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ORIGINALS

Translation, Adaptation, and Validation of the Preparedness Assessment Instrument for the Transition Home

Traducción, adaptación y validación del instrumento de evaluación de la Preparación para la Transición al Hogar

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ABSTRACT:

Introduction: Stroke is a leading cause of disability, affecting both survivors and their caregivers. Using a validated instrument to assess caregiver readiness for transitioning to home care will enable an optimal response to caregiving needs.
Objective: The objective is to translate, adapt and validate the psychometric properties of the Preparedness Assessment for the Transition Home Instrument for its use in Mexico.
Methodology: This is a methodological study with seven stages: Translation, semantic adaptation, validation by judges, style correction, pilot test, psychometric properties and factor analysis.
Results: Item Validity Index: 0.37; Criterion Validity: 24% error; Content Validity Index: 10. Kendall's W: coherence (141.848/p=0.000), clarity (143.312/p=0.000), relevance (159.631/p=0.000), sufficiency (59.885/p=0.000). The final version's criterion validity, as determined by the Kaiser-Meyer-Olkin analysis, is 0.832. Bartlett's Sphericity Test yielded a chi-squared value of 2158.306, with 300 degrees of freedom and a p-value of less than 0.000. Exploratory Factor Analysis identified seven factors explaining 63.38% of the total variance. Confirmatory Factor Analysis showed an adequate model fit (X^2 = 779.423, df = 269, p < 0.000; CFI = 0.741; TLI = 0.687; NFI = 0.660; AIC = 941.423; PNFI = 0.547; RMSEA = 0.087, CI [0.080, 0.094]). The final internal consistency is 0.86 by Cronbach's alpha.

Conclusions: The Mexican version of the instrument retains the original 25 items, which are distributed across seven domains. It is valid and reliable for the intended population.

Keywords: Translations; validation study; transitional care; caregivers; stroke.

RESUMEN:

Introducción: El accidente cerebro vascular es una de las principales causas de discapacidad que afecta a los sobrevivientes y cuidadores. Evaluar la preparación del cuidador para la transición al hogar mediante un instrumento validado permitirá responder a las necesidades de cuidado de manera óptima.
Objetivo: Traducir, adaptar y validar las propiedades psicométricas del instrumento de evaluación de la preparación para la transición al hogar en México.
Metodología: Estudio metodológico de siete etapas: traducción, adaptación semántica, validación por jueces, corrección de estilo, prueba piloto, propiedades psicométricas y análisis factorial.
Resultados: Índice de Validez por Ítem: 0.37; Criterio de Validez: 24% de error; Índice de Validez de Contenido: 10. Los coeficientes de W Kendall: coherencia [141.848/p= 0.000], claridad [143.312/p= 0.000], relevancia [159.631/p= 0.000], suficiencia [59.885/p= 0.000]. Versión final, validez de criterio mediante el análisis de Kaiser-Meyer-Olkin es de 0.832. Esfericidad de Bartlett [X^2 =2158.306, gl = 300, p = <0.000]. El análisis factorial exploratorio identificó siete factores, explicando el 63.38% de la varianza total. El análisis factorial confirmatorio mostró un ajuste adecuado del modelo: (X^2 = 779.423, gl = 269, p = <0.000; CFI = 0.741; TLI = 0.687; NFI= 0.660; AIC= 941.423; PNFI= 0.547; RMSEA = 0.087 IC [.080/.094]). La consistencia interna final es de 0.86 por alfa de Cronbach.
Conclusiones: El instrumento en México mantiene los 25 ítems distribuidos en siete dominios, válido y confiable para esta población.

Palabras clave: Traducciones; Estudio de Validación; Cuidado de transición; Cuidadores; Accidente Cerebrovascular.

INTRODUCTION

Stroke or cerebrovascular accident (CVA) is the second leading cause of death, with an estimated 6.6 million people losing their lives to it each year [(1)]. It is estimated that 14 million people worldwide had a stroke in 2021. In this regard, it is estimated that every 53 seconds a person has a stroke and every 3.3 minutes a person dies due to this cause [(1)].

Worldwide, an estimated 101 million people live with physical and/or cognitive disabilities as a result of this condition. This equates to 40.8 million disability-adjusted life years and 4.5 million years lived with disability among people under the age of 70 [(1)]. In Mexico, the Ministry of Health estimated a prevalence of 170 thousand stroke cases in the country in 2021, of which 20% died within the first 30 days and seven out of ten will live with a disability [(2)].

A stroke can potentially affect anyone, either directly or indirectly, including family members, friends and other people in the affected individual social circle. This is because the size of the lesion in the cerebral hemisphere can cause partial or total hemiplegia, as well as speech, comprehension, memory and cognitive difficulties. The resulting effects can range from minimal to catastrophic, leading to disability and dependence for the survivor [(3,4)].

For this reason, the survivor will require assistance, supervision and care with basic and instrumental activities of daily living. In many cases, this responsibility falls to a family caregiver (FC), who is responsible for providing care at home [(4)]. However, the role of caregiver is complex and difficult due to a lack of adequate preparation [(5)].

The transition from hospital to home is often inadequate and ineffective for people with stroke-related disabilities and their family caregivers. This is due to the enormous challenges arising from a lack of preparedness and the inability to provide care at home [6]. A lack of preparedness, either on the part of the patient or the caregiver, can lead to negative physical, mental and emotional health outcomes [7]. It can also lead to overloading caregivers throughout the trajectory of their caregiving role [8].

The preparedness of family caregivers for the transition from hospital to home after a stroke survivor's discharge refers to their ability and willingness to perform caregiving tasks at home [6–8]. Such readiness is assessed by evaluating the caregiver's needs and skills, and identifying any deficiencies in knowledge or resources that could hinder their ability to take on the new role. The aim is for healthcare professionals to develop an individualized care plan to prepare the caregiver for the transition to home.

