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Validation of the Informal Caregiver Burden Assessment Questionnaire for Brazil – short version

Validação do Questionário de Avaliação da Sobrecarga do Cuidador Informal para o Brasil – versão curta

Validación del Cuestionario de Evaluación de la Sobrecarga del Cuidador Informal de Brasil – versión corta

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ABSTRACT

Objectives: to cross-culturally adapt the short version of the Informal Caregiver Burden Assessment Questionnaire to the Brazilian culture and test its psychometric properties. **Methods**: the questionnaire was translated, adapted, and applied to a sample of 280 informal caregivers. The psychometric assessment was verified by estimating psychometric sensitivity and internal structure validity. **Results**: inter-rater agreement was satisfactory among specialists. In the seven-factor model, item (Q9) of the domain "Perception of Efficacy and Control Mechanisms" showed a factor loading less than 0.40 ($\lambda = 0.26$), and an alternative six-factor model was evaluated. However, both models showed excellent fit indices, and it was decided to keep the seven-factor reference model. Reliability was satisfactory for the seven subscales ($\alpha > 0.70$). **Conclusions**: the questionnaire was adapted and showed adequate psychometric indices in the Brazilian context in which it was evaluated, preserving its original essence.

Descriptors: Psychometrics; Surveys and Questionnaires; Nursing; Caregivers; Caregiver Overload.

RESUMO

Objetivos: adaptar transculturalmente a versão curta do Questionário de Avaliação da Sobrecarga do Cuidador Informal para cultura brasileira e testar suas propriedades psicométricas. **Métodos:** o questionário foi traduzido, adaptado e aplicado em uma amostra de 280 cuidadores informais. A avaliação psicométrica foi verificada pela estimativa da sensibilidade psicométrica e validade da estrutura interna. **Resultados:** a concordância interavaliadores foi satisfatória entre os especialistas. No modelo de sete fatores, o item (Q9) do domínio "Percepção dos Mecanismos de Eficácia e Controle" apresentou carga fatorial menor do que 0,40 ($\lambda = 0,26$), e um modelo alternativo de seis fatores foi avaliado. No entanto, os dois modelos evidenciaram ótimos índices de ajustamento, e optou-se por manter o modelo-referência de sete fatores. A confiabilidade mostrou-se satisfatória para as sete subescalas ($\alpha > 0,70$). **Conclusões:** o questionário foi adaptado e demonstrou índices psicométricos satisfatórios no contexto brasileiro em que foi avaliado, preservando sua essência original.

Descritores: Psicometria; Inquéritos e Questionários; Enfermagem; Cuidadores; Sobrecarga do Cuidador.

RESUMEN

Objetivos: adaptar transculturalmente la versión corta del Cuestionario de Evaluación de la Sobrecarga del Cuidador Informal para cultura brasileña y probar sus propiedades psicométricas. **Métodos:** cuestionario traducido, adaptado y aplicado para 280 cuidadores informales. Evaluación psicométrica verificada por la estimativa de la sensibilidad psicométrica y validez de la estructura interna. **Resultados:** la concordancia interevaluadores fue satisfactoria entre los especialistas. En el modelo de siete factores, el ítem (Q9) del dominio "Percepción de los mecanismos de eficacia y control" presentó carga factorial menor que 0,40 ($\lambda = 0,26$), y un modelo alternativo de seis factores fue evaluado. Sin embargo, los dos modelos evidenciaron óptimos índices de ajustamiento, y se optó por mantener el modelo-referencia de siete factores. La confiabilidad se mostró satisfactoria para las siete subescalas ($\alpha > 0,70$). **Conclusiones:** el cuestionario fue adaptado y demostró indicadores psicométricos satisfactorios en el contexto brasileño en que fue evaluado, preservando su esencia original.

Descriptores: Psicometría; Encuestas y Cuestionarios; Enfermería; Cuidadores; Sobrecarga del Cuidador.

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INTRODUCTION

Faced with the responsibility of care, the figure of the caregiver assumes a fundamental role in the life of the care-dependent person and begins to provide continuity of care in the home environment. The formal caregiver is defined as a professional academically prepared to meet the patient's specific needs. The informal caregiver is conceived as a family member or friend who is solicited to ensure most of the care related to the patient's daily life in the family context and usually has no specific training to perform this role[1].

The experience of caring for a sick family member can represent a huge burden for caregivers and brings about deprivations and changes in the family dynamics[2]. The burden is defined as a disorder that results from caring for an individual with physical dependence or mental incapacity. It refers to the subjective perception of threats related to the caregivers' physiological, social, and psychological needs, affecting cognitive and moral issues, which increase the burden on caregivers of people dependent on care in the home environment[3].

