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ORIGINAL RESEARCH

Translation, Cross-Cultural Adaptation, and Psychometric Validation of the Chinese Version of the Life Change Adaptation Scale for Family Caregivers of Individuals of Stroke Survivors

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Objective: This study aimed to translate and cross-culturally adapt the original English version of the Life Change Adaptation Scale (LCAS) into Chinese and to examine its reliability and validity among family caregivers of stroke survivors in China.

Methods: A methodological study was conducted in two phases. Phase 1 involved the cross-cultural adaptation of the LCAS using Brislin's translation model, including forward and back-translation, expert review by the original author, and cultural adaptation via a Delphi expert consultation panel (n=8). A pilot test (n=20) assessed feasibility. In Phase 2, psychometric testing was performed with a convenience sample of 260 family caregivers of stroke survivors from a tertiary hospital. Participants completed the Chinese LCAS and the Kessler Psychological Distress Scale (K10). Internal consistency, test-retest reliability (2-week interval, n=30), content validity, construct validity (Exploratory Factor Analysis), and convergent validation were evaluated.

Results: The cross-cultural adaptation process ensured semantic and conceptual equivalence. This 8-item scale is feasible for clinical use, requiring approximately 3–5 minutes to complete. The Chinese LCAS demonstrated excellent content validity (S-CVI/Ave = 0.922). Exploratory Factor Analysis (Kaiser-Meyer-Olkin measure = 0.716, Bartlett's test of sphericity $p < 0.001$) supported the original two-factor structure (factor loadings ranged from 0.568 to 0.843), explaining 54.449% of the total variance. The scale showed good internal consistency (Cronbach's $\alpha = 0.764$ for the total scale; 0.776 and 0.781 for subscales) and excellent test-retest reliability (ICC = 0.936). A significant but small-magnitude positive correlation with the K10 ($r = 0.168$, $p=0.006$) supported its convergent validation.

Conclusion: The Chinese version of the LCAS is a brief, reliable, valid, and practical tool for assessing life-change adaptation among family caregivers of stroke survivors in China. It is recommended for use by clinicians and researchers to screen caregiver adaptation needs and evaluate support interventions.

Keywords: stroke survivors, family caregiver, life change adaptation scale, cross-cultural adaptation, psychometric validation

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Introduction

Acquired Brain Injury (ABI) refers to damage to the brain occurring after birth, excluding congenital, hereditary, or degenerative conditions.[1] It encompasses a diverse range of etiologies, broadly classified as traumatic (eg., from road traffic accidents or falls) and non-traumatic (eg., stroke, brain infections, tumors, or anoxia).[2] Common sequelae include increased aggression, memory and concentration difficulties, and speech impairments.[3,4] As a life-altering event, ABI poses a significant global public health challenge.[5,6] Within the spectrum of ABI, stroke represents the single largest and most prevalent subtype, particularly in China. National surveillance data indicate an estimated 17.8 million prevalent

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cases and 3.4 million new cases annually, leading to millions of survivors with long-term disabilities.[7] This staggering burden exists alongside fragmented and limited access to formal long-term rehabilitation and caregiver support services, especially in community settings. Consequently, the responsibility for enduring care falls overwhelmingly on families, creating a pressing need for tools to assess how these families adapt to profoundly changed lives, in order to guide effective support. The resulting disabilities affect tens of millions worldwide, underscoring the scale of this issue.

