Validation of the State-Trait Hopelessness Scale in Stroke Survivors

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Abstract

Purpose: To determine the reliability and validity of the State-Trait Hopelessness Scale (STHS) in stroke survivors.

Design: Three-phase validation study evaluating psychometric properties.

Methods: Content validity was assessed through expert panel review followed by cognitive interviews with stroke survivors to evaluate face validity. In phase three, psychometric testing was conducted and the STHS was compared with the Beck Hopelessness Scale (BHS) in 95 hospitalized stroke survivors.

Results: Experts rated items as *quite* or *very relevant* and *very clear.* Cognitive interviews confirmed appropriate participant comprehension and response processes; no revisions were required. The STHS demonstrated acceptable internal consistency (State $\alpha = 0.78$; Trait $\alpha = 0.89$). Principal component analyses confirmed the scale structure. Correlation of the STHS and BHS ($r = 0.17$–0.21) suggests related but distinct constructs for stroke survivors.

Clinical Relevance to the Practice of Rehabilitation Nursing: This is the first study to evaluate the reliability and validity of the STHS scale in stroke survivors.

Conclusions: The STHS shows promise in identifying hopelessness in stroke survivors and its potential use to guide interventions to improve patient outcomes.

Keywords: stroke survivor; hopelessness; State-trait Hopelessness Scale; beck hopelessness scale; stroke emotional recovery; scale validation.

Introduction

Stroke is a devastating neurological event that typically occurs with little to no warning. Survivors and their families often have difficulty coping with sudden changes in their lives (Awosika et al., 2019; Vemuri et al., 2024). Stroke is the leading cause of long-term disability and the fifth leading cause of death in the United States. Approximately 795,000 people survive after a stroke every year, and by 2035, this is estimated to grow to more than 1.3 million due to evidence-based acute stroke interventions that focus on early stroke intervention and treatments (Xian et al., 2024). People who survive a stroke may experience a number of physical and cognitive disabilities depending on the location and severity of the brain injury. The physical effects of stroke may include hemiplegia or weakness on one side of the body, poor coordination, and difficulty with ambulation and activities of daily living. Other effects include language or speech deficits and visual deficits. Stroke survivors often experience cognitive deficits, including poor memory, difficulty in solving or managing emotions, mood, and seizures (Awosika et al., 2019; Oshvandi et al., 2022; Vemuri et al., 2024).

Over the past two decades, standardized practices, including those from the "Get With the Guidelines-Stroke" program, have led to a reduction in stroke-related mortality and hospital length of stay (American Heart Association, 2025; Xian et al., 2024). As a result,

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the number of stroke survivors requiring postacute care services has increased. Recovery from stroke is complex and unpredictable due to complications from co-morbid conditions that can last from several weeks to several months. Managing the physical limitations of stroke along with medical complications over time can lead to loss of employment and the ability to be involved in family or community events, and lead to isolation (Awosika et al., 2019).

Current research on stroke care and rehabilitation focuses on improving physical and cognitive recovery. Rehabilitation research and technology have improved therapeutic modalities to enhance physical recovery after stroke. These technologies have assisted patients with gait training and adaptive equipment to improve independence with activities of daily living (Gundez et al., 2023; McCandless et al., 2024; Vemuri et al., 2024). In contrast, few studies have focused on the emotional recovery of stroke survivors, and few validated assessment tools exist to evaluate the emotional needs of stroke survivors and implement individualized treatment plans. Health care professionals often overlook stroke survivors' emotional needs due to limited time or training (Zrelak et al., 2024). A comprehensive approach to effectively manage recovery after stroke should include the use of a validated tool to assess emotional needs.

The emotional responses to stroke, such as depression, anxiety, and stress, have been shown to have a negative impact on stroke recovery (Tjokrowijoto et al., 2023). In addition to these responses to stroke, hopelessness can also negatively impact stroke recovery (Oshvandi et al., 2022; Yazici et al., 2024). Hopelessness is defined as a sense of helplessness or a negative view of the future. The theory of hopelessness and depression (Abramson et al., 1989) describes how individuals prone to hopelessness interpret negative events as unchangeable, broadly impactful, and personally meaningful. When these interpretations occur alongside stressful life circumstances, vulnerability to hopelessness and depression increases. Hopelessness has been linked to increased adverse survival rates and adverse events in patients with coronary artery disease (CAD; Dunn et al., 2013; Dunn et al., 2016).