Although several instruments exist to assess post-stroke caregivers, including those assigned to evaluate home caregiving competency [9], verify caregiving needs and concerns [10], and identify unmet resource needs [11], these instruments are not specific enough to assess caregiver readiness prior to transitioning from hospital to home. Furthermore, these instruments were originally designed to evaluate caregivers once they had taken on their responsibilities.

Although the Caregiver Preparedness Scale instrument addresses the concept of preparedness, it does not cover other important domains for assuming the caregiver role. The Preparedness Assessment for the Transition Home after Stroke (PATH-25©) was developed in response to the lack of existing instruments that comprehensively assess these key concepts [6–8].

Given the importance of measuring the preparedness of caregivers of post-stroke patients for the transition from hospital to home in Mexico, it is necessary to have an appropriate instrument for studying the target population. However, there is currently no Spanish version of the PATH-25 instrument that has been translated and culturally adapted. This instrument was originally developed in English in California, USA. The aim of this study was to translate, culturally adapt and validate the PATH-25 for use in Mexico by caregivers of people who have had a stroke.

METHOD

Study design

This methodological study was carried out in seven stages: 1) Translation, 2) Semantic Adaptation, 3) Validation by Judges, 4) Style Correction, 5) Pilot Test, 6) Psychometric Properties, and 7) Factor Analysis [13]. Thanks to this rigorous methodology, the final version of the PATH-25 instrument is semantically equivalent.

Timing and location of the study

After obtaining approval from the Research Ethics Committee, non-probabilistic consecutive sampling was performed according to the established selection criteria [14]. Samples were collected from July to December 2024 in various medical facilities of the *Instituto Mexicano del Seguro Social* (IMSS by its acronym in Spanish) facilities

located in Michoacán, Mexico City and Guanajuato. In Michoacán, data were collected at the *Hospital General Regional No. 1* (HGRNo.1) in Charo, as well as at the *Hospital General de Zona No. 83* in Morelia (HGZ No. 83). In Mexico City, data were collected at the *Unidad Médica de Alta Especialidad* (UMAE by its acronym in Spanish) *Hospital de Cardiología del Centro Médico Nacional Siglo XXI* (UMAE Hospital de Cardiología CMN S. XXI). In Guanajuato, samples were obtained from two medical centers, the *Hospital General de Zona No. 4* (HGZ No. 4) in Celaya, and the *Hospital de Especialidades No. 1 "Centro Médico Nacional del Bajío"* (HE No. 1-CMNB) in León. These sites were chosen to strengthen the validity, generalization, representativeness and replicability of the instrument's adaptation.

Participants

The population comprised family caregivers of stroke survivors with disabilities and dependency issues treated as patients in IMSS hospitals.

Stage 1: Translation

We requested authorization from the authors of the instrument (PATH-25©) to carry out the present methodological process. They authorized this in writing and provided psychometric information supported by documentation and publications. The translation and back-translation were carried out simultaneously and independently by two certified bilingual translators, who preserved the original content and purpose of the instrument. The translators were a language professor from the Universidad Autónoma de Tamaulipas (Translator 1) and an expert translator from Sonora (Translator 2), both from Mexico. This resulted in the first Spanish version of the instrument in Mexico (PATH-Mexico).

Stage 2: Semantic Adaptation

To carry out the semantic adaptation of the translation, the review committee formed by the main researchers examined each item to establish whether it was a question or a statement, in order to ensure that the response was consistent with the Likert-type format. The original meaning of each item was established in the source language with the aim of preserving it despite any syntactic changes in the translation process [13]. Adjustments were made to the syntax of each translated item so that the sentence would have natural, fluent meaning in Spanish in Mexico. The result was the second version of the PATH-Mexico instrument.

Stage 3: Validation by Judges

Content was reviewed, evaluated and validated independently by experts; the committee was comprised by using the snowball recruitment method. Inclusion criteria included holding a doctoral degree in nursing sciences and having experience in validation studies. Twenty-two invitations were mailed.

To evaluate the quantitative face validity, the judges received the technical manual of the instrument and theoretical framework. In the operational description, they were asked to evaluate each item of the instrument in terms of its comprehensibility, clarity, relevance, and precision. The evaluation was performed using a five-point Likert-type

scale, where: 0 = definitely not related; 1 = not related; 2 = unsure of relationship; items require further revision; 3 = related, but minor modifications necessary; and 4 = highly related [13].

In terms of qualitative face validation, judges were asked to provide qualitative observations and suggestions for each item of the instrument, considering aspects such as wording, clarity, relevance and precision. The study's main researcher, after compiling the comments and suggestions of the judges, sent such compilation by mail to the review committee to analyze and evaluate the comments made. Following a consensus on the changes and modifications to be made, these were supported by empirical and theoretical evidence [13]. The third version of the PATH-Mexico instrument was thus produced.

Stage 4: Style Correction

A professor with a master's degree in philosophy and literature and expertise in Spanish linguistics from the Universidad Michoacana de San Nicolás de Hidalgo generated appropriate syntax, coherence, clarity and conciseness to improve the wording of each item's sentences in the instrument. The result was the fourth version of the PATH-Mexico.

Stage 5: Pilot Test

The fourth version of the instrument was applied to an initial sample of thirty family caregivers at the IMSS HGR No. 1 regional hospital in the state of Michoacán who met the inclusion criteria shown in the corresponding section. The pilot test played a fundamental role in stabilizing the assessment instrument. The process focused on two main aspects: the instrument's feasibility in terms of response time, and the clarity of the wording of the items for the subjects of interest. The objective was to enable participants to generate new evaluations and corrections [13].

