



A pilot study of the Thai version of the Stroke and Aphasia Quality of Life Scale-39g (SAQOL-39gTH)

Kulwadee Yolwong*¹, Jeanjai Jeeraumporn¹, Sumalee Dechongkit¹, and Sawitri Thayansin²

¹Department of Communication Sciences and Disorders, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Phaya Thai campus, Bangkok, Thailand

²National Institute for Child and Family Development, Mahidol University, Salaya campus, Nakorn Pathom, Thailand

*Corresponding author, E-mail: kulwadee.yol@mahidol.ac.th

Abstract

1) *Introduction:* Aphasia is a communication disorder caused by brain damage, most frequently strokes. People with aphasia may have a poorer quality of life due to their communication difficulties. An important goal of speech and language therapy is to enhance the communication abilities and quality of life of people with communication disorders. The Stroke and Aphasia Quality of Life Scale-39g (SAQOL-39g) involves measuring these important clinical outcomes. 2) *Objectives:* This study aimed to translate the SAQOL-39g into Thai and assess its psychometric properties. 3) *Methodology:* For this descriptive study, a sample of 30 people with aphasia were given an interview-based questionnaire. Missing data and floor/ceiling effects were used to evaluate acceptability. The Content Validity Index (CVI) was used to measure the validity, whereas Cronbach's α was employed to determine the reliability. 4) *Result and Discussion:* This study found that the SAQOL-39gTH is acceptable (no missing data and no floor/ceiling effects), with excellent content validity and internal consistency (CVI = 1.00; Cronbach's α for the overall scale = 0.908 and subscales = 0.844–0.895), but 17 items showed negative skewness and 8 items showed item-total correlation below 0.30. The skewed data could be due to the small sample size and/or participants' ability to cope with chronic aphasia, and the disturbance in correlation could be caused by item content. 5) *Conclusions:* The SAQOL-39gTH is a valid instrument for assessing the health-related quality of life of Thai people with aphasia. However, larger sample size investigations of this instrument's psychometric properties are recommended.

Keywords: quality of life, stroke, aphasia, the SAQOL-39g

1. Introduction

People are social beings who express their thoughts, emotions, and ideas with one another through a process known as communication. Communication's main purpose is to build and maintain human relationships between people (Threats & Worrall, 2004). Due to their speech and language impairments, some individuals, such as those with aphasia will experience limitations in their daily living activities (Cruice, Hill, Worrall, & Hickson, 2010; Darrigrand et al., 2011). A limitation in activity may also be the result of feelings of social isolation and exclusion (Davidson, Howe, Worrall, Hickson, & Togher, 2008; Nyström, 2006). Engelter et al (2006) did a study that showed stroke survivors with aphasia might have a lower quality of life in the long run than those without aphasia. In addition, many studies have shown that people with aphasia are more likely to be depressed, have less social interaction, and have a lower quality of life than those without aphasia (Cruice, Worrall, & Hickson, 2006; Hilari, 2011). Following that, the communication skills of people with aphasia are linked to their quality of life.

Aphasia is a brain damage-related communication disorder. It has a significant impact on speaking, listening, reading, and writing. Aphasia is not the result of a mental disorder or a general intellectual deficit, but strokes and cerebrovascular diseases are the leading causes of aphasia (Hallowell & Chapey, 2008). Approximately One-third of acute stroke survivors had aphasia, according to numerous studies (Dickey et al., 2010; Engelter et al., 2006). Moreover, strokes are more prevalent in the elderly population (Benjamin,

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Muntner, & Bittencourt, 2019; Suwanwela, 2014). According to the findings of a Thai epidemiological stroke study, 1.88% of people in Thailand between the ages of 45 and 80 have experienced a stroke (Suwanwela, 2014). Stroke has also been identified as the leading cause of disability among Thais aged 60 and older (International Health Policy Program Thailand, 2018). Between 2007 and 2021, the elderly population in Thailand has risen from 10.7% to 19% of the total population (Foundation of Thai Gerontology Research and Development institute, 2016, 2022). Consequently, the risk of aphasia following a stroke rose with age (Dickey et al., 2010; Engelter et al., 2006). To reiterate, aphasia can negatively impact the daily lives and well-being of individuals. Therefore, it is essential to develop treatment plans that will help this population live happier and have a better quality of life.