The State-Trait Hopelessness Scale (STHS) is a valid and reliable tool for measuring hopelessness in CAD and ischemic heart disease populations (Dunn et al., 2013; Dunn et al, 2016). Currently, there is no valid and reliable tool for measuring hopelessness in stroke survivors. It is important that assessment tools are available to conduct comprehensive emotional assessments, which can lead to an individualized, evidence-based treatment plan.

The purpose of this study was to determine the reliability and validity of the STHS for stroke survivors. The aims of the study were the following:

1. Assess the appropriateness of the STHS for use with stroke survivors.
2. Modify the STHS, as indicated by the results of Aim 1, for stroke survivors.
3. Describe the validity of the STHS in this population.

Design, Methods, and Data Analysis

The study was completed in three phases: (a) review of the STHS by subject matter experts for content validity; (b) evaluation of scale content through cognitive interviews with patients with stroke; and (c) validation of the modified scale by comparison with the Beck Hopelessness Scale (BHS). For the validation phase, questionnaire and demographic data were entered into a secure, password-protected database and cross-checked for accuracy before analysis. Approval from [Avera Institutional Review Board] institutional review board was required and obtained for phase two and three of the study.

Phase 1: Expert Panel Review

The first step in scale development or testing within a new population is to have a group of experts review the scale for appropriate definitions of the constructs of interest, relevance in the target population, clarity, and wording of each item, or for any items that were potentially missed. Seven health care professionals from nursing, occupational therapy, physical therapy, neurology, psychology, and physiatry with expertise working with stroke survivors, completed the request to provide feedback on each item of the STHS using a web-based survey.

Phase 2: Cognitive Interviewing

Cognitive interviewing was used to establish content and face validity, assessing how stroke survivors processed, comprehended, and answered each item of the STHS. Participants were recruited from a single Midwestern hospital site based on the primary investigator's assessment of their cognitive ability to complete the interviews. Inclusion criteria were English-speaking patients from a Midwestern hospital, at least 18 years old, who had experienced a stroke, and were admitted to the hospital. Patients who had cognitive impairment that impeded verbal understanding and/or responses

were excluded. Each question was read aloud to the participants, who were then asked what the question meant to them. Interviews were recorded, transcribed, coded, analyzed, and triangulated by two members of the research team trained in the use of qualitative methods.

Phase 3: Construct and Criterion Validity

Construct and criterion validity were evaluated by comparing the STHS with the established benchmark of the BHS. The inclusion criteria for Phase 3 of the study were as follows: English-speaking patients from a Midwestern hospital, at least 18 years old, who had experienced a stroke, and were admitted to the hospital. Patients who had cognitive impairment that impeded verbal understanding and/or responses were excluded. The patients were identified by the primary investigator or a trained research assistant. After informed consent was obtained, the participants completed three surveys: a demographic survey, the STHS, and the BHS. Permission to use the STHS and BHS was obtained before data collection. Research staff assisted the participants with the completion of the instruments, if necessary. The participants were provided with a $10 gift card after completing the survey.

Measures

Demographic data were collected from the participants using a self-report questionnaire. The information included age, sex, race, marital status, educational level, and employment status. Clinical history included the time since the most recent stroke, any prior stroke diagnosis and date, and diagnosis or treatment of depression.

State and Trait Hopelessness

Hopelessness was measured using the STHS, a 23-item (10 states, 13 traits) instrument measured on a 4-point Likert-type scale (1 = *strongly disagree*, 4 = *strongly agree*) (Dunn et al., 2013). The scale distinguishes between hopelessness as a temporary feeling or response (a state) or as a tendency or characteristic (a trait) and differentiates hopelessness as distinct, yet related to depression (Abramson et al., 1989). The STHS has state and trait subscales, with 10 and 13 items, respectively. The STHS has been validated for use in individuals with ischemic heart disease in rural and urban locations (Dunn et al., 2013; Bomgaars et al., 2021).