ABI profoundly impacts not only the individual but also their entire family system.[8,9] It leads to a complex array of cognitive, emotional, physical, and behavioural deficits that severely compromise functional independence and quality of life.[10] The repercussions extend beyond the patient, imposing a substantial, long-term burden on family caregivers who assume unexpected and demanding roles.[11] This burden manifests as high levels of psychological distress, social isolation, financial hardship, and diminished personal well-being, establishing ABI as a major national health and social concern.[11]

The family's role is pivotal in the long-term support and rehabilitation of individuals with ABI. However, the sudden onset of ABI forces families to navigate drastic personal and social changes. While existing literature extensively documents the negative impacts and burden on caregivers, a comprehensive understanding must also incorporate the process of life-change adaptation. This construct, distinct from unidimensional concepts like burden or coping, refers to the outcome of a family's holistic efforts to adjust to the new reality post-ABI, encompassing both challenges and potential growth.[12] Specifically, it reflects changes in the family's appraisal of external caregiving resources (eg., support, responsibilities) and internal health beliefs (eg., outlook, self-efficacy), providing a balanced indicator of the family's overall well-being.[13] Health-belief theory indicates that perceptions of threat, benefits/barriers, and self-efficacy influence health behaviors and coping decisions, supporting the relevance of assessing caregivers' health-belief changes as a core component of adaptation.[14]

To measure this multifaceted construct, Shindo and Tadaka (2020) developed the Life Change Adaptation Scale (LCAS), a reliable and valid instrument originally designed for family caregivers of individuals with ABI.[13] Subsequent research has confirmed its utility in identifying factors influencing adaptation and serving as a sensitive outcome measure in intervention trials.[15] Its focus on both challenges and potential positive adaptations provides a balanced, holistic view of the caregiver experience.

In many countries, including China, long-term care for individuals with ABI predominantly falls upon families. However, the availability and accessibility of formal support and rehabilitation resources, especially during the chronic phase, are often limited and fragmented.[16–18] This is particularly true in China, where post-discharge community-based rehabilitation and psychosocial support for caregivers remain underdeveloped, creating a significant service gap. This service gap increases reliance on family caregivers and highlights the urgent need for effective tools to assess their adaptation status, enabling targeted support. A Chinese version of the LCAS would be invaluable for clinicians and researchers, facilitating the early identification of families struggling to adapt and allowing for the evaluation of interventions aimed at enhancing family resilience and well-being.

While several instruments exist to measure caregiver burden, stress, or quality of life among caregivers of individuals with chronic conditions in China,[19] few are specifically designed for the ABI population or focus on the dynamic process of adaptation to life changes. The LCAS, with its dual focus on external resources and internal beliefs, offers a unique and balanced perspective that moves beyond deficit-based assessment.[13] Given the overwhelming prevalence of stroke within the ABI population in China and the associated caregiver burden, establishing the psychometric properties of the LCAS in a stroke-specific cohort is a critical first step. Validating this tool in the Chinese context is crucial because early identification of maladaptation can prevent the escalation of caregiver distress, family dysfunction, and compromised patient care.[20] Without targeted assessment, caregivers struggling to adapt may remain unidentified by healthcare systems, leading to increased long-term health and social costs.[21]

Therefore, this study aims to cross-culturally adapt the original LCAS into Chinese and rigorously examine its reliability and validity. This initial validation was conducted among family caregivers of stroke survivors, the most prevalent subgroup of ABI in China, to establish foundational evidence for the scale's use before expanding to other ABI etiologies in future research. The psychometric evaluation plan includes assessing content validity, construct validity (via exploratory factor analysis), internal consistency, test-retest reliability, and convergent validation. A culturally appropriate and psychometrically sound Chinese LCAS will fill a critical gap in clinical practice and research, ultimately contributing to improved support for these essential yet often overlooked families.

Methods

Study Design

This methodological study involved the cross-cultural adaptation of the original LCAS into Chinese and the validation of its psychometric properties among family caregivers of individuals with ABI in China. The study was conducted in two sequential phases: (1) cross-cultural adaptation, including translation and content validation, and (2) psychometric testing. The research procedure is shown in Figure 1. This study was conducted in accordance with the Declaration of Helsinki and was approved by the Clinical Research Ethics Committee of the First Affiliated Hospital of Wenzhou Medical University (Approval No: 2024–191). All participants provided written informed consent.