Studies report that caregiving involves activities that demand full-time and exclusive dedication. These activities compromise social interaction and commitment to oneself. Thus, informal caregivers are exposed to a daily burden and may present anxiety, depression, stress, tension, sleep deprivation, reduced quality of life, feeling of powerlessness, sadness, helplessness, and financial difficulties resulting from the impossibility of working outside. Those factors contribute to making them sick anonymously due to the many hours spent on home care[3-6].

Thus, evaluating the burden of informal caregivers becomes relevant for detecting factors that can contribute to the illness of these individuals. In this context, the Informal Caregiver Burden Assessment Questionnaire (QASCI) has been a structurally balanced instrument and has demonstrated adequate validity and accuracy in the populations of caregivers to which it was applied[7-8]. In addition, the questionnaire seeks to assess not only the physical burden but also the emotional and social burden factors[9].

Initially, the QASCI was developed to assess, in the medium and long term, the quality of life outcomes of informal caregivers of people after a stroke[8] and, later, adapted for family caregivers of dependent people with chronic diseases[7]. The questionnaire, created by Portuguese researchers, has two versions, one long and another short. The extended version was developed in 2003[8], consisting of 32 items divided into seven dimensions, as follows: Implications in the Caregiver's Personal Life (11 items); Satisfaction with the Role and with the Family Member (five items); Reactions and Demands (five items); Emotional Burden (four items); Family Support (two items); Financial Burden (two items); and Perception of Efficiency and Control Mechanisms (three items). This version was adapted to the Brazilian culture and tested in 2015, for its psychometric properties[10].

Following recommendations about the need for more concise instruments that involve less time spent in their completion[9,11-14], the Portuguese authors developed a short version of the QASCI in 2016[9]. This version consists of 14 items also arranged in the same seven dimensions, and it showed adequate values in the psychometric assessment in the context in which it was evaluated[9].

OBJECTIVES

To cross-culturally adapt the short version of the QASCI to the Brazilian culture and test its psychometric properties in a sample of informal Brazilian caregivers.

METHODS

Ethical aspects

The development of this research was carried out in compliance with Resolution 466/2012. The Permanent Committee for Ethics in Research with Human Beings (*Comitê Permanente de Ética em Pesquisa com Seres Humanos* - COPEP) approved the study. All individuals who agreed to participate in the study signed the Informed Consent Form in two copies.

Design, participants, and procedures of study

This study is a methodological, cross-cultural adaptation and psychometric assessment of the short version of the QASCI, conducted between June 2020 and January 2021, in a medium-sized city located in northwestern of the state of Paraná, Brazil. The main author of the QASCI was contacted and authorized the cultural adaptation and use of the instrument in the Brazilian context.

The cross-cultural adaptation procedure was carried out following Beaton's methodological reference[15], whose stages are: translation, translation synthesis, back-translation, a committee of judges, and pre-test. The original version of the questionnaire was adapted into Brazilian Portuguese by two bilingual translators. The two translated versions (T1 and T2) reached a consensus between the translators and the researchers, forming the T3 version. This version was forwarded to three bilingual, fluent, native Portuguese speakers living in Portugal for back-translation, generating the versions RT1, RT2, and RT3.

When the back-translation stage was completed, the committee of specialists was organized to prepare the pre-test version of the adapted instrument. This committee was composed of 13 judges with the following characteristics: a Brazilian master's degree student in health, and resident in Portugal; a PhD in linguistics; two PhD professors and nurses with experience in the method; three PhD candidates in Nursing with experience in the subject; a PhD professor in Nursing with experience in-home care; two informal caregivers; and three nurses working in-home care.

Each member received a letter of invitation by e-mail explaining the purpose of the study, the role, and functions of the judge on the committee, specific instructions regarding the completion of the instrument and assessment of the items, scoring description, and form of response. The judges were asked to assess the instrument's semantic, idiomatic, cultural, and conceptual equivalences. After evaluation by the specialists committee, the version of the QASCI was subjected to pre-testing with 40 informal caregivers. Figure 1 presents all the phases of the study.

