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INVENTÁRIO HABILIDADES DO CUIDADOR: ESTRUTURA FATORIAL NUMA AMOSTRA DE PARTICIPANTES PORTUGUESES
CAREGIVER SKILLS INVENTORY: FACTORIAL STRUCTURE IN A SAMPLE OF PORTUGUESE PARTICIPANTS
INVENTARIO HABILIDADES DEL CUIDADOR: ESTRUCTURA FACTORIAL EN UNA MUESTRA DE PARTICIPANTES PORTUGUESES

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RESUMO

Introdução: O Inventário de Habilidades do Cuidador traduzido do original *Caring Ability Inventory (CAI)* de *Ngozi Nkongho* (1999) foi projetado para medir as habilidades autopercecionadas pelos cuidadores informais.
Considerando que alguns cuidadores poderão não estar capacitados com habilidades para cuidar de pessoas dependentes e que o conhecimento acerca desta problemática é ainda deficitário, justifica-se desenvolver investigação neste domínio.
Objetivos: Avaliar as propriedades psicométricas, nomeadamente a estrutura fatorial e a consistência interna; classificar as habilidades autopercecionadas pelos cuidadores informais.
Métodos: Estudo transversal de natureza observacional com foco metodológico, realizado em contexto comunitário, numa amostra de 214 participantes (86,9% mulheres), com uma média de 51,07 anos. Residem em meio rural 63,6% dos participantes; 66,8% possuem companheiro(a); 57,5% possuem até ao 3.º ciclo do ensino básico, 65,9% com família altamente funcional, 51,9% estão inseridos numa família nuclear ou simples. Foi estudada a consistência interna e realizada uma análise fatorial confirmatória do *Caring Ability Inventory* de *Ngozi Nkongho* (1999).
Resultados: O estudo da consistência interna do *Caring Ability Inventory* de *Ngozi Nkongho* (1999), versão espanhola *Inventário de Habilidades do Cuidador* de Berdejo & Parra (2008), confirmou a estrutura original, apresentando três (3) fatores relativos a: fator 1- Conhecimento (α= 0.78); fator 2 – Coragem (α=0. 65); fator 3 - Paciência (α= 0.78). O valor de Alfa de Cronbach para o global do CAI foi de 0,84. No global, 45,3 % dos participantes detêm adequadas habilidades para cuidar, 27,6% têm habilidades de cuidados muito adequadas, sendo que em 27,1% as habilidades são inadequadas.
Conclusões: Esta investigação aporta o estudo das propriedades psicométricas do *Caring Ability Inventory* , numa amostra da população portuguesa. A análise comparativa dos achados da presente investigação com os resultados obtidos por *Ngozi Nkongho* (1999) revelou que, no presente estudo, a estrutura fatorial se mantém e que os valores de consistência interna na Nota Global são coincidentes (α=0.84), porém nos fatores *Conhecimento* e *Coragem* são mais baixos e no factor *Paciência* mais altos.
A aferição de um instrumento de medida das habilidades dos cuidadores potencia que as/os enfermeiras/os implementem na prática clínica a sua avaliação e mensuração, de modo a identificar os clusters mais vulneráveis, ou seja, os grupos de cuidadores com menos habilidades e elaborar uma proposta de intervenção em termos de ajuda/intervenção formal.

Palavras-Chave: Estrutura fatorial; Habilidades; Cuidadores.