Beck Hopelessness Scale

The BHS was used to validate the STHS for use in stroke survivors. The BHS contains 20 true or false items that measure negative feelings about the future in various psychopathological conditions. Participant responses were coded to 2 if they stated "false" and 1 if they stated "true." The BHS has been tested for reliability and validity in various populations and age groups (Beck et al., 1974).

Data Analysis

Surveys with up to 10% missing responses on up to two subscales were imputed using linear regression on the non-missing components of the subscale. Surveys with more than 10% missing responses on a subscale were excluded from that subscale analysis. Surveys with more than 10% missing data on more than one subscale were excluded from the analysis. Descriptive statistics were used to summarize the sample. Inter-item correlations were determined for the STHS state and trait subscales and the BHS; for each scale, the correlation coefficient from each item to all of the other items was determined. Inter-item correlations were also run to compare the STHS State and Trait Subscales to the BHS. Internal consistency reliability was assessed using Cronbach's alpha. Principal component analysis (PCA) was conducted for each scale to examine the dimensional structure. The statistical software R (version 4.3.3) was used for all the analyses.

Results

Phase 1: Expert Panel Review

For each question in the STHS, the subject matter experts rated the relevance and clarity of the question for stroke survivors and suggested revisions to the statements. On the state portion of the scale, respondents rated the relevance of the questions at "very relevant" and "quite relevant" (89%). The clarity of the questions was rated as "very clear" (67%). For the trait portion of the scale, respondents rated the relevance of the questions at "very relevant" and "quite relevant" (85%) and the clarity of the questions was rated as "very clear" (85%). Recommended clarifications included concepts of "today" and "things" that are very general and require interpretation; however, the experts noted that cognitive ability determines a patient's ability to respond to these questions. The study team discussed the panel responses and decided not to make any changes to the scale.

Phase 2: Cognitive Interviewing

The research team initially planned to interview 10 stroke survivors to evaluate the face validity of the STHS; however, data saturation was reached after seven interviews. The participants agreed that they could answer the questions and that the survey instructions were clear. Responses to the questions affirmed participants' comprehension, processing, and appropriate responses. While some participants stated that questions including the term "things" were vague, they were all able to discuss their own interpretation of the term and their thought processes in answering the question. Some participants reported that several items referred to negative thoughts or emotions that they felt did not apply to their experiences, with one participant stating, "That's not me; I don't think like that." All participants were willing to think about each question and describe how they arrived at their answers. One participant stated, "I think they're good questions because you have to think about how you feel. I think many people will be honest about it." Based on the responses of the participants, the team decided not to make any changes to the scale.

Phase 3: Construct and Criterion Validity

One hundred participants were enrolled in Phase 3. Surveys with more than 10% missing information on any scale were removed from the dataset (four on the STHS state subscale, seven on the STHS trait subscale, and four on the BHS scale). Another 23 surveys had imputation on one or two subscales (10, 8, and 9 surveys had data imputed in the state and trait portions of the STHS and the BHS, respectively). Following data cleaning, data from 95 participants were included in the analysis. Participants were mostly white (96%), married (59%), and had no history of a prior stroke (82%; Table 1). The median age of the participants was 71 years, and most were not employed (70%).

Table 1 Demographics

Characteristic	$N = 95$
Age, median (IQR)	71 (63, 80)
Sex, *n* (%)	
Female	40 (42)
Male	55 (58)
Hispanic or Latino, *n* (%)	
No	95 (100)
Race, *n* (%)	
Non-White	4 (4)
White	91 (96)
Marital status, *n* (%)	
Divorced or separated	8 (8)
Married	56 (59)
Never been married	9 (9)
Widowed	22 (23)
Prior stroke, *n* (%)[a]	
No	76 (82)
Yes	17 (18)
Days since stroke, median (IQR)[b]	11 (8, 14)
History of depression, *n* (%)[c]	
No	75 (84)
Yes	14 (16)
Education, *n* (%)[d]	
High school or less	52 (55)
Some college or AA degree	22 (23)
College graduate	13 (14)
Master's or doctoral degree	7 (7)
Current employment status, *n* (%)[d]	
Employed at least part-time	28 (30)
Not employed at least part-time	66 (70)

[a]$N = 93$. [b]$N = 92$. [c]$N = 89$. [d]$N = 94$.