According to the American Speech-Language-Hearing Association's (2016) Scope of Practice in Speech-Language Pathology, "the overall goal of speech-language pathology services is to optimize people's abilities to communicate and swallow, thereby improving their quality of life." Similar statements can be found in the Clinical Guidelines of the Royal College of Speech and Language Therapists (2005). These guidelines include enhanced communication and improved quality of life as desired outcomes of effective rehabilitations. However, the first step in achieving these rehabilitation outcomes is to collect data on the quality of life. The information gathered directly from a person would help therapists make more accurate rehabilitation plans and understand how aphasia affects people's daily lives (Worrall & Holland, 2003). To help people with aphasia live a better life, the speech-language pathologists can use the quality of life assessment instruments to review and modify the speech and language therapy plan during the speech and language therapy program.

Hilari, Byng, Lamping, and Smith (2003) developed the Stroke and Aphasia Quality of Life Scale-39 (SAQOL-39), a formal instrument for measuring health-related quality of life that was made just for people with aphasia. In contrast to previous studies on developing a health-related quality of life instrument for people with strokes and aphasia (Duncan et al., 1999; Williams, Weinberger, Harris, Clark, & Biller, 1999), Hilari's study (2003) included participants with aphasia. They developed the SAQOL-39 from the Stroke-Specific Quality of Life Scale (SS-QOL). They changed the format of the instrument and made the questions easier for people with aphasia to answer. Later, they modified the SAQOL-39 and renamed it the SAQOL-39g (Hilari et al., 2009). In their study (2009), it was shown that the SAQOL-39g is a complete and useful tool to measure the quality of life of stroke and aphasia patients. Internal consistency was satisfactory (Cronbach's $\alpha = 0.95$ for the overall scale, 0.92-0.95 for domains). High test-retest reliability was observed (ICC for overall scale = 0.96, ICC for domains = 0.92-0.98). The convergent validity ($r = 0.36-0.70$ overall, 0.47-0.78 domains) and discriminant validity ($r = 0.26$ overall, 0.03-0.40 domains) showed clear validity.

The SAQOL-39g consists of 39 questions divided into the physical, communication, and psychosocial domains. All of the questions refer to events from the previous week. The physical domain includes a total of 16 items that assess self-care (SC), mobility (M), work (W), and upper extremities (UE). The communication domain consists of 7 items that assess language function (L) and the impact of language difficulties on family and social life (items FR9 and SR8). The psychosocial domain contains a total of 16 items that assess thinking (T), personality (P), mood (MD), energy and fatigue (E), and the impact of language difficulties on family and social life (items FR7, SR1, SR4, SR5, SR7). This tool uses a Likert scale score, which ranges from 1 to 5. The better the score, the higher the quality of life.

The Thai version of the Stroke Impact Scale was a health-related quality of life assessment tool for stroke survivors in Thailand (SIS) (Garnjanagoonchorn & Dajpratham, 2015). However, neither the original nor the Thai versions of the SIS included people with aphasia. In Thailand, there is no particular instrument to assess the quality of life for aphasia patients. Therefore, the main goal of this study was to translate the SAQOL-39g into Thai (SAQOL-39gTH) in order to provide Thai people with aphasia with a specific formal quality of life instrument.



2. Objectives

The purposes of the study were

- 1) To translate the Stroke and Aphasia Quality of Life Scales-39g (SAQOL-39) into the Thai language.
- 2) To evaluate the validity, acceptability, and reliability of the Thai version of the SAQOL-39g (SAQOL-39gTH).

The study hypotheses were that 1) the SAQOL-39gTH satisfied the criteria for acceptability in terms of missing data less than 10%, floor/ceiling effects less than 80%, and skewness ($>\pm 1$) on no more than 25% of the items (Hilari et al., 2003). 2) Based on an item-level content validity index (I-CVI) of 1.00, the SAQOL-39gTH has an acceptable level of content validity (Polit & Beck, 2006; Streiner & Norman, 2008). 3) The SAQOL-39gTH has excellent internal consistency (reliability) if the Cronbach's α coefficient is 0.70 or higher (Lohr, 2002; Streiner & Norman, 2008).

3. Materials and Methods

This was a cross-sectional interview-based questionnaire study. The study's procedures consisted of three steps: 1) translation of the original version of the SAQOL-39g into Thai by using a cross-cultural translation method 2) collecting data on the Thai participants with aphasia, and 3) evaluating the psychometric properties of the SAQOL-39gTH. On February 19, 2018, the author of the original version of the SAQOL-39g authorized its translation into Thai. This study was approved by the Ethics Committee of the Faculty of Medicine, Ramathibodi Hospital, Mahidol University (COA. MURA2019/543).