ABSTRACT

Introduction: The Caregiver Skills Inventory translated from the original Caring Ability Inventory (CAI) by Ngozi Nkongho (1999) was designed to measure skills that are self-perceived by informal caregivers.
Considering that some caregivers may not be able to care for dependants and that knowledge about this problem is still lacking, it is justified to develop research in this area.
Objectives: To evaluate the psychometric properties, namely the factorial structure and internal consistency; Self-perceived skills by informal caregivers.
Methods: A cross-sectional observational study with a methodological focus was carried out in a community context, in a sample of 214 participants (86.9% women), with a mean age of 51.07 years. 63.6% of the participants live in rural areas; 66.8% have a partner; 57.5% studied up to the 3rd cycle of basic education, 65.9% have a highly functional family, 51.9% are in a nuclear or simple family. The internal consistency was studied and a confirmatory factorial analysis of the Caring Ability Inventory of Ngozi Nkongho (1999) was performed.
Results: The internal consistency study of the Caring Ability Inventory by Ngozi Nkongho (1999), Spanish version of the Skills Inventory of the Caretaker of Berdejo & Parra (2008), confirmed the original structure, presenting three factors: Factor 1 - Knowledge (α=0.78); Factor 2 - Courage (α=0.65); Factor 3 - Patience (α=0.78). The Cronbach's alpha value for the CAI global was 0.84. Overall, 45.3% of the participants had acceptable skills to care for, 27.6% had very adequate care skills, and in 27.1% the skills were inadequate.
Conclusions: This research contributes to the study of the psychometric properties of the Caring Ability Inventory, in a sample of the Portuguese population. The comparative analysis of the findings of the present investigation with the results obtained by Ngozi Nkongho (1999) revealed that, in the present study, the factorial structure is maintained and that the internal consistency values in the Global Note coincide (α=0.84), but in Knowledge and Courage factors are lower and in the Patience factor higher. The assessment of an instrument to measure the abilities of caregivers empowers nurses to implement their assessment and measurement in clinical practice in order to identify the most vulnerable clusters, that is, the groups of caregivers with less skill and to elaborate a proposal for intervention in terms of aid/formal intervention.

Keywords: Factor structure; Skills; Caregivers.

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RESUMEN

Introducción: El Inventario de Habilidades del Cuidador traducido del original Caring Ability Inventory (CAI) de Ngozi Nkongho (1999) fue diseñado para medir las habilidades autoperceciadas por los cuidadores informales.
Considerando que algunos cuidadores pueden no estar capacitados con habilidades para cuidar de las personas dependientes y que el conocimiento sobre esta problemática es todavía deficitario, se justifica desarrollar investigación en este ámbito.
Objetivos: Evaluar las propiedades psicométricas, en particular la estructura factorial y la consistencia interna; clasificar las habilidades autopercezadas por los cuidadores informales.
Métodos: Estudio transversal de naturaleza observacional con enfoque metodológico, realizado en contexto comunitario, en una muestra de 214 participantes (86,9% mujeres), con una media de 51,07 años. Residen en medio rural el 63,6% de los participantes; El 66,8% tiene compañero (a); El 57,5% posee hasta el 3º ciclo de la enseñanza básica, el 65,9% con familia altamente funcional, el 51,9% está insertado en una familia nuclear o simple. Se estudió la consistencia interna y se realizó un análisis factorial confirmatorio del *Caring Ability Inventory de Ngozi Nkongho (1999).*
Resultados: El estudio de la consistencia interna del *Caring Ability Inventory de Ngozi Nkongho (1999),* versión *española Inventario de Habilidades del Cuidador* de Berdejo & Parra (2008), confirmó la estructura original, presentando tres (3) factores: factor 1- Conocimiento α = 0.78); factor 2 - Coraje (α = 0 65); factor 3 - Paciencia (α = 0.78). El valor de Alfa de Cronbach para el global del CAI fue de 0,84. En total, el 45,3% de los participantes tiene adecuadas habilidades para cuidar, el 27,6% tiene habilidades de cuidado muy adecuadas, siendo que en el 27,1% las habilidades son inadecuadas.
Conclusiones: Esta investigación aporta el estudio de las propiedades psicométricas del Caring Ability Inventory, en una muestra de la población portuguesa. El análisis comparativo de los hallazgos de la presente investigación con los resultados obtenidos por Ngozi Nkongho (1999) reveló que, en el presente estudio, la estructura factorial se mantiene y que los valores de consistencia interna en la Nota Global son coincidentes (α = 0.84), pero en los casos Los factores de conocimiento y coraje son más bajos y en el factor de paciencia más altos.
La medición de un instrumento de medida de las habilidades de los cuidadores potencia que las / las enfermeras / os implementen en la práctica clínica su evaluación y medición, para identificar los clusters más vulnerables, o sea, los grupos de cuidadores con menos habilidades y elaborar una propuesta de intervención en términos de ayuda / intervención formal.