Phase 1: Translation and Content Validation

Translation Process

After obtaining authorization from the original scale developer, the LCAS was translated following Brislin's translation model.[22] The process involved the following steps:

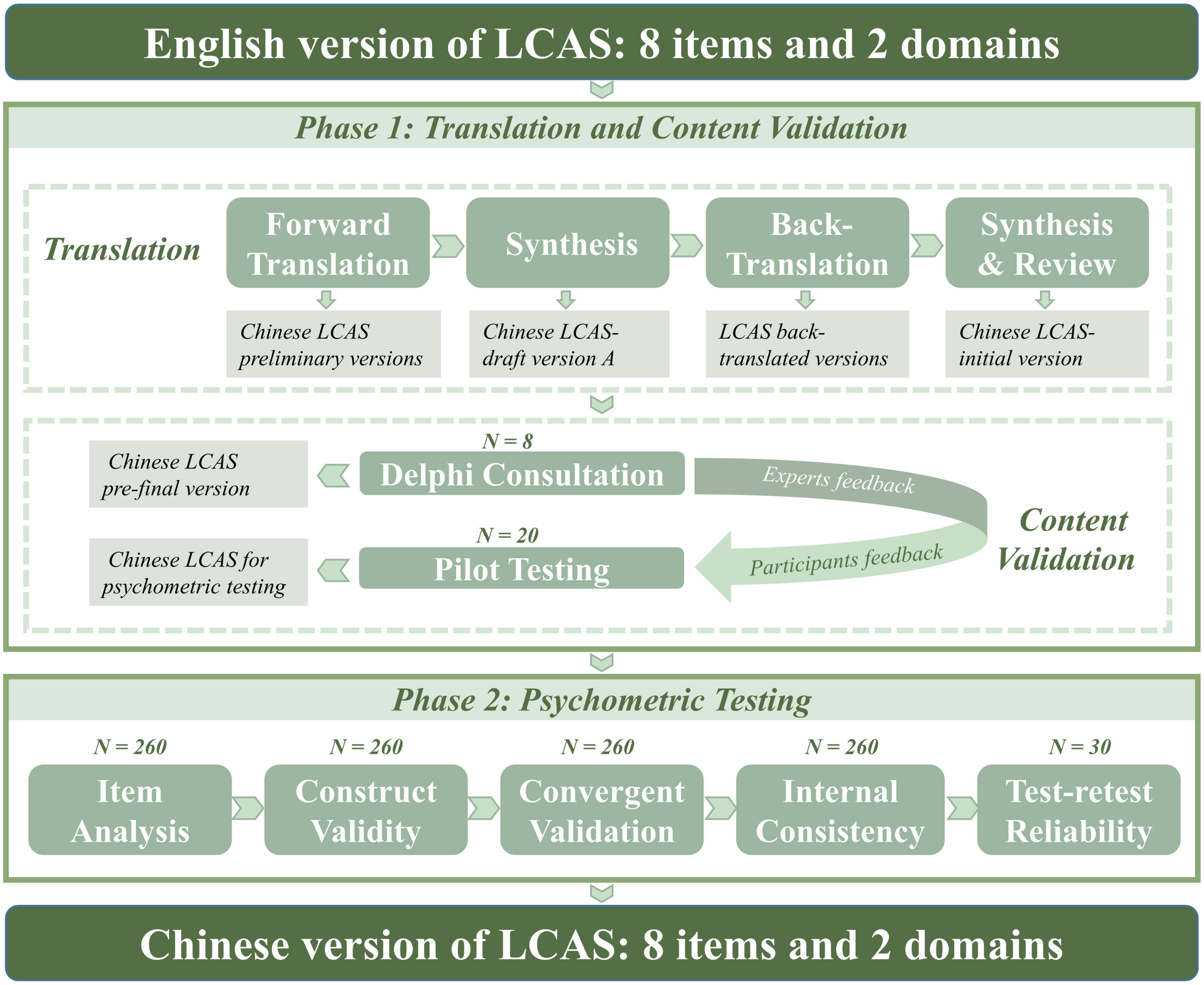

Figure 1 Study Flowchart of the Cross-Cultural Adaptation and Validation of the Chinese Version of the Life Change Adaptation Scale.