3.1 Participants

Thirty people with aphasia were recruited from the speech and language clinic and the outpatient department (OPD) of the Department of Medicine at Ramathibodi Hospital. Thirty aphasia patients were chosen as the sample size for the following reasons: First, from 2015 to 2018, the median number of adults with aphasia who received speech and language therapy at the speech and language clinic at Ramathibodi Hospital was 47 people per year, as shown in Table 1. The sample size of thirty people was nearly equal to the population. Consequently, the sampling distribution will differ slightly from the population distribution. Second, according to statistical references, when the sample size is thirty or more, the data are approximately normally distributed (Hogg, Tanis, & Zimmerman, 2015). Therefore, based on these considerations, the sample consisted of thirty aphasia individuals.

Table 1: A number of people with aphasia who had speech and language therapy at the speech and language clinic, at Ramathibodi Hospital in each year: 2015 – 2018

Year	2015	2016	2017	2018
A number of people with aphasia	43	49	93	45

Participants in the study were at least 18 years old, had aphasia due to a stroke that occurred at least six months prior, had no history of cognitive decline, psychiatric disorders, or visual or hearing impairment, and had basic reading and writing skills and a minimum sixth-grade education level (elementary school). Additionally, participants were native Thai speakers who understood standard Thai. For the validity of self-reported questionnaire scores, participants must have met the criteria of the auditory comprehension subtest of the Thai adaptation of the Western Aphasia Battery (WAB) by scoring at least 48 out of 60 on the yes/no questions section and at least 5 out of 10 for the overall subtest (Cruice et al., 2010; Teerapong, 2000). Participants were excluded if they had a known cognitive decline prior to stroke, a history of psychiatric disorders, a severe concomitant disease, or were currently receiving medical treatment. All participants signed informed written consent forms. The data were collected between April and November 2019.



3.2 Materials

The researchers obtained the participants' illness histories from their medical records and collected their demographic information using a case record form. The adapted version of the auditory comprehension subtest of the Thai Adaptation of the Western Aphasia Battery (WAB) was used to assess the participants' comprehension ability. The Thai version of the Stroke and Aphasia Quality of Life Scale-39g (SAQOL-39gTH) was administered to evaluate the psychometric properties of this instrument. A video recorder was utilized to verify data completeness during data collection. SPSS statistical software version 18.0 for Windows was used to analyze the data.

3.3 Procedures

Step 1: Translation process

After the authors of the original study granted permission to translate the original SAQOL-39g version into Thai, the cross-cultural forward and backward translation method was applied to maintain the conceptual equivalence of the instruments (Lohr, 2002).

1) Forward translation:

A speech-language pathologist (the first researcher) and a professional translator translated the original version of the SAQOL-39g into Thai. These translators independently spoke Thai as their native language. Consequently, two new forward translation versions of the SAQOL-39gTH were created (version 1 and version 2). Then, another two professional speech-language pathologists (SLPs) collaborate to reconcile the differences between the two forward translation versions. This step yielded version 3 of the SAQOL-39gTH.

2) Backward translation:

A linguistics professor who was blind to the original version translated the SAQOL-39gTH version 3 into English. This procedure produced the SAQOL-39gTH-EN. The SAQOL-39gTH-EN was then sent to the author of the original study for review. The researchers discussed the comments, and the consensus version of this process was SAQOL-39gTH version 4.

3) Evaluation of content validity:

The three speech-language pathologists who were experienced in neurological communication disorders determined the content validity of SAQOL-39gTH version 4 by using a content validity index (CVI). The comments and notes in the content validity evaluation process were again discussed among the researchers until a satisfactory version was agreed upon. The result from this process was the final version of the Thai version of the SAQOL-39g (SAQOL-39gTH). The SAQOL-39gTH had the same layout as the original version. The font size is printed in large (Angsana New Font; minimum is 26 pt). The keywords are in bold, and there are few items per page. Every page was printed on standard A4 paper.