STHS State Subscale

The mean response on the state subscale was 3.12, which is slightly above "agree" (Figure 1). The mean inter-item correlation for the state subscale was 0.26 (interquartile range = 0.20, 0.31), and internal consistency was acceptable with a Cronbach's alpha of 0.78. Cronbach's alpha decreased when each of the ten items was removed from the state scale. The first two items of the state PCA had eigenvalues > 1 and explained 49% of the variance (PC1: std.dev = 1.84, variance = 34%, PC2: std.dev = 1.23, variance = 15%).

STHS Trait Subscale

The mean trait subscale response was similar to state, at 3.21 (Figure 2). The mean inter-item correlation for the trait subscale was 0.39 (interquartile range = 0.26, 0.52), and Cronbach's alpha was 0.89, demonstrating acceptable internal consistency. Cronbach's alpha increased marginally (from 0.891 to 0.893) when item 11 was removed from the trait scale. The first three items of the trait PCA had eigenvalues > 1, and explained 64% of the variance (PC1: std. dev = 2.41, variance = 45%; PC2: std. dev = 1.23, variance = 12%; PC3: std. dev = 1.00, variance = 8%).

Beck Hopelessness Scale

The mean BHS response was 1.86, and the majority of participants disagreed with the BHS statements. Only one item (Number 4) on the BHS was affirmed by most participants. The mean inter-item correlation for BHS was 0.22 (IQR = 0.10, 0.34), and Cronbach's alpha was 0.85. Cronbach's alpha increased when items 3, 4, 8, and 10 were removed. When these four items were removed, the Cronbach's alpha increased to 0.97. Six of

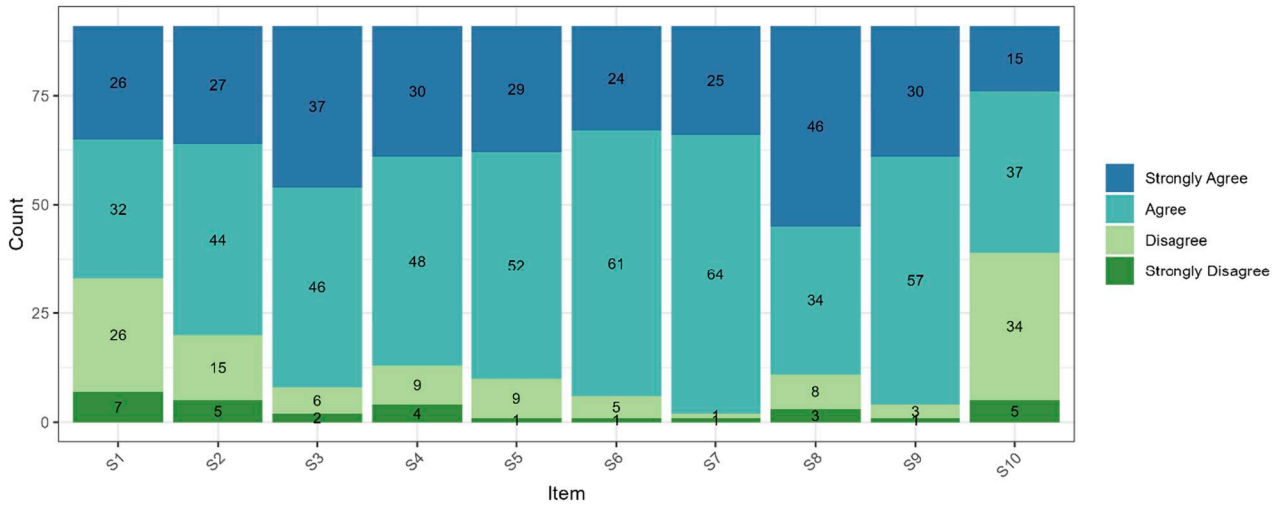


Figure 1. State Response Distribution (n = 91).