1) Forward translation: Two bilingual translators (one nursing PhD candidate and one clinical physician) independently translated the original English LCAS into Chinese, yielding two preliminary versions (P1 and P2).
2) Synthesis: The research team reviewed P1 and P2, synthesizing them into a unified Chinese draft (Version A) based on linguistic and conceptual equivalence.
3) Back-translation: Two other independent bilingual experts (one nursing scholar with overseas experience and one English language expert), blinded to the original scale, back-translated Version A into English, producing two back-translated versions (B1 and B2).
4) Synthesis and Review: The synthesized Chinese draft (Version A) and the back-translated versions were sent to the original author, Prof. Yuka Shindo, for review. Minor revisions were made based on her feedback to ensure semantic and conceptual consistency with the original, resulting in the initial Chinese version of the LCAS.

Cultural Adaptation and Content Validity

Content validity and cultural appropriateness were assessed via a two-round Delphi expert consultation with eight experts.[23] The panel inclusion criteria were: (1) ≥15 years of professional experience in traumatic brain injury medical care, nursing, or rehabilitation management; (2) intermediate professional title or higher; (3) willingness to complete both consultation rounds. Prior to the consultation, all experts received a detailed briefing on the study objectives, the LCAS construct, and the Delphi process to ensure a common understanding of the evaluation criteria. The Item-level Content Validity Index (I-CVI), Scale-level Content Validity Index/Average (S-CVI/Ave), and Scale-level Content Validity Index/Universal Agreement (S-CVI/UA) were calculated. Consensus was defined as an I-CVI ≥ 0.78 and S-CVI/UA ≥ 0.80.[24] Based on expert suggestions, minor wording adjustments were made to three items to enhance clarity and cultural relevance, yielding the pre-final version for pilot testing.

Pilot Testing

A pilot test was conducted with a convenience sample of 20 family caregivers of stroke patients from the rehabilitation department of a tertiary Grade A hospital in Wenzhou (April 2024). Inclusion criteria for caregivers were: (1) primary daily caregiver; (2) age ≥ 18 years; (3) a family member of the patient (eg., parent, spouse, child); (4) caring for a patient with a confirmed stroke diagnosis; (5) normal comprehension and communication abilities; (6) provision of informed consent. Exclusion criteria included: (1) severe physical illness (eg., cancer, organ failure); (2) paid caregiver; (3) experience of major stressful life events in the past month. Participants reported the items were clear and comprehensible, and the scale required approximately 3–5 minutes to complete. No further modifications were needed, finalizing the Chinese LCAS for psychometric testing.

Phase 2: Psychometric Testing

Participants and Sampling

Using a convenience sampling method, family caregivers of stroke patients were recruited from the same hospital department between May 2024 and April 2025. The inclusion and exclusion criteria mirrored those of the pilot test. The sample size calculation, based on a recommended 5–10 participants per scale item[25] and accounting for a 20% potential invalid response rate, yielded a minimum target of 50–100 participants. A total of 260 caregivers were recruited, exceeding this requirement.

Measures

Data were collected using: (1) Demographic Questionnaire: A self-designed form collecting information on caregiver characteristics (age, gender), patient characteristics (disease duration, use of assistive devices), and caregiving context (relationship to patient, daily caregiving time). (2) Chinese Version of LCAS: The finalized 8-item self-reported scale with two dimensions: Changes in Appraisal of Caregiving Resources (4 items) and Changes in Health Belief as a Caregiver (4 items). Items are rated on a 7-point Likert scale from −3 ("most deteriorated") to +3 ("most improved"), with a total score range of −24 to +24. (3) Kessler Psychological Distress Scale (K10): The Chinese version of this 10-item scale was used to assess convergent validation.[26,27] Items are rated on a 5-point Likert scale, with total scores ranging from 10 to 50; higher scores indicate greater psychological distress. It has demonstrated good reliability (Cronbach's α = 0.801) in previous studies.