After obtaining the results, they were sent to the committee of experts for their review and thus generate the final modifications for adaptation. Following this process, the review committee produced a fifth version of the PATH-Mexico instrument. The version of the instrument adapted to the Mexican context was back-translated from Spanish to English by translator T2. The authors of the instrument approved the modifications and authorized proceeding with the psychometric analysis and final testing.

Stage 6: Psychometric Properties

The preliminary psychometric properties of the instrument were established in the fifth version of the PATH-Mexico. Exploratory Factor Analysis (EFA) was used to determine the instrument's dimensions, including the number of items in each section. A correlation matrix greater than 0.30 was established. The preliminary internal consistency of the pilot test was evaluated using Cronbach's alpha coefficient [13].

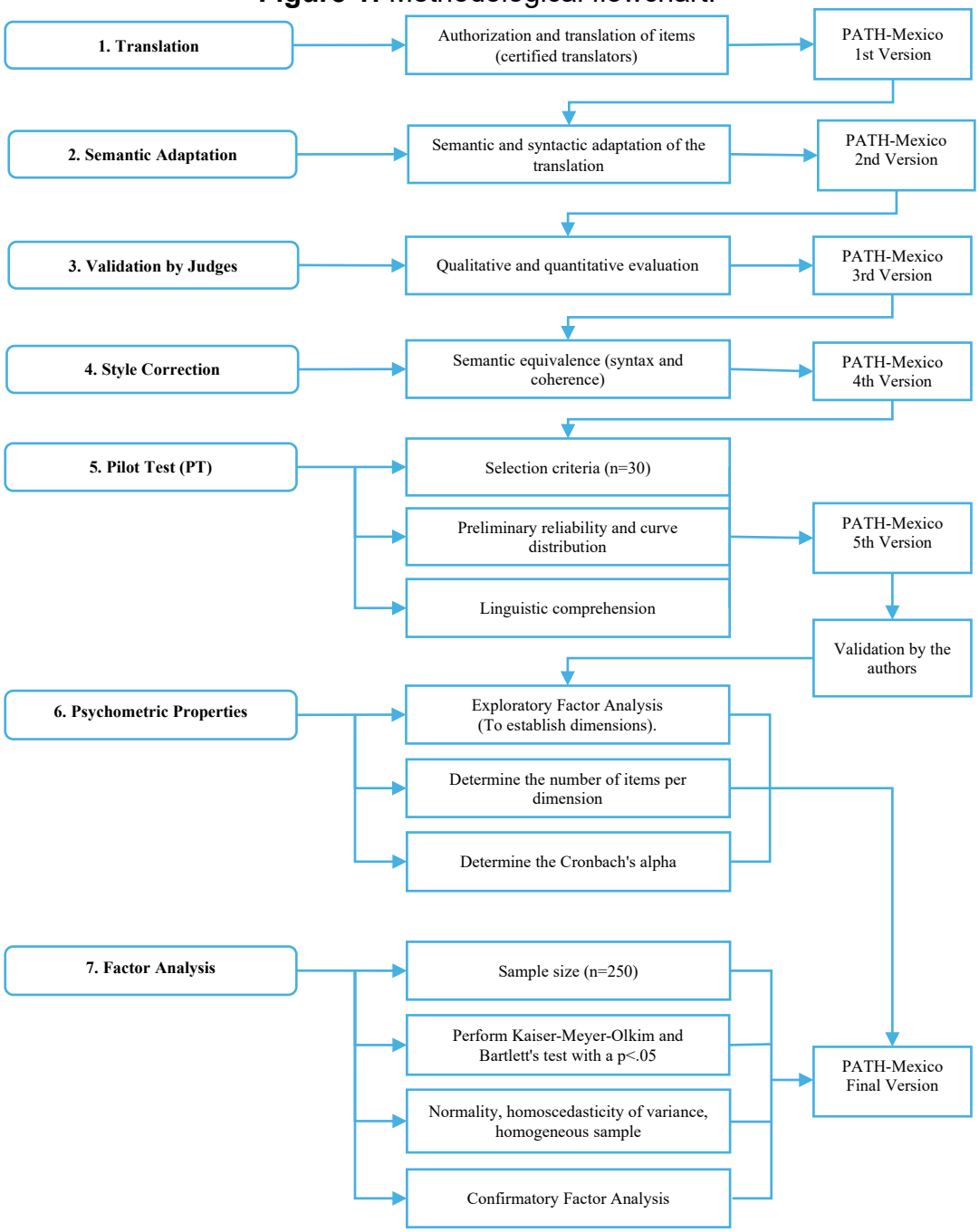
Stage 7: Factor Analysis

The fifth version of the PATH-Mexico, also known as the 'final version', was administered to a significant sample size in order to obtain an acceptable effect size

and valid, reliable results [13]. Confirmatory Factor Analysis (CFA) [15] was performed to confirm, from a theoretical perspective, whether the sections or dimensions (hereafter referred to as 'factors') were statistically grouped by rotating the items.

After verifying the normality of the data and the homoscedasticity of variance, as well as the homogeneity of the samples and the absence of collinearity, Bartlett's Test of Sphericity (BST) and a Kaiser–Meyer–Olkin (KMO) value close to one proved the absence of significant correlations between the variables. A confirmatory factor analysis (CFA) was performed using AMOS Graphics 23 and the maximum likelihood method to evaluate the psychometric properties [16]. Figure 1 shows the methodological flowchart summarizing the process followed.

Figure 1: Methodological flowchart.



Source: Self-developed (2025).

