelling stroke survivors and were less satisfied with their social networks than community-dwelling stroke survivors. This meant that institutionalised stroke survivors had less frequent contact with their children, friends and family, and this could be attributed to the restrictive environment of the institution where visiting hours must be adhered to. Our results indicate that approximately one in three stroke survivors experience loneliness. Only 28.1% of the stroke survivors were very satisfied with their social network. These findings emphasised the importance of providing social and emotional support for stroke survivors.

Considering that stroke survivors have long-term social needs, it is important to raise awareness so that healthcare personnel can target those at risk. Stroke services can help stroke survivors by identifying any emotional or psychological symptoms resulting from social issues and provide or help them seek for the support that they require. Transition from a familiar neighbourhood into an institutional setting can often be difficult for the stroke survivor. Given that staff and patient interactions are centered on solely recovery, one way to improve the social support of stroke survivors is to build rapport with them by having active conversations with them. It is crucial that staff aid stroke survivors with the adjustment as much as possible, encourage social interaction in hope of decreasing loneliness, satisfaction, and loss of identity.

Abbreviations

KWSH	Kwong Wai Shiu Hospital
AMK-THKH	Ang Mo Kio-Thye Hua Kwan Hospital
SLH	St. Luke's Hospital
UMC	United Medicare Centre
AG	Active Global Caregivers
ABLE	Abilities Beyond Limitations and Expectations
MWS	Methodist Welfare Services
SLEC	St Luke's ElderCare
FMA-UE	Fugl Meyer Assessment for Upper Extremity
SSNS	Stroke Social Network Scale
MSBS	Multidimensional State Boredom Scale
SD	Standard Deviation
IQR	Interquartile Range

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Author contributions
Co-Investigator J.E.K: collection of data; analysis of data; interpretation of data; and wrote the main manuscript text. Principal Investigator P.L.C: conception of the study; design of the study; co-ordination of the study; collection of data; analysis of data; interpretation of data; and commented on written drafts of the manuscript. All authors reviewed and approved the final manuscript.

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Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
This study, which was approved by the Singapore Institute of Technology-Institutional Review Board (Approval Reference: 2021131), was conducted in accordance with the latest Declaration of Helsinki. Informed consent was obtained from the participants prior to their enrolment. Participants were given the Participant Information Sheet and provided the opportunity to ask all questions before enrolling in the study. Data collection took place between November 2021 and April 2023.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Conflict of interest
The Author(s) declare(s) that there is no conflict of interest.

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