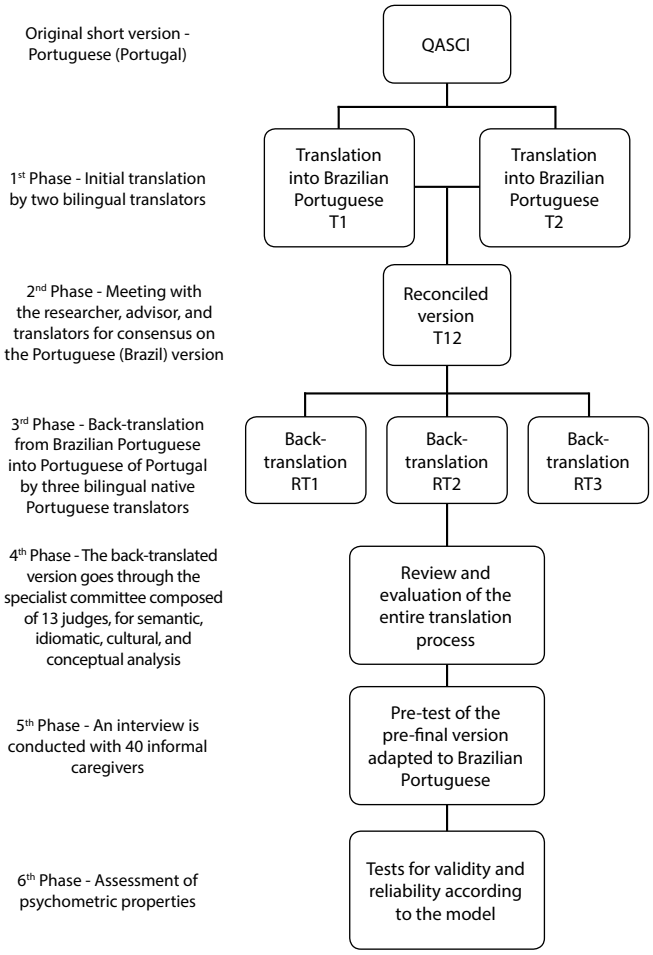


Figure 1 – Stages of translation, adaptation, and validation, Paranavaí, Paraná, Brazil, 2021

Population and sample: criteria of inclusion and exclusion

For the psychometric assessment stage, the sample size followed that recommended by Pasquali[16]. The data collection was performed by telephone with 280 informal caregivers, and the inclusion criteria were: 18 years of age or older, be the primary caregiver of the care-dependent person in that residence, not receiving a salary for this service, exercising the role of caregiver for a period longer than 60 days. The immigrant caregivers who had lived in Brazil for less than a year due to communication and language interpretation difficulties were excluded. A list of the care-dependent patients and their informal caregivers was requested from the Municipal Health Department to compose the sample. The Family Health Units (FHU) nurses provided a list of 570 care-dependent patients and their respective informal caregivers. This list contained the name, phone number, and the community health agent (CHA) responsible for that family's coverage area.

Study protocol

Data collection and analysis

For data collection, it was used the QASCI short version adapted for Brazil (14 items)[9] and a sociodemographic questionnaire with the following items: age, gender, schooling, degree of kinship, number of hours per day dedicated to caring, and how long they acted as caregivers for that person. The QASCI items are distributed in seven domains: Emotional Burden (BE) - two items; Implications in Personal Life (IPL) - two items; Financial Burden (FB) - two items; Reactions and Demands (RD) - two items; Perception of Efficiency and Control Mechanisms (PECM) - two items; Family Support (FSup) - two items; Satisfaction with the Role and Family Member (SFR) - two items. The response scales to the items are of the Likert type of five points: 1 = Not or never; 2 = Rarely; 3 = Sometimes; 4 = Almost always; 5 = Always.

Regarding the scores, the authors proposed two forms of rating: the total score, which evaluates the global burden, and the score of each dimension. The positive dimensions' items must be inverted to calculate the global burden, and the result can vary from 14 to 70. For each dimension score, the average score is calculated, i.e., the response of each subscale is added and divided by the number of items applicable to the respective subscale[9].

Committee of judges

It was applied Fleiss' Kappa index of agreement (KF) to evaluate the inter-rater agreement. The classification of the index ranges from "insignificant" to "perfect," as suggested by Landis and Kock[17]. It was considered three categories of item classification: not equivalent, partially equivalent, and equivalent[17].