Data Collection

Trained researchers administered the questionnaires face-to-face after obtaining hospital permission. The study purpose and instructions were explained, and each questionnaire was immediately checked for completeness upon collection. Questionnaires were considered invalid and excluded from analysis if: (1) ≥20% of items were missing; (2) identical response options were selected consecutively for >10 items (patterned responding); or (3) obvious logical contradictions were identified. All 260 distributed questionnaires were returned and deemed valid (100% response rate).

Data Analysis

Data were analyzed using IBM SPSS (Version 25). Descriptive statistics presented categorical data as frequencies/percentages and continuous data as mean ± standard deviation. A significance level of $P < 0.05$ was applied. Psychometric properties were evaluated as follows:

1) Item analysis: The Critical Ratio (CR) was calculated by comparing item scores between the top and bottom 27% of total scores. Items with CR < 3 and P < 0.05 were considered for removal.[28]
2) Construct Validity: Exploratory Factor Analysis (EFA) was performed using principal axis factoring with promax rotation. The Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity assessed factorability. Factors with eigenvalues >1 were retained, and items with factor loadings >0.40 on a single factor were considered satisfactory.[28,29]
3) Convergent validation: Pearson's correlation analysis was conducted between the total LCAS score and the K10 score.
4) Internal Consistency: Measured using Cronbach's alpha, with a target of >0.70 for the total scale and subscales.[28]
5) Test-retest Reliability: Assessed using Intraclass Correlation Coefficients (ICC) from a subset of participants (n=30) who completed the scale again after 2 weeks. This subsample size is consistent with the range commonly used in scale validation studies for estimating test-retest reliability.[26] ICC > 0.70 indicated good stability.[30]

Results

Phase 1: Translation and Content Validation Results

The cross-cultural adaptation process was successfully completed. The initial Chinese version (Version A) was synthesized from two independent forward translations. After back-translation and review by the original author, Prof. Yuka Shindo, minor revisions ensured semantic and conceptual equivalence, resulting in the official initial Chinese LCAS. The English version of LCAS can be found in Supplementary Figure S1.

Content validity, assessed via a two-round Delphi consultation with eight experts, showed excellent results. The I-CVI ranged from 0.750 to 1.000, and the S-CVI/Ave was 0.922. Minor wording adjustments were made to three items based on expert feedback, enhancing clarity and cultural appropriateness, which yielded the pre-final version for pilot testing.

The pilot test with 20 family caregivers confirmed the scale's feasibility. Participants found the items clear, comprehensible, and culturally relevant. The average completion time was 3–5 minutes. No further issues were identified, finalizing the Chinese LCAS for formal psychometric testing.

Phase 2: Psychometric Testing Results

Participant Characteristics

All 260 recruited family caregivers completed the study. The caregivers' mean age was 50.90 ± 12.48 years, and the patients' mean age was 64.84 ± 13.08 years. Most caregivers were female (75.00%) and were either the spouse (39.60%)

or parent (40.80%) of the patient. The vast majority (91.50%) had provided care for less than one year. Detailed demographic characteristics are presented in Table 1 and Table 2.

Item Analysis Results

Item analysis demonstrated good discriminative power for all items. The CR values, derived from comparing the high-score and low-score groups (top and bottom 27%), ranged from 6.013 to 10.375 (all $P < 0.05$). The correlation coefficients between each item and the total scale score ranged from 0.454 to 0.724 (all $P < 0.05$). Consequently, all items were retained for subsequent analysis.