Sample selection

The sample included family caregivers aged over 18 who took care of stroke survivors with a physical or cognitive disability. Participants must have dedicated at least one day per week to patient care, have been in the caregiver role for more than one month, and agree to participate in the study by signing the informed consent form. Family caregivers whose first language was not Spanish were excluded.

Sample

The sample size was determined to be 250 participants based on an alpha significance level of 0.05, a power of 80%, and a factor loading of 0.35 [17].

Statistical analysis

Data capture, organization, processing and analysis were carried out using the Statistical Package for the Social Sciences (SPSS) version 26. Parametric data were expressed as the mean and standard deviation (SD). Non-parametric data were expressed using descriptive statistics and measures of central tendency.

Content validation was estimated using the Content Validity Index (CVI). The following indices were estimated: Item Validity Index (IVI) (ratio of items <3/total judges); Criterion Validity (CV) = IVI/total items. The overall CVI was estimated using the proportion of items ≥3/total items. Values of the Content Validity Index close to 1 were considered acceptable. The data were estimated using Microsoft Excel for Windows®, with the quantitative variables and qualitative variable frequencies estimated [13].

The reliability of the scale was evaluated using an internal consistency analysis with Cronbach's alpha coefficient, with an acceptance criterion greater than 0.7 [13]. To determine the degree of concordance between the evaluators, a Kendall's W analysis was performed, whose value ranged from 0 to 1 (with 1 indicating total concordance). Acceptable values were found to be 0.90 and 0.74, respectively [13]. Items that did not reach the minimum score were analyzed and incorporated into the instrument at the suggestion of the experts.

To measure the criterion validity of the instrument, the Kaiser–Meyer–Olkin (KMO) test was applied, with values close to one. The Bartlett's Test of Sphericity was also applied (chi-square, $p < 0.05$ and a 95% confidence level), which determines the absence of correlations (collinearity) between variables [15,18,19].

To measure the psychometric properties, confirmatory factor analysis was performed using Amos Graphics 23 and the maximum likelihood method [16]. The following fit indicators were established: A) The chi-square (χ^2) indicator evaluates the probability that the theoretical model fits the data, looking for a low value. However, it is more common to use the ratio with the degree of freedom (χ^2/df), where a maximum value of 3 indicates an adequate fit [15,16,18, and 19]. B). The Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI) and the Normalized Fit Index (NFI) evaluate the fit of the estimated model versus the null model. Values close to 1 are considered satisfactory.

In general, scores above 0.90 suggest that the model is adequately constructed. C). The Akaike Information Criterion (AIC) and Parsimonious Normalized Fit Index (PNFI) show that the smaller the AIC value, the better the model fit since the model will be more parsimonious. These values are achieved with models that have few estimated parameters and low X^2 values. D) The Root Mean Squared Error of Approximation (RMSEA) is an statistical index whose values should be less than 0.05. For large samples, a value of 0.08 is acceptable [15,16,18 and 19].

Ethical considerations

Written authorization was obtained from the author of IE. The instrument and the evaluation and interpretation data sheet were received as attachments. The project was approved by the National Scientific Research Committee of the IMSS with the registration number R-2024-785-035.

RESULTS

Stage 1 and 2: After receiving the English-Spanish translations from translators T1 and T2, the main researcher sent the concordance of the documents to the review committee, as there were some similarities in the meaning of words within the cultural context. The review committee generated the semantic adaptation of the words and phrases, resolving them by consensus.

Stage 3: Of the 22 invitations sent to be part of the expert committee, 17 female doctors of nursing accepted and voluntarily signed the informed consent and confidentiality agreement. Finally, 16 completed the evaluation round, so that the committee was established.

The committee conducted two rounds of analysis, one before the final pre-test of the available version and one after the final pre-test. The first analysis involved the estimation of the values of the Content Validity Index and Kendall's W to determine the degree of evaluator agreement in terms of coherence, clarity, relevance, and sufficiency. These values are shown in Table 1.

Content validity was obtained using the judges' technique, yielding the following results: the Item Validity Index was 0.375, and the Criterion Validity Index was 0.015, representing a 24% margin of error. The Content Validity Index was 10, which is acceptable.

Kendall's W coefficient for coherence was 141.848 and was statistically significant (p = 0.000). For clarity, relevance and sufficiency, the coefficients were 143.312, 159.631 and 159.885, respectively, all with p values of 0.000. Consequently, there was concordance in the judges' measurements (see Table 1).

Table 1: Kendall's W coefficient obtained in the expert evaluation round.

Evaluation	Kendall's W*	N	Chi-square	Significance
Coherence	0.369	16	141.848	<0.000
Clarity	0.373	16	143.312	<0.000
Relevance	0.416	16	159.631	<0.000
Sufficiency	0.416	16	159.885	<0.000

Source: Self-developed (2025).

Twenty-two related items were evaluated, resulting in a high level of agreement among the judges' measurements. Regarding the qualitative evaluation, modifications were generated for all items except 2, 17, 18, 22, 23, 24 and 25.

Stage 4: During the style correction phase, the reviewer made no changes to the syntax, coherence, clarity or consistency of the text.

Stage 5: The pilot test was administered to 30 family caregivers of stroke survivors who were hospitalized at the IMSS HGR No. 1 regional hospital in Michoacán. The preliminary Cronbach's alpha was 0.897. The average response time was approximately 13 minutes. Regarding the clarity of the items, participants 7, 15, 19 and 28 suggested specifying the type of banking operations mentioned in items 16 and 17. To improve understanding of these items, the evaluators agreed to include specific examples and add the clarification 'for example, withdrawing or depositing money'. This resulted in the fifth version of the PATH-Mexico instrument.