Step 2: Data collection process

Following inclusion and exclusion criteria, participants were recruited. Each participant was interviewed in a private setting. The auditory comprehension subtest of the Thai adaptation of the WAB test was used to assess the participants' comprehension ability. Those participants who fulfilled the comprehension requirements would continue. The 39 items of the SAQOL-39gTH were administered to these participants through an interview-based questionnaire. Participants could either speak or point to their responses. The interview began with instructions and practice questions. For each response format, there were two practice items. The first response format was utilized for questions regarding daily activities. This response format consisted of a 5-point scale ranging from 1 = "couldn't do it at all" to 5 = "no problem at all." The second format was applied to questions regarding emotional states and other activities. This format ranges from 1 = "absolutely yes" to 5 = "absolutely no." The SAQOL-39gTH retained the same anchor points as the original version (e.g., ✘ = couldn't do it at all, ✓ = no problem at all) to ensure that participants understood the choice and pointed to their actual response. The participant's response was recorded on the scoring sheet. Following the interview, participants were asked to comment on the content, response formats, and layout of the SAQOL-39gTH. Afterwards, the researchers gathered and analyzed statistical data.

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Step 3: Data analysis

Descriptive statistics, including percentages, means, and standard deviations, were used to analyze the demographic data of the participants. Three of the psychometric properties of the SAQOL-39gTH were examined. The content validity index method was employed to determine the instrument's validity. A percentage of the completeness of the data and score distributions was used to determine acceptability. The reliability (internal consistency) of the SAQOL-39gTH was used to determine Cronbach's α coefficient.

4. Results and Discussion

4.1 Results

The result of the translation method was the Thai version of the Stroke and Aphasia Quality of Life Scale-39g (SAQOL-39gTH). Figures 1 and 2 show examples of the SAQOL-39gTH and the scoring sheet, respectively.

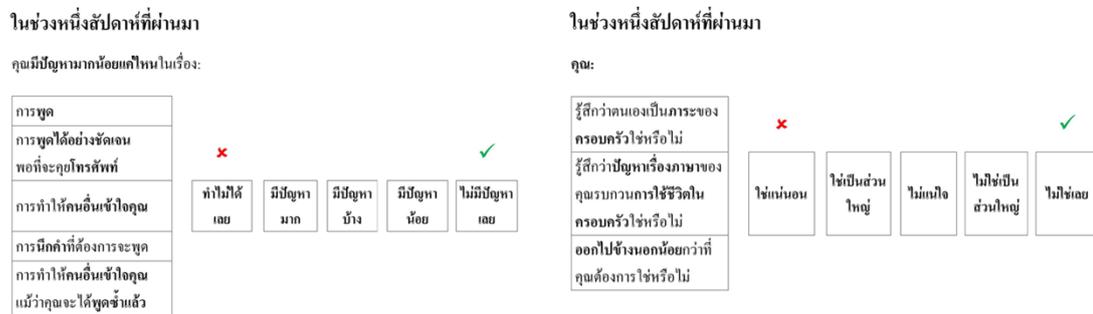


Figure 1: Examples of the SAQOL-39gTH

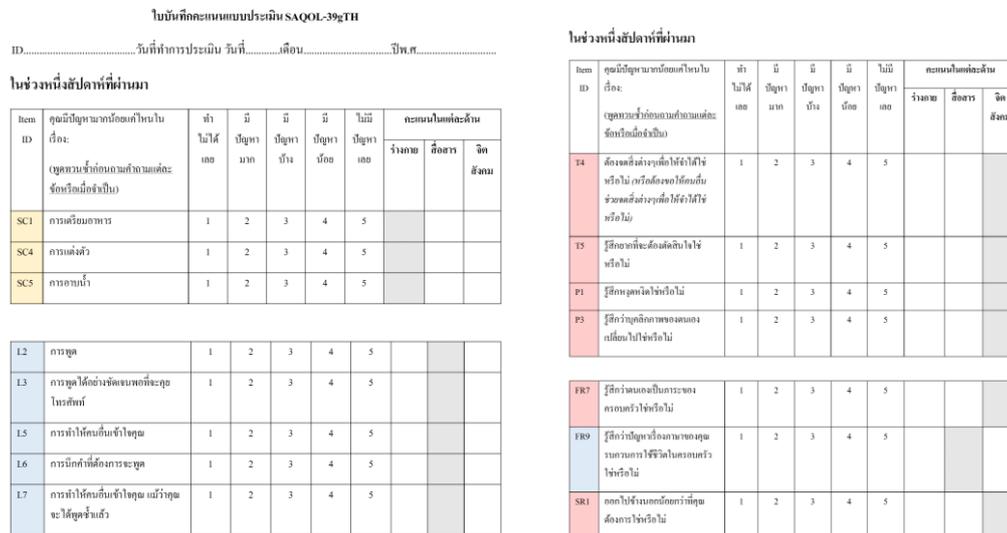
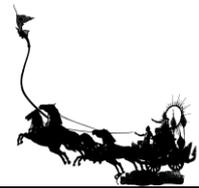