the BHS PCA items had eigenvalues > 1, and explained 66% of the variance. The correlations between the BHS and the STHS state and trait subscales were low. The mean correlation between the STHS state subscale and the BHS was 0.17 (IQR = 0.08, 0.24), while the mean correlation between the STHS trait subscale and the BHS was 0.21 (IQR = 0.12, 0.29).

Discussion

To the research team's knowledge, this is the first study to report the reliability and validity of the STHS among stroke survivors. The results of this study supported reliability, as well as face and construct validity of the STHS in this predominantly White, Midwestern sample. After expert review and cognitive interviewing, no changes to the items on the STHS were recommended. Concurrent validity was evaluated by comparing the BHS to the STHS. Although correlations between the STHS and the BHS were lower (r = .17 and .21) than reported with other populations (Dunn et al., 2013), these positive associations suggest conceptual overlap without redundancy. This is consistent with related but distinct constructs and may reflect the STHS's sensitivity to stroke-specific dimensions of hopelessness not fully captured by the BHS. Cronbach's alpha was high when measuring hopelessness in participants using the BHS, which is considered the standard for measuring hopelessness. Cronbach's alpha was also high in the same population using the STHS; thus, the reliability of the STHS for measuring hopelessness among stroke survivors is supported. The PCA results indicate that

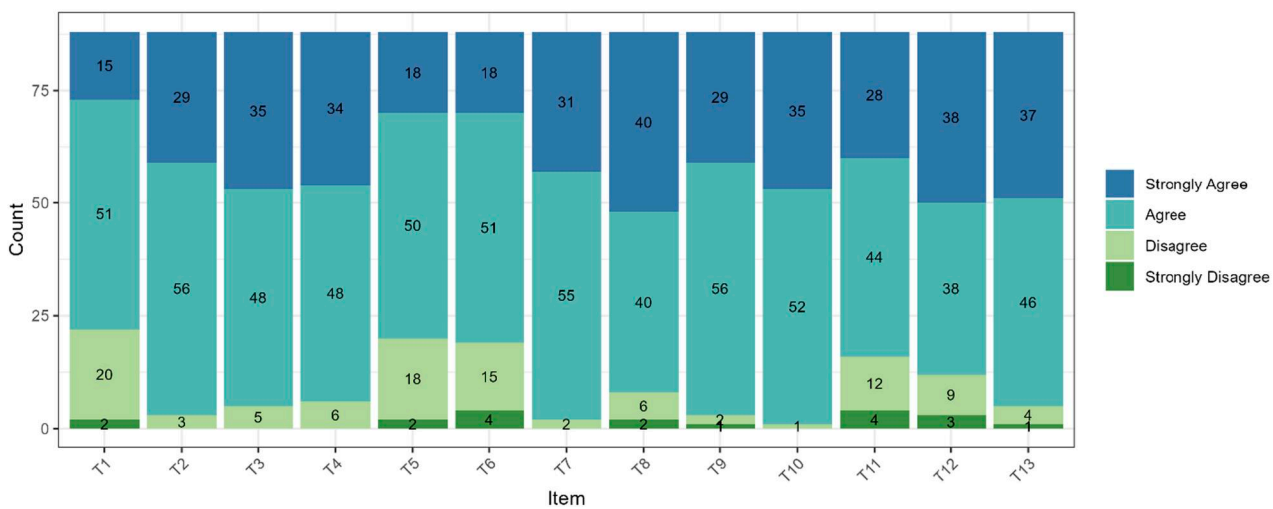


Figure 2. Trait Response Distribution (n = 88).

the STHS and BHS items performed well, further supporting construct validity (Appendix A, Supplemental Digital Content 1, http://links.lww.com/RNJ/A72).