Stage 6: The context of the sample: the 250 participants came from three states in the country: 56% (140) from Michoacán, 24.8% (62) from Mexico City, and 19.2% (48) from Guanajuato. In terms of demographic characteristics, 68% (170) of participants were female and 31.6% (79) were male, with an average age of 45.3 years (SD = 13.5). In terms of marital status, 50.4% (126) of participants were married, 22% (55) were single, 13.6% (34) were in a common-law marriage, 6% (15) were separated, 4.8% (12) were divorced, and 3.2% (8) were widowed.

In terms of health, 58.4% (146) of participants reported having no diseases. However, 13.6% (34 participants) have more than two chronic non-communicable diseases, 9.2% (23 participants) have high blood pressure, 3.6% (9 participants) have type 2 diabetes, 2.8% (7 participants) have depression, 6% (15 participants) have another disease, 2.4% (6 participants) have anxiety, 1.6% (4 participants) have hypercholesterolemia, 1.6% (4 participants) have rheumatoid arthritis, and 0.8% (2 participants) have heart failure.

In terms of religious identity, 81.6% (204) identified as Catholic, 9.6% (24) as Christian, 4% (10) as agnostic, 1.6% (4) as evangelical, 0.6% (4) as Jehovah's Witnesses, and 0.6% (4) as atheist. In terms of education, participants have an average of 11.8 years of schooling, which is roughly equivalent to completing high school.

In terms of cohabitation, 47.6% (119) live with their spouse, 14.8% (37) with their mother, 12.8% (32) with their children, 10.8% (27) alone, 10.4% (26) with a partner, and 3.6% (9) with their father. The occupations of the caregivers vary, with a third (32.4%, or 81 individuals) being housewives. This is followed by employees or laborers (26.8%, or 67 individuals), professional workers in government companies (17.6%, or 44 individuals), the unemployed (16%, or 40 individuals), day laborers (4%, or 10 people), retirees and/or pensioners (1.6%, or 4 individuals), and the self-employed (1.2%, or 3 individuals).

In terms of income, 22.4% (56) of caregivers earn between 3,000 and 4,999 Mexican pesos (MXN) per month, while 22% (55) earn between 8,000 and 12,999 MXN. 15.2% (38) earn less than 3,000 MXN, 14.8% (37) declined to answer, 12.8% (32) earn

between 6,000 and 7,999 MXN, and 9.6% (24) earn between 4,000 and 5,999 MXN. Only 3.2% (8) do not know.

On average, caregivers dedicate 13.3 hours per week to this task, spread over an average of 5.7 days. The average duration of caregiving is 14.9 months. In terms of support networks, 52.2% (131) of participants receive support from their immediate family. However, 22.8% (57) have no support at all, while 19.6% (49) have more than two sources of help. Of these, 1.6% (4) receive financial support, 1.6% (4) receive psychological support and 1.2% receive other types of support. Only 0.8% receive spiritual support.

To validate the mean content of the instrument, an exploratory factor analysis was performed. The analysis began with the Kaiser–Meyer–Olkin (KMO) test, which measures the sample adequacy. The result obtained was 0.832, considered very good [20, 21]. Bartlett's Test of Sphericity was then performed, yielding a chi-squared value of 2,158.306 with 300 degrees of freedom and a significance level of less than 0.000, indicating significant correlations [20, 21]. Factor analysis identified seven factors explaining 63.38% of the total variance (Table 2). The instrument's reliability was evaluated using Cronbach's alpha coefficient, achieving a value of 0.866, which is considered acceptable [13].

Table 2: Variance explained with Varimax rotation (n=250).

Factor	Initial values			Sum of saturations squared by rotation		
	Total	% of variance	Accumulated %	Total	% of variance	Accumulated %
1	6.264	25.057	25.057	4.570	18.280	18.280
2	2.662	10.647	35.704	2.373	9.493	27.773
3	1.871	7.485	43.190	2.007	8.029	35.802
4	1.534	6.136	49.325	1.777	7.107	42.909
5	1.315	5.260	54.585	1.766	7.065	49.974
6	1.197	4.789	59.374	1.703	6.812	56.786
7	1.003	4.011	63.386	1.650	6.600	63.386

Source: Self-developed (2025).

To obtain the psychometric results, an exploratory factor analysis was performed using Varimax rotation with Kaiser Normalization to determine the factors of the instrument (Table 3). The results of the analysis were satisfactory, as most items moved to a different factor within the scale.

Table 3: Rotated components matrix (n=250).

Item	Factors (dimensions)						
	1	2	3	4	5	6	7
1	0.693	-0.052	-0.094	-0.022	0.002	0.098	0.121
2	0.678	0.035	-0.134	0.127	-0.075	0.128	0.167
3	0.798	0.114	0.092	-0.002	0.095	-0.048	0.084
4	0.811	0.031	0.102	0.081	0.105	-0.008	0.000
5	0.762	0.122	0.142	-0.159	0.040	-0.007	0.018
6	0.784	0.130	0.205	0.102	0.068	0.054	0.037
7	0.372	-0.244	0.437	0.337	-0.139	0.178	0.282
8	0.133	0.064	0.674	0.185	0.096	0.177	0.146
9	-0.050	0.098	-0.020	0.836	0.112	0.042	0.065
10	0.111	0.086	0.146	0.801	-0.013	0.262	-0.007
11	0.168	-0.028	0.181	0.130	0.701	0.143	0.113
12	0.059	-0.011	0.239	0.080	0.161	0.538	0.057
13	-0.087	0.180	0.667	-0.131	0.254	-0.037	0.077
14	0.041	0.367	0.730	0.058	-0.005	0.111	-0.110
15	0.027	0.052	0.076	-0.049	0.774	0.110	0.174
16	0.593	-0.034	-0.088	0.011	0.366	0.120	0.208
17	0.223	-0.072	0.147	0.078	0.107	0.527	0.448
18	0.360	0.405	0.117	0.256	0.448	-0.097	-0.287
19	0.247	0.172	0.002	0.058	0.328	-0.089	0.723
20	0.234	0.755	0.267	0.059	0.064	0.088	0.148
21	0.016	0.827	0.127	-0.002	0.022	0.174	0.033
22	0.046	0.659	0.114	0.205	-0.052	-0.269	0.384
23	0.147	0.208	0.119	0.002	0.087	0.246	0.636
24	0.028	0.139	-0.032	0.151	0.023	0.789	0.007
25	0.505	0.348	0.013	0.198	0.203	0.318	0.067

Source: Self-developed (2025).