Figure 2: Examples of the scoring sheet of the SAQOL-39gTH

4.1.1 Demographic data of participants

Thirty-three patients from two settings, the speech and language clinic and the outpatient department of the Department of Medicine at Ramathibodi Hospital, signed the consent form to participate in this study. However, three patients were excluded because two of them had lacunar strokes, which are not associated with aphasia, and one was diagnosed with early-stage Alzheimer's disease. As a consequence, thirty

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participants were recruited. The demographic information of the participants is shown in Table 2. The majority of participants had an ischemic stroke (80%), were male (66.7%), were married (70%), and lived with their families (96.7%). Ages ranged from 32 to 81, with a mean (SD) of 58.76 (10.75) years. The post-onset time ranged from six months to twenty years. Half of the participants were government employees with a bachelor's degree. One-third of participants were still employed; 23.3% worked full time, and 10% worked part time. Aphasia Quotient (AQ) scores for the auditory comprehension subtest of the WAB test ranged from 5.95 to 10, with a mean (SD) score of 8.68 (1.41). More than half of the participants scored at least 57 out of 60 points on the yes/no question part (60%).

Table 2: Demographic data of participants

Demographic data	Number (n = 30)	Percentage (%)
Gender		
Male	20	66.7
Female	10	33.3
Age, years		
Mean (SD)	58.76 (10.75)	
Range	31.80 – 81.20	
30 – 59 years	16	53.3
60 – 69 years	9	30.0
70+ years	5	16.7
Stroke type		
Ischemic	24	80.0
Hemorrhagic	6	20.0
Time post-stroke onset, months		
Mean (SD)	59.80	64.18
Range	6.00 – 247.19	
6 – 24 months	13	43.3
25 – 48 months	5	16.7
49 – 72 months	5	16.7
72+ months	7	23.3
Education level		
Elementary school	1	3.3
Junior high school	2	6.7
High school	5	16.7
High vocational certificate	4	13.3
Bachelor's degree	14	46.7
Master's degree	3	10.0
Doctor's degree	1	3.3
Occupation		
Government employee	15	50.0
Private/company employee	5	16.7
Self-employed	2	6.7
Merchant	2	6.7
Freelance	4	13.3
Unemployed	2	6.7
Employment status		
Full-time work	7	23.3
Part-time work	3	10.0
Retired before stroke/unemployed	9	30.0
Inactive because of stroke	11	36.7
Marital status		
Single	5	16.7
Married/ has a partner	21	70.0
Divorced/ widowed	4	13.3
Social status		

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Demographic data	Number (n = 30)	Percentage (%)
Alone	1	3.3
With family	29	96.7

4.1.2 Psychometric properties of the SAQOL-39gTH

Content validity

Three experts in speech and language pathology rated the content's relevance on a four-point scale, with 1 representing completely irrelevant content and 4 representing completely pertinent content. The CVI was the proportion of items that received a score of 3 or 4. The SAQOL-39gTH CVI result was 1.00 for each item that met the criteria, as shown in Table 3.

Acceptability

Missing data and the floor/ceiling effect both met the criteria. According to Table 3, there were no missing data (0%) and no floor/ceiling effect in the overall and domain scores of the SAQOL-39gTH (0%). However, seventeen items (43.58%) exceeded the criteria for negative skewness (SC1, SC4, SC5, M9, W1, W2, UE2, UE4, UE5, UE6, MD2, MD3, MD6, E2, E3, E4, and FR7).

Reliability

The results of the SAQOL-39gTH's internal consistency were presented in Table 3. Cronbach's α was 0.908 for the overall score, 0.864 for the physical domain, 0.895 for the communication domain, and 0.844 for the psychosocial domain. This result satisfied the criterion and is regarded as an indication of excellent internal consistency. However, the item-total correlation was less than 0.30 for eight items on the overall scale (SC5, M1, M7, M9, UE2, UE4, T4, and SR4) and two items on the physical (M7 and UE1) and psychological (T4 and SR4) scales.

4.1.3 Comments from participants and their relatives on the SAQOL-39gTH

The SAQOL-39gTH received favorable feedback. The majority of respondents commented on the clarity of the instrument's layout and response formats. They noted that the font size was appropriate and made the interview easy to follow. In addition, the relatives of the participants who observed the interview stated that they now have a better understanding of the concerns and difficulties faced by those with aphasia. The participants provided a few suggestions. About one-third of the participants indicated that the item for practicing in the first introductory part, "tying your shoelaces," and one of the items in the physical domain part: UE2, "putting on socks," were not their everyday outfit. Most of them usually wear sandals. They stated that they could tie shoes and put on socks, but they did not do so routinely.