Psychometric Assessment

The psychometric performance assessment of the data from the QASCI short Brazilian version was carried out by estimating the psychometric sensitivity and validity of the internal structure[18]. The psychometric sensitivity was verified employing summary measures (mean and standard deviation) and distribution shape (skewness and kurtosis), which were considered adequate when the absolute value of skewness was lower than 3 and kurtosis was lower than 7[19-20]. In order to verify whether the QASCI short Brazilian version satisfied the same seven-factor structure of the original Portuguese version and assess the degree of evidence of validity based on the internal structure of the instrument, the following analyses were performed: confirmatory factor analysis (CFA), verification of internal consistency by the convergence of items - mean extracted variance (MEV), composite reliability (CR) and Cronbach's alpha coefficient (α).

Regarding the conduction of the CFA, the Maximum Likelihood Estimation method was used; and as for the indices to evaluate the quality of adjustment, the following were verified: chi-square ratio by degrees of freedom (χ2/gl), p-value, Goodness of Fit Index (GFI); Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) Parsimony Goodness of Fit Index (PGFI), Parsimony Comparative Fit Index (PCFI) and Root Mean Square Error of Approximation (RMSEA), with 90% confidence interval (CI 90%). Such parameters were considered adequate when $\chi^2/gl \leq 2.0$; $p < 0.05$; CFI ≥ 0.90; TLI ≥ 0.90, PGFI and PCFI ≥ 0.60; RMSEA [90% CI] < 0.10[19,21]. Items' factor loadings (λ) were also evaluated and considered adequate when greater than or equal to 0.40, and items with factor loadings below this cutoff point were considered to be removed from the model[22].

The internal consistency by the convergence of items was considered using the items' factor loadings and the Mean Extracted

Variance (MEV) evaluation. The value of MEV ≥ 0.50 indicates that, on average, the construct explains more than half of the variability of the items. On the other hand, one MEV ≤ 0.50 suggests that, on average, there are more errors present in the items than the variability explained by the construct[22-23]. Cronbach's alpha coefficient (α) standardized and Composite Reliability (CR) calculation were also used as internal consistency parameters. These criteria were considered adequate when α ≥ 0.70 and CR ≥ 0.70[19,21,23]. Composite reliability defined by Fornell and Larcker[23] was calculated based on the confirmatory factor analysis results. This parameter estimates the internal consistency of the items reflecting the construct and indicates the degree to which those items are consistent manifestations of that construct[19,21].

Since the Portuguese authors also report the possibility of the QASCI providing a global score for caregiver burden, a second-order hierarchical model was evaluated to calculate that global score in the Brazilian informal caregivers' sample to preserve the theoretical difference between the items.

For all tests, a 5% significance level was adopted. The statistical analyses were performed in the statistical program SPSS version 20.0 and AMOS version 20.0 (SPSS, IBM Company, Chicago/IL).

RESULTS

Among the participants of the specialist committee, the majority (38.5%) had a master's degree, were between 25 and 55 years old, were female (92.3%), and were nurses (69.3%). The time of training was between 5 and 30 years. The informal caregivers participating in the pre-test were between 31 and 40 years old, and 77.5% were female. In the analysis of psychometric properties, among the 280 informal caregivers, 66.8% were female, 66.8% were between 41 and 50 years old, and 19.3% were between 61 and 70 years old.

In the assessment of semantic, idiomatic, conceptual, and cultural equivalence, the relevance of each item and the inter-rater agreement were satisfactory among the specialists. In total, there were 43 suggestions. All domains had good agreement: conceptual equivalence (81.14%; CI 0.60-0.84) - moderate and perfect agreement; cultural equivalence (75.73%; CI 0.51-0.76) - substantial agreement; idiomatic equivalence (87.55%; CI 0.72-0.90) - almost perfect agreement; and semantic equivalence (69.51%; CI 0.39-0.69) - moderate agreement. After the pre-test evaluation, all prompts were adequate.

Table 1 presents the descriptive characteristics of the items of the QASCI short version and the frequency of the distribution of responses to the questionnaire items assessed by psychometric sensitivity. We observed absolute asymmetry values lower than 3 and kurtosis lower than 7. That indicates the adequacy of the distribution form and demonstrates that the factor analysis could be performed. The means ranged from 2.6 to 4.1, and the standard deviation (SD) was 1.2 to 1.5.

The results indicating the degree of validity of evidence based on the internal structure of the instrument are displayed in Figure 2 and Table 2. It is observed that in the seven-factor model, one of the items of the PECM domain (item Q9) had a factor loading lower than 0.40 ($\lambda = 0.26$), so it was considered its exclusion. Thus, an alternative six-factor model was evaluated without the PECM domain since it only had two items.