Stage 7: A Confirmatory Factor Analysis was performed using the Maximum Likelihood Estimation (MLE) method. The results suggest that the proposed two-dimensional measurement model fits the data well overall (X^2 = 779.423, df = 269, p = .000; CFI = 0.741; TLI = 0.687; NFI = 0.660; AIC = 941.423; PNFI = 0.547; RMSEA = 0.087, CI [0.080, 0.094]). The regression coefficient values suggest that the factors explain an acceptable proportion of the variance in the items (Figure 2). The correlation between the seven factors ranged from -0.01 to 0.53; therefore, while they are related, they do not present collinearity problems [15,16].

Figure 2: Inter-item variance and inter-factor correlation.

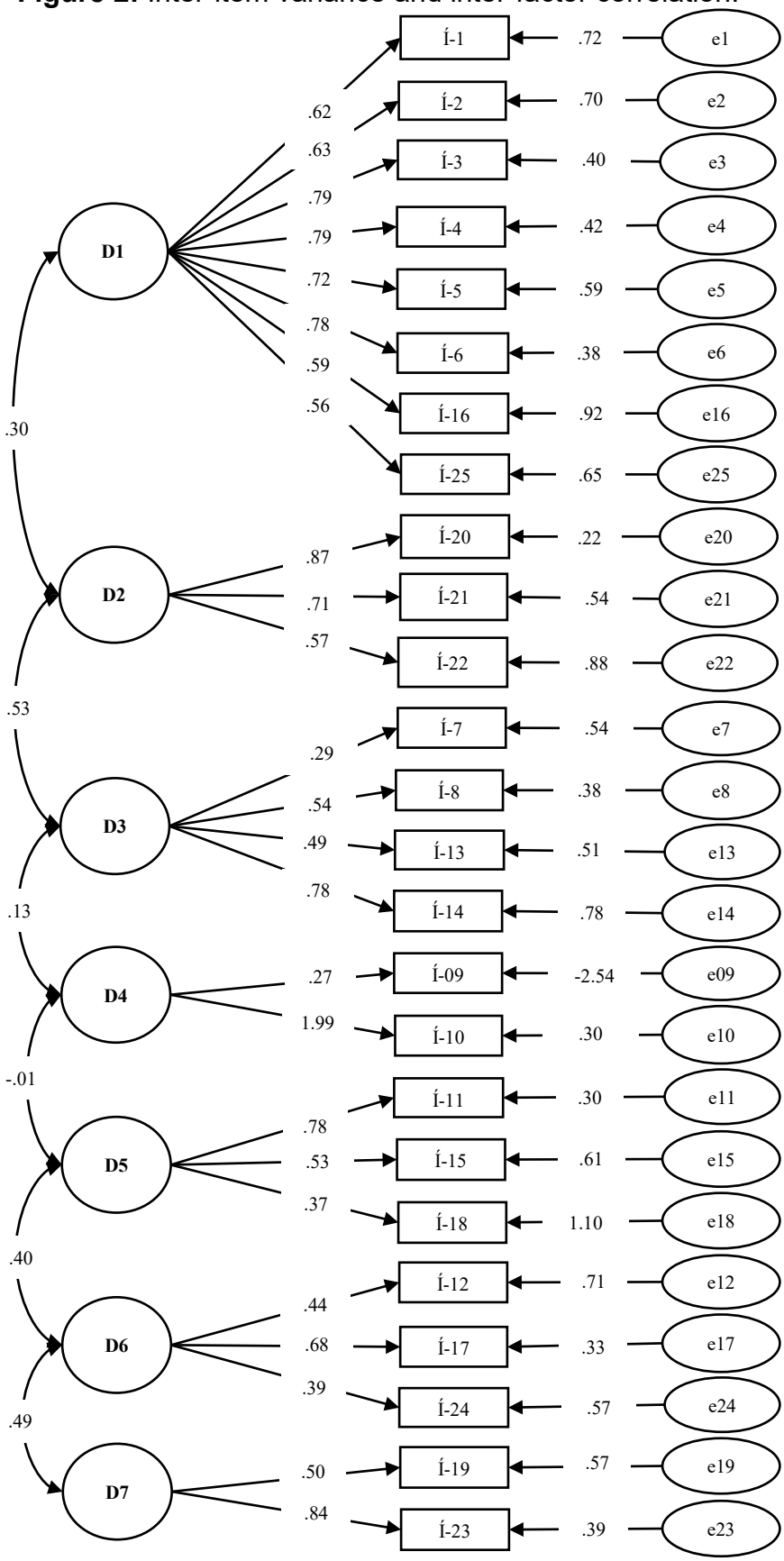


Table 4 shows the total number of factors and dimensions, as well as the number of items that make up the final version of the instrument adapted for use in the Mexican context.

Table 4: Factors and dimensions of the final version of the instrument.