Table 3: Psychometric evaluation of the SAQOL-39gTH

Properties	Results of SAQOL-39gTH (n=30)
Scale score range	1.00 – 5.00
Sample score range	2.62 – 4.79
Sample scores, mean (SD)	
Overall scale	4.02 (0.51)
Physical domain	4.29 (0.50)
Communication domain	3.59 (0.88)
Psychosocial domain	3.93 (0.67)
Validity	
Content validity index	1.00
Acceptability	
Missing data (>10%)	0
Skewness (> \pm 1), items affected (%)	17 (43.58%)
Floor effect (>80%)	0
Ceiling effect (>80%)	0

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Properties	Results of SAQOL-39gTH (n=30)
Internal consistency	
Cronbach's α	
Overall scale	0.908
Physical domain	0.864
Communication domain	0.895
Psychosocial domain	0.844
Item-total correlations	
Overall scale	0.007 – 0.727 (8 items < 0.30)
Physical domain	0.229 – 0.742 (2 items < 0.30)
Communication domain	0.602 – 0.819
Psychosocial domain	0.134 – 0.754 (2 items < 0.30)

4.2 Discussion

4.2.1 Validity

In the review of the Scientific Advisory Committee (SAC), Cross-cultural and language adaptation criteria were used to ensure content validity (Lohr, 2002). The SAC (2002) defined content-related validity as "evidence that an instrument's component is appropriate relative to its intended use." The SAQOL-39gTH content validity index resulted in a CVI of 1.00, indicating that the validity of this instrument is good. As a result, this instrument could measure what it was designed to measure (Polit & Beck, 2006; Streiner & Norman, 2008).

4.2.2 Acceptability

The SAQOL-39gTH's acceptability was appropriate. There were no missing data or floor/ceiling effects in the SAQOL-39gTH's overall or domain scores. This result was consistent with the original study's findings, which found 1.2% missing data and no floor or ceiling effect (Hilari et al., 2003). However, the results of the skewness items did not meet the requirements of the original study (negative skewness should not exceed 25 percent of items). In the present study, there were 17 items (43.58%) with negative skewness, a higher proportion than in the original study (Hilari et al., 2003; Hilari et al., 2009). The exceedingly negative skewness was also observed in the Chinese-Singapore (SAQOL-CSg) (Guo, Togher, Power, & Koh, 2016) and Dutch-Netherlands (SAQOL-39NL) versions of the SAQOL-39g (Van Ewijk, Versteegde, Raven-Takken, & Hilari, 2016). In the SAQOL-39NL study conducted by Van Ewijk et al. (2016), the negative skewness indicated a tendency toward high quality of life. The post-onset time (SD) for participants with chronic aphasia in the SAQOL-39NL was 5 (4) years, whereas it was 4.9 (5.4) years in the SAQOL-39gTH. The total scores of the instrument were between 1 and 5, and the higher the score, the better the quality of life. The SAQOL-39NL score and standard deviation were 3.65 (0.58), whereas the SAQOL-CSg and SAQOL-39gTH scores were 4.02 (0.93) and 4.02 (0.51), respectively. In addition, the majority of participants in the SAQOL-39NL and this study were actively involved in the rehabilitation process, utilizing the program to improve language impairment and communication abilities. These participants were active and engaged in social activities. Consequently, higher health-related quality of life scores could be obtained, resulting in a greater negative skewness compared to the original study (Van Ewijk et al., 2016). Further, the negatively skewed data in this study could be attributed to the small sample size (n = 30) and/or the participants' coping experiences with chronic aphasia.

4.2.3 Reliability

The SAQOL-39gTH's internal consistency also met the criteria (Hilari et al., 2003; Streiner & Norman, 2008). The Cronbach's α for the overall scale was 0.908, and the subscales' ranged from 0.844 to 0.895. This result demonstrated that the SAQOL-39gTH is reliable. However, there were eight items with an item-total correlation of less than 0.30. The items were in physical (SC5, M1, M7, M9, UE2, and UE4) and psychosocial subscales (T4 and SR4). The content of the items may cause a disturbance in this correlation (Streiner & Norman, 2008). Some participants had comorbidities such as gout and osteoarthritis of the knee,



so they had difficulty performing M1 ("walking"), M7 ("walking with no rest"), and M9 ("getting out of a chair"), respectively. Some participants indicated that the content of certain items, such as UE2 "putting on socks," did not relate to their everyday lives. They indicated that it was not something they did routinely. Therefore, the cultural adaptation and appropriateness of the items' content should be investigated further.