Table 1 – Descriptive characteristics and distribution of responses to Informal Caregiver Burden Assessment Questionnaire items, Paranavaí, Paraná, Brazil, 2021

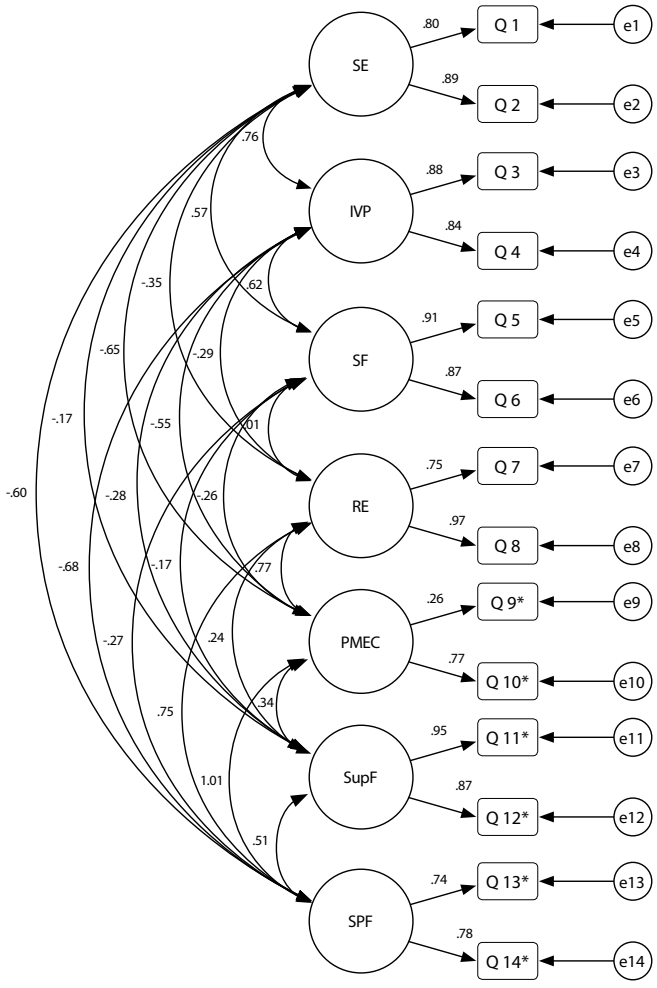
Factor	Item	Mean	SD	Asymmetry	Kurtosis	Frequency of distribution (%)				
						1	2	3	4	5
Emotional Burden (EB)	Q1. Is caring for your family member psychologically difficult for you?	3.3	14	-0.3	-1.2	15	17.5	51	68	70
	Q2. Do you feel tired and exhausted from taking care of your family member?	3.5	1.3	-0.5	-0.8	11.4	11.4	21.4	27.9	27.9
Implications in Personal Life (IPL)	Q3. Have the plans you made for this phase of life been altered as a result of caring for your family member?	3.3	1.3	-0.3	-1.1	13.6	13.9	26.1	20.4	26.1
	Q4. Has your social life (e.g., vacations, socializing with family and friends) been hindered by caring for your family member?	3.3	1.3	-0.2	-1.0	13.9	13.9	28.6	19.6	23.9
Financial Burden (FB)	Q5. Do you have economic difficulties because you are taking care of your family member?	3.2	1.4	-0.2	-1.2	15.0	16.4	21.1	23.6	23.9
	Q6. Do you feel that your economic future is uncertain because you are taking care of your family member?	3.2	1.4	-0.2	-1.3	16.1	17.9	18.9	21.8	25.4
Reactions and demands (RD)	Q7. Have you ever felt offended and irritated by your family member's behavior?	2.9	1.4	0.1	-1.2	24.6	16.4	26.4	13.6	18.9
	Q8. Do you feel manipulated by the family member you care for?	2.6	1.5	0.4	-1.3	34.6	16.8	18.2	12.9	17.5
Perception of Efficacy and Control Mechanisms (PECM)	Q9*. Are you able to do most of the things you need to do, despite the time spent caring for your family member?	3.0	1.2	-0.84	-0.8	15.4	14.6	36.1	19.3	14.6
	Q10*. Do you feel able to continue caring for your family member for much longer?	3.9	1.4	-1.0	-0.5	9.6	10.4	12.5	11.4	56.1

To be continued

Table 1 (concluded)