Construct Validity Results

EFA supported the two-factor structure of the scale. The KMO measure was 0.716, and Bartlett's test of sphericity was significant ($\chi^2 = 445.573$, $P < 0.001$), confirming the data's suitability for factor analysis. Using principal component analysis with promax rotation, two factors with eigenvalues greater than 1 were extracted, consistent with the original scale. These two factors explained a cumulative 54.449% of the total variance (Factor 1: 31.331%; Factor 2: 23.118%). All factor loadings exceeded 0.5 on their primary factors with no substantial cross-loadings (>0.3). Communalities ranged from 0.331 to 0.741, indicating that the extracted factors adequately explained the variance in each item. The factor loading matrix is presented in Table 3.

Convergent Validation Results

Convergent validation was assessed by correlating the Chinese LCAS total score with the Kessler Psychological Distress Scale (K10) score. A significant positive correlation was found ($r = 0.168$, $P = 0.006$).

Table 1 Demographic Characteristics of Family Caregivers (N = 260)

Variable	Number or Mean±SD	%
Age, years	50.90±12.47	
Gender		
Male	65	25.0
Female	195	75.0
Education Level		
Primary school or below	49	18.8
Junior high school	112	43.1
High school	60	23.1
College or above	39	15.0
Marital Status		
Unmarried or Divorced or widowed	22	8.5
Married	238	91.5
Household Income, RMB		
<3000	101	38.8
3000-5000	111	42.7
>5000	48	18.5
Relationship to Patient		
Spouse	103	39.6
Child	40	15.4
Parent	106	40.8
Other	11	4.2
Duration of Caregiving, years		
<1	238	91.5
1–3	19	7.3
>3	3	1.2

Notes: Data are presented as n (%) or mean ± standard deviation (SD). Percentages may not sum to 100% due to rounding. RMB: Renminbi (Chinese Yuan).

Table 2 Demographic Characteristics of Stroke Patients (N = 260)

Variable	Number or Mean±SD	%
Age, years	64.84±13.08	
Gender		
Male	171	65.8
Female	89	34.2
Education Level		
Primary school or below	130	50.0
Junior high school	91	35.0
High school	27	10.4
College or above	12	4.6
Stroke Type		
Ischemic	194	74.6
Hemorrhagic	66	25.4
Times of Stroke Episodes		
1	213	81.9
2	41	15.8
>3	6	2.3

Note: All patients were diagnosed with stroke (ischemic or hemorrhagic), a major acquired brain injury (ABI) subtype. Data are presented as n (%) or mean ± standard deviation (SD). Percentages may not sum to 100% due to rounding.

Table 3 Factor Loadings of the Chinese Version of the Life Change Adaptation Scale (N = 260)

Item	Factor I Changes in the Appraisal of Caregiving Resources	Factor II Changes in the Health Belief as a Caregiver
1. Your attitude of being considerate of the circumstances and feelings of others	0.843	0.176
2. Your view toward social systems related to health and life for individuals with acquired brain injury	0.767	0.041
3. Your attitude of seeking help when needed	0.756	0.031
4. Your sense of responsibility as a member of family	0.725	−0.058
5. Your attitude of not trying too hard alone on any issue	0.025	0.579
6. Your relaxed mind that allows enjoyment of leisure activities and hobbies	0.089	0.568
7. Your mindset of respecting your own health	−0.065	0.783
8. Your outlook on your life going forward	−0.056	0.798

Notes: Extraction method: principal component analysis. Rotation method: Promax. The two factors together explained 54.449% of the total variance.

Reliability Results

The Chinese LCAS demonstrated good reliability. Internal consistency, measured by Cronbach's alpha, was 0.764 for the total scale, 0.776 for the "Changes in Appraisal of Caregiving Resources" subscale, and 0.781 for the "Changes in Health Belief as a Caregiver" subscale. Test-retest reliability, assessed with 30 caregivers over a two-week interval, showed excellent stability: the ICC was 0.936 for the total scale, 0.918 for the first subscale, and 0.902 for the second subscale.