5. Conclusion

The SAQOL-39TH exhibited high levels of validity, acceptability, and reliability. This instrument was suitable for measuring the health-related quality of life of Thai people with aphasia. The quality of life evaluation could be conducted at any stage of therapy, including the intake session, during therapy, and at the discharge session. This interview-based, self-reported questionnaire could be used to evaluate the effectiveness of speech-language therapy on the quality of life of Thai aphasia patients. Therefore, speech-language pathologists are able to modify the appropriate speech-language therapeutic plan for optimal clinical outcomes.

Suggestions for further study

The study should be conducted with a larger sample size. Additionally, the comprehensive instrument's psychometric properties, including test-retest reliability, construct validity, sensitivity to change, and responsiveness, should be evaluated. Cultural adaptation and content modification of the item should be carried out. Comorbidities included in the exclusion criteria, such as gout and arthritis, should be addressed because they could affect the instrument's internal consistency. To make the instrument valid and reliable for use as a standard outcome measurement or health care service assessment, further studies must be done on a general population of stroke survivors (with or without aphasia).

6. Acknowledgements

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7. References

- American Speech-Language-Hearing Association. (2016). Scope of practice in speech-language pathology. Retrieved February 1, 2023, from <https://www.asha.org/siteassets/publications/sp2016-00343.pdf>
- Benjamin, E. J., Muntner, P., & Bittencourt, M. S. (2019). Heart disease and stroke statistics-2019 update: a report from the American Heart Association. *Circulation*, *139*(10), e56-e528. DOI: 10.1161/cir.0000000000000659
- Cruice, M., Hill, R., Worrall, L., & Hickson, L. (2010). Conceptualising quality of life for older people with aphasia. *Aphasiology*, *24*(3), 327-347. DOI: 10.1080/02687030802565849
- Cruice, M., Worrall, L., & Hickson, L. (2006). Quantifying aphasic people's social lives in the context of non-aphasic peers. *Aphasiology*, *20*(12), 1210-1225. DOI: 10.1080/02687030600790136
- Darrigrand, B., Dutheil, S., Michelet, V., Rereau, S., Rousseaux, M., & Mazaux, J.-M. (2011). Communication impairment and activity limitation in stroke patients with severe aphasia. *Disability and Rehabilitation*, *33*(13-14), 1169-1178. DOI: 10.3109/09638288.2010.524271
- Davidson, B., Howe, T., Worrall, L., Hickson, L., & Togher, L. (2008). Social participation for older people with aphasia: the impact of communication disability on friendships. *Topics in Stroke Rehabilitation*, *15*(4), 325-340. DOI: 10.1310/tsr1504-325
- Dickey, L., Kagan, A., Lindsay, M. P., Fang, J., Rowland, A., & Black, S. (2010). Incidence and Profile of Inpatient Stroke-Induced Aphasia in Ontario, Canada. *Archives of Physical Medicine and Rehabilitation*, *91*(2), 196-202. DOI: 10.1016/j.apmr.2009.09.020