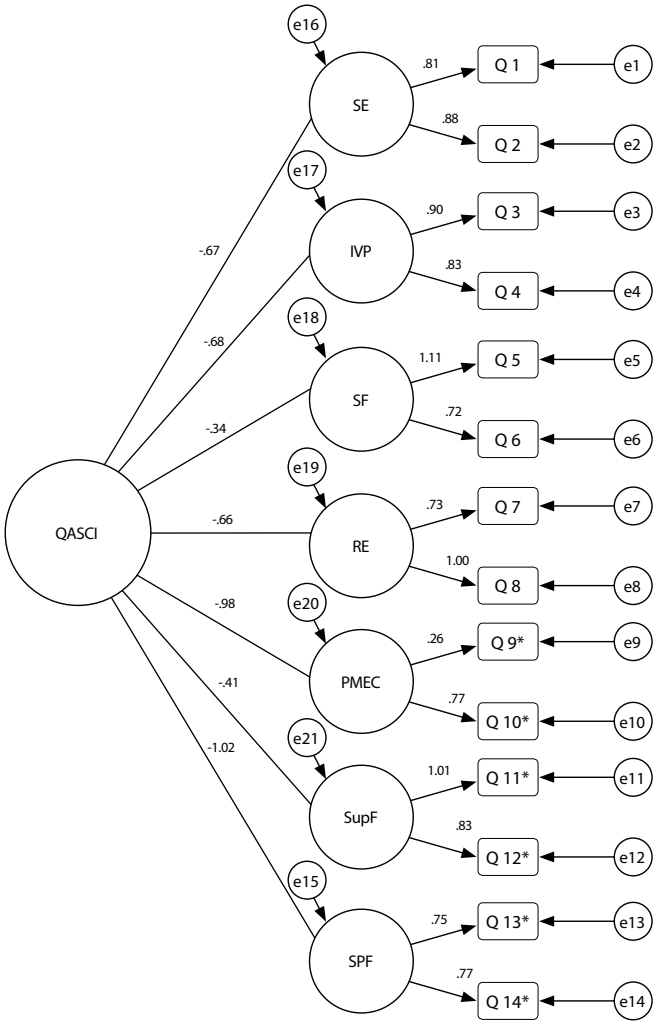
Factor	Item	Mean	SD	Asymmetry	Kurtosis	Frequency of distribution (%)				
						1	2	3	4	5
Family Support (FSup)	Q11*. Do family members who do not live with you recognize your work in caring for your family member?	3.5	1.4	-0.5	-1.2	13.6	14.6	16.4	18.2	37.1
	Q12*. Do you feel supported by your family members?	3.5	1.5	-0.5	-1.2	14.6	13.9	15.7	20.7	35.0
Satisfaction with Role and Family Member (SFR)	Q13*. Do you feel closer to your family member because you are taking care of him/her?	4.1	1.2	-1.2	0.3	5.7	9.3	10.4	16.4	58.2
	Q14*. Do you feel appreciated, a special person and with better self-esteem by taking care of your family member?	2.6	1.4	0.3	-1.1	12.1	14.3	25.4	17.1	31.1

SD – standard deviation.



**EB – Emotional Burden; IPL – Implications in Personal Life; FB – Financial Burden; RD – Reactions and Demands; PECM – Perception of Efficiency and Control Mechanisms; F Sup – Family Support; SFR – Satisfaction with Family Role.*

Figure 2 – Heptadimensional Structure of the Informal Caregiver Burden Assessment Questionnaire - short version, Paranavaí, Paraná, Brazil, 2021



**EB – Emotional Burden; IPL – Implications in Personal Life; FB – Financial Burden; RD – Reactions and Demands; PECM – Perception of Efficiency and Control Mechanisms; FSup – Family Support; SFR – Satisfaction with Family Role*

Figure 3 – Structure of the second-order hierarchical model of the Informal Caregiver Burden Assessment Questionnaire - short version, Paranavaí, Paraná, Brazil, 2021

However, even with domain exclusion, both the seven-factor model [χ^2/gl=1.64; CFI = 0.98; TLI = 0.97; GFI = 0.96; RMSEA = 0.048 (CI = 0.029-0.066)] and the six-factor model [χ^2/gl = 1.47; CFI = 0.99; TLI = 0.98; GFI = 0.97; RMSEA = 0.041 (CI = 0.014-0.063)] showed optimal fit indices. Regarding the internal consistency by the convergence of the items, all domains had adequate MEV values (> 0.5), with the exception of the PECM domain (MEV = 0.33).

Regarding the internal consistency parameters in the different models, Cronbach's alpha, and Composite Reliability, relative to the domains, showed adequate values (> 0.7), except for the PECM domain (α = 0.33).