The theory of hopelessness and depression (Abramson et al., 1989) describes how individuals interpret negative life events as unchangeable. Stroke represents a significant, negative life event and may be interpreted as an inability to recover. The STHS aligns closely with this theoretical framework by capturing both context-dependent emotional responses (state hopelessness) and a stable tendency toward hopeless thinking (trait hopelessness). This allows clinicians to delineate stable risk factors from potentially modifiable responses during stroke rehabilitation. From a nursing perspective, use of the STHS supports an evidence-based assessment that may identify patients at risk for hopelessness-related depressive outcomes. This will allow for appropriate referrals to psychological interventions to enhance adaptive coping and allow the patient to fully engage in the rehabilitation process.

The stroke population is unique, as each patient experiences varying degrees and types of disabilities. Current clinical practice guidelines recommend screening for depression in the acute phase post stroke with antidepressant treatment if indicated (Powers et al., 2019; American Heart Association, 2025). Prior research studies have focused on generalized screening for depression, stress, anxiety, and quality of life in individuals in the acute phase of stroke recovery (Ignacio et al., 2024; Zrelak et al., 2024). Validated screening tools, such as the STHS, are needed to identify hopelessness and those in need of intervention, after which patient-centered strategies can be developed.

Measurement of hopelessness using validated assessment tools supports informed decision-making for interventions. Future interventional research should focus on developing and testing evidence-based strategies to reduce hopelessness in this population. Art and physical therapies have been shown to help the emotional needs of stroke patients, as has spiritual care (Oshvandi et al., 2022; Yazici et al., 2024). Specific interventions aimed at hopelessness have been limited. In addition, exercise has been shown to improve levels of hopelessness in patients with CAD (Dunn et al. 2013; Dunn et al. 2016). Future research could determine which interventions are most effective in decreasing hopelessness.

The strengths of this study include a comprehensive methodology that involved expert review and cognitive interviews, followed by testing for use in a specific population. Limitations of this study are that it was a single-site study, all participants were English-speaking, mostly White, and no participants were Hispanic or Latino. These demographics were representative of the population in which the study was conducted. These demographic factors, along with the relatively small sample size, may limit the generalizability of the results. In addition, only older stroke survivors were included in this study.

Future research should test this instrument in a larger, more diverse population across multiple geographical areas. In addition, the instrument should be evaluated at longer intervals following a stroke to determine its reliability and validity over time. Furthermore, analysis comparing state and trait subscales, as well as clinical trials examining responsiveness and effective interventions for the prevention or treatment of hopelessness among stroke survivors are warranted.

Existing literature supports the need for emotional support in stroke survivors, particularly hopelessness that may impact recovery and quality of life. The findings of this study suggest that the STHS may be used as a screening tool for state and trait hopelessness, leading to early intervention. Incorporating the STHS into clinical practice may enable health care professionals who work with stroke survivors to identify hopelessness in stroke survivors, leading to early and patient-centered intervention, and potentially improve emotional and functional outcomes.

Conclusions

The stroke population is unique because of the risk of permanent disability and reduced quality of life related to functional ability limitations. Therefore, patients' emotional and physical needs must be considered. Identification of hopelessness during the early phases of stroke recovery has the potential to improve patient outcomes and the overall quality of life. Valid assessment tools are essential to effectively support stroke survivors in managing hopelessness during their emotional recovery from stroke. This study supports the STHS is a valid and reliable instrument for measuring hopelessness in patients with stroke. The use of this instrument can help guide inter-professional teams in delivering focused, individualized interventions. Early identification of hopelessness may also enable timely interventions, ultimately improving patient outcomes.

Conflicts of interests

The authors declare no conflict of interest.

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Key Practice Points

- Valid assessment instruments are required to effectively evaluate hopelessness in the emotional recovery of stroke survivors.
- Early identification of hopelessness can lead to timely interventions.
- This study supports the STHS is a valid and reliable instrument for measuring hopelessness in stroke survivors.

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