Discussion

This study successfully developed a Chinese version of the LCAS and established its sound psychometric properties among family caregivers of stroke survivors in China. The final scale demonstrated good reliability and validity, confirming its two-factor structure ("Changes in the Appraisal of Caregiving Resources" and "Changes in the Health

Belief as a Caregiver"), which aligns with the original Japanese version.[13] This finding provides preliminary support for the cross-cultural applicability of the life-change adaptation construct among stroke survivors families.

The rigorous translation and cultural adaptation process, guided by established models like Brislin's, was pivotal in ensuring conceptual equivalence.[22] The high content validity indices achieved through expert consultation confirm the items' relevance and appropriateness within the Chinese socio-cultural context. This successful adaptation provides a valuable methodological blueprint for future cross-cultural validation of caregiver-assessment tools in China.

The EFA confirmed the two-dimensional structure, accounting for 54.449% of the total variance. The clear factor loadings indicate that Chinese family caregivers, like their Japanese counterparts, conceptualize life-change adaptation through the dual lenses of external resources (eg., social support, family responsibility) and internal beliefs (eg., outlook on life, health mindset). The "Changes in Health Belief as a Caregiver" factor aligns with health behavior theories, such as the Health Belief Model, which posits that individuals' health-related actions are influenced by their perceptions of susceptibility, severity, benefits, barriers, and self-efficacy.[14] Assessing shifts in these beliefs post-ABI is thus crucial for understanding caregivers' adaptive processes. The two-factor structure identified in this Chinese sample is consistent with the theoretical framework underpinning the original LCAS, which drew upon Continuity Theory to conceptualize life-change adaptation among caregivers of stroke survivors as comprising both external (caregiving resources) and internal (health beliefs) dimensions.[13,31]

Convergent construct validity was examined through the correlation with the Kessler Psychological Distress Scale (K10). A significant but modest positive correlation was observed ($r = 0.168$, $p = 0.006$). This positive association differs from the negative correlation reported in the original Japanese LCAS validation study,[13] but can be understood through the distinct dynamics of early-stage caregiving. In the acute/subacute phase, adaptation is an effortful, conscious process: caregivers actively appraising resources and restructuring health beliefs (behaviors captured by higher LCAS scores) may simultaneously experience heightened awareness of caregiving demands and concomitant emotional strain.[32] The co-occurrence of adaptation efforts and psychological distress during early caregiving is well-documented,[33] and similar positive correlations between stress and adaptation measures have been reported in other caregiving populations.[34] Longitudinal evidence further indicates that caregiver preparedness increases while distress decreases only over extended timeframes,[35] in the initial months, adaptation and distress frequently coexist.[36]

The internal consistency (Cronbach's $\alpha = 0.764$) and excellent test-retest reliability (ICC = 0.936) of the Chinese LCAS indicate that it is a stable and consistent measurement tool. These reliability metrics are comparable to those reported for the original scale (Cronbach's $\alpha = 0.84$)[13] and other well-validated instruments in healthcare,[12,37] affirming its suitability for both clinical and research applications.

The introduction of the Chinese LCAS addresses a critical gap in the healthcare assessment toolkit for stroke survivors' families in China. As a "silent epidemic," ABI drastically alters the lives of patients and their families.[38,39] In China, where family members are the primary source of long-term care due to evolving social structures and sometimes limited formal support services,[40] caregiver well-being is inextricably linked to patient care quality. The Chinese LCAS moves beyond simply measuring caregiver burden, a focus of many existing tools, to capture a more nuanced and empowering construct: adaptation. Adaptation is distinct from resilience; the LCAS assesses adaptation outcomes, which may be influenced by resilience, but does not directly measure resilience itself. By assessing both positive and negative changes, it allows clinicians and researchers to identify not only struggling caregivers but also those demonstrating successful adaptation and resilience. This aligns with the growing recognition of the "strengths and resiliency" of stroke survivors' families and is crucial for developing strength-based, family-centered interventions.[8,12]

From a clinical standpoint, the Chinese LCAS serves as a practical and efficient tool (completion time: 3–5 minutes) for routine screening. Its application can directly facilitate targeted support in two key ways. First, it enables healthcare professionals to identify caregivers at different stages of adaptation, allowing for timely referrals to tailored supportive services (eg., psychological counseling for those struggling, or resilience-building programs for others). Second, it provides a sensitive outcome measure to evaluate the effectiveness of specific psychosocial interventions or educational programs aimed at enhancing caregiver adaptation, thereby moving caregiver support from a generic to a data-informed approach.