	PATH-English		PATH-Mexico	
No.	**Dimension**	**Item**	**Dimension**	**Item**
1	Long-term implications: Expectations and perceptions.	1, 2, 3, 4	Long-term implications: expectations, perception and capacity.	1, 2, 3, 4, 5, 6, 16, 25
2	Commitment: Willingness	6, 7, 8, 17, 25	Home accessibility	20, 21, 22
3	Capacity: Formal and informal resources.	11, 12, 15	Formal and informal resources.	11, 15, 18
4	Capacity: Caregiver experience prior to stroke.	5, 16		
5	Capacity: Financial resources.	19, 22	Financial and transportation resources	19, 23
6	Capacity: Pre-existing health problems.	9, 10	Pre-existing health problems.	9, 10
7	Capacity: Accessibility of home and transportation.	20, 21, 23	Commitment and availability of formal and informal resources	12, 17, 24
8	Social context: Commitment (strength of relationship) and capacity (pre-established roles/responsibilities, ability to sustain).	13, 14, 18, 24.	Social context: commitment (strength of relationship) and capacity (pre-established roles/responsibilities, ability to sustain).	7, 8, 13, 14

Source: Self-developed (2025).

DISCUSSION

Preparing the caregiver to provide care at home is an opportunity for the multidisciplinary team, as it positively affects the well-being of both the patient and the caregiver. Therefore, it is essential to have an adequate assessment tool for this process in the Mexican context. Although there are several scales that measure caregiving skills, several of them have been published in another language, making translation and linguistic adaptation necessary. The present study therefore aimed to translate, culturally adapt and validate the PATH-25 in a sample of Mexican caregivers of people with stroke-related disabilities, while maintaining semantic, idiomatic, conceptual and cultural equivalence with the original version [13]. During the semantic adaptation process, linguistic adjustments were made. For example, the term “patient” was replaced with the more idiomatic expressions “your relative” or “my relative”, which are closer to the cultural concept of family and the Mexican context [22].

A recent study carried out the adaptation of a self-assessment scale of nursing competencies in informatics in Spanish and evaluated the Item Validity Index (3.0), Criterion Validity (16.0%) and Content Validity Index (8.33). This yielded a second version of the instrument [23]. Another study, carried out in 2023 when adapting a short-format self-efficacy scale for breastfeeding in puerperal women, yielded a Content Validity Index of 8.78 [24]. Similarly, content validation analysis by expert

judges of the PATH-25 yielded a Content Validity Index of 10 and an acceptable coefficient of variation [13]. The Kendall's W coefficient obtained for the PATH-25 showed high concordance between judges, with good statistical significance ($p < 0.0001$), which is consistent with the studies of Aragon et al. (2023), who evaluated an instrument for measuring types of residents from the perspective of social representations, obtaining a Kendall's W coefficient of 0.6 [25], and Yunta and Romero (2022), who adapted an instrument for the implementation of emotional education projects and obtained an overall Kendall's W coefficient of 0.138 [26].

In the original version, the authors state that the instrument's average response time is less than 15 minutes [6–8]. During the pilot test, the clarity and coherence of the items and content were confirmed, as was the functionality of the instrument in the Mexican context, with a response time of less than 15 minutes.

In terms of its psychometric properties, the adapted version of the PATH-25 demonstrated acceptable reliability and validity. Exploratory Factor Analysis revealed a robust structure in the adapted instrument, with a KMO index of 0.832 indicating an adequate correlation between items. According to Kaiser's criteria [20], this classification is considered "very good", supporting the suitability of the data for Confirmatory Factor Analysis derived from the stability of the extracted factors [21]. This finding is consistent with other studies reporting similar KMO values in cross-cultural validation processes. The original authors of the PATH-25 scale reported a KMO value of 0.850 [6]. Ruiz et al. reported a KMO value of 0.840 when validating the Zarit Burden Interview in informal caregivers of patients with severe visual impairment and blindness [27]. Meanwhile, Cjuno et al. found a KMO value of 0.880 when validating the Generalized Anxiety Disorder 7 (GAD-7) questionnaire [28]. Likewise, Jimenez and Romero [29] reported an adequate sample fit KMO of 0.810 when validating the Family Health Status Self-Perception Questionnaire V2, which is within the same range of sample adequacy.

Bartlett's Test of Sphericity, when applied to the PATH-25 in Mexico, shows a significant correlation between the instrument's items. This finding is consistent with previous research: Yucel et al. (2020) reported a significant value ($\chi^2 = 645.245$; $gl = 200$; $p < 0.001$) when validating a questionnaire designed to measure perceptions of the role of the community nursing professional [30]. Similarly, Jiménez and Romero obtained a favorable result ($\chi^2 = 1{,}176.719$; $gl = 190$; $p < 0.000$) in the Family Health Status Self-Perception Questionnaire Version 2 [29] in 2021. Likewise, in 2022, Mamani et al. reported a statistically significant value ($\chi^2 = 1.324$; $gl = 450$; $p < 0.000$) in their validation study of a questionnaire focused on the role of the community nursing professional [31]. This result aligns with those obtained in the present study. Finally, Ruiz et al. validated the Zarit Burden Interview for informal caregivers in 2025 and obtained a significant value ($\chi^2 = 1105.604$; $gl = 231$; $p < 0.000$) [27]. This result reinforces those obtained in the Exploratory Factor Analysis [20, 21] in the validation of the PATH-25.