- Duncan, P. W., Wallace, D., Lai, S. M., Johnson, D., Embretson, S., & Laster, L. J. (1999). The stroke impact scale version 2.0: evaluation of reliability, validity, and sensitivity to change. *Stroke*, 30(10), 2131-2140. DOI: 10.1161/01.str.30.10.2131
- Engelter, S. T., Gostynski, M., Papa, S., Frei, M., Born, C., Ajdacic-Gross, V., Gutzwiller, F., Lyrer, P. A. (2006). Epidemiology of aphasia attributable to first ischemic stroke. *Stroke*, 37(6), 1379-1384. DOI:10.1161/01.str.0000221815.64093.8c
- Foundation of Thai Gerontology Research and Development institute. (2016). *Situation of the Thai elderly 2015*. Nakhon Pathom: Institute for Population and Social Research, Mahidol University.
- Foundation of Thai Gerontology Research and Development institute. (2022). *Situation of the Thai older persons 2021*. Nakhon Pathom: Institute for Population and Social Research, Mahidol University.
- Garnjanagoonchorn, A., & Dajpratham, P. (2015). Reliability and validity of the Thai version of the Stroke Impact Scale (SIS) 3.0. *ASEAN Journal of Rehabilitation Medicine*, 25(2), 45-52. DOI: 10.14456/jtrm.2015.9
- Guo, Y. E., Togher, L., Power, E., & Koh, G. C. (2016). Validation of the Stroke and Aphasia Quality of Life Scale in a multicultural population. *Disability and Rehabilitation*, 38(26), 2584-2592. DOI: 10.3109/09638288.2016.1138551
- Hallowell, B., & Chapey, R. (2008). Introduction to language intervention strategies in adult aphasia. In Chapey, R. (Editor), *Language intervention strategies in aphasia and related neurogenic communication disorders* (5th ed., pp. 3-19). Philadelphia: Lippincott Williams & Wilkins.
- Hilari, K. (2011). The impact of stroke: are people with aphasia different to those without?. *Disability and Rehabilitation*, 33(3), 211-218. DOI: 10.3109/09638288.2010.508829
- Hilari, K., Byng, S., Lamping, D. L., & Smith, S. C. (2003). Stroke and Aphasia Quality of Life Scale-39 (SAQOL-39) evaluation of acceptability, reliability, and validity. *Stroke*, 34(8), 1944-1950. DOI:10.1161/01.str.0000081987.46660.ed
- Hilari, K., Lamping, D. L., Smith, S. C., Northcott, S., Lamb, A., & Marshall, J. (2009). Psychometric properties of the Stroke and Aphasia Quality of Life Scale (SAQOL-39) in a generic stroke population. *Clinical Rehabilitation*, 23(6), 544-557. DOI:10.1177/0269215508101729
- Hogg, R. V., Tanis, E. A., & Zimmerman, D. L. (2015). *Probability and statistical inference, Global edition* (9th ed). Harlow: Pearson Education.
- International Health Policy Program Thailand. (2018). *Thailand disability-adjusted life years: DALYs 2014*. Nonthaburi: Burden of Disease Research Program Thailand, International Health Policy Program, Ministry of Public Health.
- Lohr, K. N. (2002). Assessing health status and quality-of-life instruments: attributes and review criteria. *Quality of Life Research*, 11(3), 193-205. DOI: 10.1023/a:1015291021312
- Nyström, M. (2006). Aphasia – an existential loneliness: a study on the loss of the world of symbols. *International Journal of Qualitative Studies on Health and Well-being*, 1(1), 38-49. DOI: 10.1080/17482620500501883
- Polit, D. F., & Beck, C. T. (2006). The content validity index: are you sure you know what's being reported? critique and recommendations. *Research in Nursing & Health*, 29(5), 489-497. DOI: 10.1002/nur.20147
- Royal College of Speech & Language Therapists. (2005). *Royal College of Speech & Language Therapists: clinical guidelines*. Retrieved February 1, 2023, from <https://DOI.org/10.4324/9781315171548>
- Streiner, D. L., & Norman, G. R. (2008). *Health measurement scales: a practical guide to their development and use* (4th ed.). New York: Oxford University Press.
- Suwanwela, N. C. (2014). Stroke epidemiology in Thailand. *Journal of Stroke*, 16(1), 1-7. DOI: 10.5853/jos.2014.16.1.1
- Teerapong, W. (2000). *The comparison of language abilities of Thai aphasic patients and Thai normal subjects by using Thai Adaptation of Western Aphasia Battery*. A thesis for the degree of Master of Arts in Communication Disorders. Mahidol university.



- Threats, T., & Worrall, L. (2004). Classifying communication disability using the ICF. *Advances in Speech Language Pathology*, 6(1), 53-62. DOI:10.1080/14417040410001669426
- Van Ewijk, L., Versteegde, L., Raven-Takken, E., & Hilari, K. (2016). Measuring quality of life in Dutch people with aphasia: development and psychometric evaluation of the SAQOL-39NL. *Aphasiology*, 1-12. DOI: 10.1080/02687038.2016.1168919
- Williams, L. S., Weinberger, M., Harris, L. E., Clark, D. O., & Biller, J. (1999). Development of a Stroke-Specific Quality of Life Scale. *Stroke*, 30(7), 1362-1369. DOI:10.1161/01.str.30.7.1362
- Worrall, L., & Holland, A. (2003). Editorial: Quality of life in aphasia. *Aphasiology*, 17(4), 329-332. DOI: 10.1080/02687030244000699