Table 2 – Confirmatory Factor Analysis (CFA) of the Informal Caregiver Burden Assessment Questionnaire (Model fit index, convergent validity); and internal consistency - seven-factor model (Portuguese version), seven-factor unmodified model (Brazilian version) and alternative six-factor model, Paranavaí, Paraná, Brazil, 2021

Model	CFA λ	X^2/gl	*p* value	CFI	GFI	TLI	PGFI	PCFI	RMSEA (90% IC)	MEV	Reliability CR	Reliability α
QASCI – Short Version (Portuguese) – seven factors		1.84	0.000	0.97	0.97	-	0.52	0.59	0.045 (0.031-0.058)	-	-	0.71
Emotional Burden	0.71-0.75									-	-	0.66
Implications in Personal Life	0.87-0.72									-	-	0.70
Financial Burden	0.85-0.81									-	-	0.82
Reactions and Demands	0.74-0.68									-	-	0.67
Perception of Efficiency and Control Mechanisms	0.57-0.75									-	-	0.67
Family Support	0.86-0.74									-	-	0.77
Satisfaction with Family Role	0.64-0.65									-	-	0.59
QASCI – Short Version (Brazilian) – seven factors		1.64	0.002	0.98	0.96	0.97	0.51	0.60	0.048 (0.029- 0.066)	-	-	0.76
Emotional Burden	0.80-0.89									0.71	0.83	0.83
Implications in Personal Life	0.88-0.84									0.74	0.85	0.85
Financial Burden	0.91-0.87									0.79	0.88	0.89
Reactions and Demands	0.75-0.97									0.75	0.86	0.84
Perception of Efficiency and Control Mechanisms	0.26-0.77									0.33	0.44	0.33
Family Support	0.95-0.87									0.83	0.91	0.91
Satisfaction with Family Role	0.74-0.78									0.58	0.73	0.73
QASCI – Short Version (Alternative Model) – six factors		1.47	0.029	0.99	0.97	0.98	0.48	0.58	0.041 (0.014-0.063)	-	-	0.75
Emotional Burden	0.80-0.89									0.71	0.83	0.83
Implications in Personal Life	0.88-0.84									0.74	0.85	0.85
Financial Burden	0.91-0.87									0.79	0.88	0.89
Reactions and Demands	0.75-0.97									0.75	0.86	0.84
Family Support	0.95-0.88									0.83	0.91	0.91
Satisfaction with Family Role	0.74-0.78									0.58	0.73	0.73

CFA – confirmatory factor analysis; χ2/gl – degrees of freedom; GFI – Goodness of Fit Index; CFI – Comparative Fit Index; TLI – Tucker-Lewis Index; PGFI – Parsimony Goodness of Fit Index; PCFI – Parsimony Comparative Fit Index; RMSEA – Root Mean Square Error of Aproximation; MEV – mean extracted variance; CR – composite reliability.

As for the empirical test of a model with a second-order hierarchical structure (Figure 3), this was not confirmed and showed poor fit indices: [χ^2/gl = 4.23; CFI = 0.89; TLI = 0.86; GFI = 0.86; RMSEA = 0.108 (CI = 0.096-0.121)].

DISCUSSION

The present study evaluated the cross-cultural adaptation process and tested the validity evidence of the internal structure of the short version of the QASCI in a population of informal caregivers living in a city northwest of Paraná. The QASCI has already been applied to caregivers of people with stroke[8], to caregivers of dependent people affected by chronic diseases[7], informal caregivers of the elderly[10], and, in the present study, to informal caregivers of people with a dependence on care.

In the evaluation process of semantic, idiomatic, conceptual, and cultural equivalence, the relevance of each item and the inter-rater agreement showed satisfactory results among the specialists. It was possible to identify that, between the QASCI short Portuguese version and its short Brazilian version, the instrument's items showed more divergence as to agreement. Item 14 had a reasonable agreement for three domains: Conceptual, Cultural, and Semantic in the adapted short version. The agreement on the extended version of the QASCI adapted for Brazil was above 85% between the judges[10].

Based on the confirmatory factor analysis results and internal consistency, it could be observed that the domain that diverged the most among the other studies that also used the QASCI was the Perceptions of Efficiency and Control Mechanisms (*Percepção dos Mecanismos de Eficácia e Controle*). In the Portuguese research that developed the original short version, the items' factor loadings (λ) ranged from 0.57 to 0.75[9]. In the adapted version, the factor loadings ranged from 0.26 to 0.77. Literature indicates that items with factor loadings below 0.5 should be removed from the model[19,22]. Thus, we analyzed an alternative six-factor model. Since the PECM domain had only two items, it was necessary to exclude not only item Q9, but also the PECM domain[19,22]. However, there was minimal difference between the seven and the six-factor models when comparing the adjustment indexes.