These findings demonstrate the instrument's excellent inter-item reliability, as evidenced by a high Cronbach's alpha coefficient [13]. This is comparable to the original PATH-25, which achieved a similar level of reliability ($\alpha = 0.90$) in a US population [6]. Based on these data, it can be affirmed that the instrument is stable and consistent in the Mexican population. Furthermore, this level of reliability is consistent with other validation studies conducted in Mexico, such as the Nursing Competencies

Self-Assessment Scale, which obtained an α equal to 0.94 ([23]); the Breastfeeding Self-Efficacy Scale (α = 0. 85) [24]; the instrument for measuring types of residents (α= 0.85) (24); the Zarit Burden Interview (α= 0.87) [27]; the Family Health Status Self-Perception Questionnaire v2 (α= 0.84) [29]; and the instrument for evaluating training in sustainability in higher education (α = 0.90) [32].

In this study, seven factors were found to be sufficient to explain 63.38% of the variance, which is an acceptable result when compared to previous studies. For example, Mamani et al. reported that two factors explained 55.73% of the total variance [31], while Jiménez and Romero, as well as Arango et al., identified five factors that explained 59% and 67.18% of the variance, respectively [25,29]. Likewise, Martínez et al. reported seven factors explaining 59 % of the variance in their study [32]. However, Yucel et al. identified three factors with 44.92 % of variance explained [30], and Ruiz et al. reported seven factors explaining 49.48 % [27], values that do not exceed the minimum threshold of 50 % of variance explained in psychometric validation studies [34].

Although the original 25 items were retained, redistribution into seven factors reflects an empirical reorganization based on the results of Exploratory Factor Analysis [15,16]. This indicates that the instrument adequately represents the intended construct and reinforces its structural validity. However, this configuration differs from that proposed by the original authors [6], which is a frequent finding in cross-cultural validation processes [33]. Here, items tend to be regrouped according to socio-cultural, idiomatic, and contextual factors that are specific to the intended country of use [13,15, and 16]. In this sense, the semantic adaptation of the PATH-25 in Mexico required substantial adjustments to the wording of the items to ensure clarity and cultural relevance [13], which may have affected how the participants interpreted the concept. These differences may be attributed to the specific characteristics of the Mexican context, such as the role of the family, access to resources, and caregiving dynamics [34].

Confirmatory Factor Analysis is the recommended method for validating the factor structure of a questionnaire [33]. The results of the CFA on the PATH-25 instrument showed that all items have a factor loading that exceeds the minimum requirement. However, there are several goodness-of-fit indices, and most of these can be interpreted as describing the model's poor fit to the data [35]. Several global goodness-of-fit indices have been developed; however, this study refers to those suggested by several authors, such as RMSEA, CFI and TLI [35,36], which are key metrics for interpreting model adequacy.

The results of the Confirmatory Factor Analysis in this study indicate an acceptable overall model fit. While the RMSEA (0.087) and its confidence interval suggest that the level of approximation error is within the acceptable range, the values of the CFI (0.741), TLI (0.687) and NFI (0.660) indicate that the proposed model is not entirely adequate. This is in contrast to studies such as those by Yucel et al. (CFI = 0.88; RMSEA = 0.08) [30] and Mamani et al. (CFI = 0.938; TLI = 0.915; RMSEA = 0.080), which reported better fit indices and suggest that their factor structure fits the empirical data more accurately.

Furthermore, recent studies have shown that models with a better fit, such as those of Cunjo et al. (2024) and Barajas et al. (2023), have been developed. Cunjo et al. reported a CFI of 0.994 and an RMSEA of 0.092 in a unifactorial model, whereas

Barajas et al. obtained CFIs and TLIs higher than 0.98, as well as very low error rates (SRMR < 0.03; RMSEA < 0.04). Villarreal (2023) also reported an acceptable fit (CFI = 0.914; RMSEA = 0.06). Finally, Maya et al. (2024) also reported an acceptable fit (CFI = 0.914; RMSEA = 0.06) (39). These comparisons suggest that, while the model in the present study has a reasonable fit, improvements could be made by revising certain items or making structural modifications to enhance its adequacy.

Furthermore, recent studies have shown that models with a better fit, such as those of Cunjo et al. (2024) and Barajas et al. (2023), have been developed. Cunjo et al. reported a CFI of 0.994 and an RMSEA of 0.092 in a unifactorial model [28], whereas Barajas et al. obtained CFIs and TLIs higher than 0.98, as well as very low error rates (SRMR <0.03; RMSEA <0.04) [37, 38]. Finally, Maya et al. (2024) also reported an acceptable fit (CFI = 0.914; RMSEA = 0.06) [39]. These comparisons suggest that, while the model in the present study has a reasonable fit; improvements could be made by revising certain items or making structural modifications to enhance its adequacy.

Among the limitations, the moderate sample size stands out, although it is similar to that of other previous investigations [37-41], which is sufficient to perform a confirmatory factor analysis [35, 36]. However, the limited scope of the study could restrict the generalizability of the findings to other caregiver populations. Additionally, a robust quantitative indicator of content validity, such as the percentage of agreement between independent reviewers, was not included [15,35].

The use of consecutive sampling and the lack of information on the total universe of caregivers in the hospitals prevented the calculation of an accurate response rate. This may affect the representativeness of the sample. In a highly sociocultural diverse country such as Mexico, these limitations mean that the results should be interpreted with caution and cannot be extrapolated to other regions or contexts automatically. Therefore, to validate its psychometric properties and guarantee its applicability at the national level, it is recommended that the PATH-25 be applied in different geographical areas of the country with larger and more representative samples.

CONCLUSION

The Mexican version of the PATH-25 instrument retains the original 25 items, categorized into seven domains. It demonstrates acceptable construct validity, as well as good reliability and internal consistency. This tool is a promising resource for assessing the preparedness of family caregivers of people affected by the after-effects of a stroke, as well as for monitoring the adaptation process to the caregiving role and improving home care. Using this instrument can significantly contribute to planning multidisciplinary strategies aimed at strengthening home care.

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