Scientifically, the introduction of this validated tool opens new avenues for health services and policy research. By systematically assessing adaptation levels, researchers can collect robust data on the needs and outcomes of the caregiver population. This evidence is crucial for advocating and designing evidence-based support policies. For example, data generated using the LCAS can help quantify the need for caregiver support services within healthcare systems and evaluate the cost-effectiveness of related interventions. To fully realize its potential, future research should explore the scale's utility across diverse sub-populations within China, including caregivers from ethnic minority groups and rural areas, to ensure its equitable application in policy and practice.

This study has several limitations. First, the use of a convenience sample from a single tertiary hospital may introduce selection bias and limit the generalizability of the findings. Participants in this study likely had relatively better access to healthcare resources, and the sample predominantly comprised caregivers in the acute/subacute phase (91.5% with <1 year of caregiving). Thus, the sample may not fully represent all family caregivers of stroke survivors in China, particularly those from rural areas, primary care settings, lower socioeconomic status, or those in the chronic caregiving phase. Future multi-center studies across different regions, healthcare levels, and caregiving stages are needed to validate the scale in broader populations. Second, the cross-sectional design precludes assessment of the scale's responsiveness to change over time. Future longitudinal studies are needed to establish its predictive validity and track adaptation trajectories. Furthermore, while EFA supported the two-factor structure, CFA was not performed. As this initial Chinese validation appropriately employed EFA to explore structural replication, future studies should conduct CFA with independent samples to confirm factorial validity and cross-cultural measurement invariance across diverse ABI populations and settings. Third, while our sample consisted of caregivers of stroke survivors, a major and representative ABI subtype in China, future research should include caregivers of individuals with other ABI types (eg., traumatic brain injury) to further validate the scale's utility across the broader ABI population. Finally, convergent validity evidence was established solely using the K10 as a measure of psychological distress. While the observed correlation provides initial support for the construct validity of the Chinese LCAS, future validation studies should incorporate a broader battery of measures. This should include established instruments assessing caregiver burden (eg., Zarit Burden Interview) or positive aspects of caregiving, to further delineate the scale's convergent and discriminant validity.

Conclusions

This study provides initial evidence that the Chinese version of the Life Change Adaptation Scale is a reliable and valid tool for assessing positive and negative aspects of life-change adaptation among family caregivers of stroke survivors, supporting its use in clinical screening and intervention research. Future multi-center studies encompassing diverse ABI etiologies, confirmatory factor analysis, and longitudinal designs are needed to further confirm factorial structure, measurement invariance, responsiveness to change, and to establish more robust convergent validity evidence. Such work will solidify the scale's utility in advancing family-centered care and health policy for ABI families in China.

Abbreviations

LCAS, Life Change Adaptation Scale; ABI, Acquired Brain Injury; I-CVI, Item-level Content Validity Index; S-CVI/Ave, Scale-level Content Validity Index/Average; CR, Critical Ratio; EFA, Exploratory Factor Analysis; KMO, Kaiser-Meyer-Olkin; ICC, Intraclass Correlation Coefficients.

Data Sharing Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Ethics statement

This study was conducted in accordance with the Declaration of Helsinki and was approved by the Clinical Research Ethics Committee of the First Affiliated Hospital of Wenzhou Medical University (Approval No: 2024-191). All participants provided written informed consent.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

All the authors declare no conflicts of interest with this work.

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