Since the QASCI short version instrument was used for the first time in the Brazilian context, and there are still no studies in other cultures using the QASCI besides Portugal, we opted to be cautious. So, we maintained the seven-factor reference model as proposed by the author. More studies are needed to review item Q9 and the PECM domain. It is necessary to evaluate if the item is, in fact, not valid or reliable and thus not applicable to the Brazilian population or if it has some issue related to equivalence or construction problems.

The psychometric analysis using Cronbach's alpha showed good fit for all domains of the adapted version for both the seven-factor model and the alternative six-factor model except for the PECM (α = 0.33). The original short Portuguese version showed internal consistency values from "acceptable" to "good" for all domains: BE (α = 0.66), IPL (α = 0.7); FB (α = 0.82); RD (α = 0.67); PECM (α = 0.67); FSup (α = 0.77) and SFR (0.59)[9].

In the extended version adapted to Brazil, the alpha values for the respective domains ranged from 0.88 (Implications in Personal Life) to 0.51 (Perception of Efficiency and control mechanisms), but a Cronbach's alpha of 0.92 was obtained for the scale as a whole[10].

It is known that some factors can affect the results of factor loadings, such as the number of items per domain. Thus, in the short version, all domains were composed of only two items, but

the literature recommends having at least three to five measured variables representing each common factor. Additionally, item Q9 may have obtained a low factorial result because it appears to be response-inducing and/or redundant compared to other items in the reader's comprehension. Therefore, the construction criteria may influence the final result when analyzing the factorial loadings of a measurement instrument. Consequently, further research is needed to evaluate the adjustment of the item mentioned above or its exclusion[24].

Thus, it is recommended that the instrument be submitted to new populations to verify if the item presenting divergence in the present study will need adjustments so that its factorial load becomes representative and will be maintained as part of the model or need to be removed. New studies with informal caregivers who use the QASCI will increase the credibility of the questionnaire and disseminate it to those interested in this subject.

It is worth noting that the study also checked the QASCI empirical model for the plausibility that a second-order hierarchical model could represent it. That assumption was raised because the instrument's authors employed Cronbach's overall alpha coefficient in all of their studies and addressed the possibility that the QASCI could provide a global score for caregiver burden. In those studies, the alpha parameters had the following values: ($\alpha = 0.71$)[9] and ($\alpha = 0.90$)[8]. Even the Brazilian study reporting the adaptation of the long version also evidenced a global alpha ($\alpha = 0.92$)[10]. However, none of the studies mentioned discussed the possibility that a second-order hierarchical model could better represent the QASCI to obtain a global score for caregiver burden.

The present study pointed out that an empirical model represented by a second-order hierarchical structure was not corroborated and showed very poor adjustment indexes. That refutes the possibility of generating a representative global score for the sample, besides rendering the presentation of the global Cronbach's alpha without a psychometric basis.

Study limitations

This study has some limitations, such as using a population from only one city with characteristics that prevent generalizing the conclusions to other groups of Brazilians with distinct profiles. The absence of results from different countries/cultures that used the QASCI also makes it difficult to compare the outcomes, so we did not find it pertinent to address the relations of the scores obtained with the respective sample characteristics. The issue of the QASCI global score itself needs further evidence since, in this study, the second-order hierarchical structure did not obtain a good fit. Other limitations are related to the inherence of cross-sectional studies and reliance on self-reported data, which are often subject to social desirability effects and some other response biases.

Contributions to the field of Nursing

This study performed the cross-cultural adaptation and assessment of the QASCI psychometric properties. It proved to be reliable for use in the field of health, contributing to new studies that evaluate the informal caregiver's burden or even for adaptation to other populations.

This study considered the contribution to the nursing practice and intended to help nurses assess and identify the informal caregiver's burden, lead them to a differentiated perspective, and enable interventions to reduce the burden and improve the quality of life of informal caregivers.

CONCLUSIONS

The short version of the adapted QASCI proved to be satisfactory and maintained all the factors and items of the questionnaire, preserving its original essence. The questionnaire can be used to assess the burden of informal caregivers since, for the sample studied, this version presented adequate evidence of content validity and internal structure validity. Only one item of a domain revealed questionable parameters as to validity; thus, it is suggested that these (item and domain) be cautiously evaluated/interpreted and improved in future studies.

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