Palavras Clave: Estrutura Factorial; Habilidades; Cuidadores.

INTRODUCTION

The presence of a disease in the family household results, in most cases, in breaking with the previous life, which requires an adjustment to a new social/spiritual reality; it involves a process of reorganization in the family's structure, roles and affective relationships. Therefore, the transformations of each family resulting from the illness of one of its members depend on the social role of the patient, age, gender and the structure of the family itself. Accordingly, it should be taken into account the complexity of care provided by the families, and the fact that they themselves go through complex adjustment phenomena regarding the transformations of social organization demanded by the disease, resulting in potential constraints on the performance of their roles as caregivers. (Bica, Cunha, Andrade, Dias, Ribeiro et al., 2016).

An informal caregiver is a person who has a family-like or close relationship and takes responsibility for the care of a loved one with chronic illness, as well as participates in decision making, supervises and supports the execution of daily living activities to make up for the existing dysfunction in the sick person (Montalvo, Flórez & Stavro, 2007).

Informal caregivers are mainly middle-aged women with many civil statuses, some employed and others housewives, with different levels of education and heterogeneous socioeconomic conditions, who tend to take on this role at the time of diagnosis for over a period of six months. These people feel that this activity takes up most of their day and, in general, are not aware of the role they play (Montalvo, Flórez & Stavro, 2007).

Caring is a concern that includes elements which are invisible, intangible and difficult to account for. The role of the caregiver is defined not only in terms of the procedures and the tasks he/she performs, but above all refers to the ability to acquire the knowledge, patience and value for the task at hands, it consists in the ability of caring. Among these intangible elements lies the care skills of informal caregivers, which refer to the potential care of adult caregivers who carry out the role of caring for a significant family member or person who has an incapacitating chronic illness (Diaz, 2014).

Taking the aforementioned into account, the main objective of this study was to evaluate the psychometric characteristics of the Caregiver Skills Inventory, namely the factorial structure and the consistency of the Caregiver Skills Inventory, translated and adapted from Caring Ability Inventory (CAI) of Ngozi Nkongho (1999), using the Caregiver Skills Inventory (Spanish version) by Berdejo & Parra (2008).

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1. THEORETICAL FRAMEWORK

The performance of the tasks carried out by an informal caregiver depends on the type/frequency of the need for care provided, the family context and the context in which the patient cared for is part of (Sequeira, 2007). For Moreira (2001), these are related to family structure, division and distribution of labour work, socioeconomic status and ethnicity.

André, Cunha, Duarte & Students 24 CLE (2015) carried out a study aimed at evaluating the impact of family functionality on informal caregiver overload in the context of palliative care, whose sociodemographic profile of the informal caregiver points to a predominantly female sample (73.6%), in which the majority of caregivers were aged 44 or over (34.0%), 54.2% did not have a partner, the majority lived in urban areas (53.3%), 77.6% in the central region of Portugal, and 47.2% were employed and earned minimum wage (43.5%). A single caregiver prevailed (54.2%) and it was made up of caregivers with secondary level education (41.4%). The study of family functionality revealed the majority to be highly functional families (77.1%), followed by moderately functional families (21.5%) and 1.4% of the caregivers belong to families with some type of dysfunction. It was also found that 36.1% of the informal caregivers did not present an overload, whilst 27.8% presented mild overload. Men reported higher levels of overload in terms of the impact of care provision, perceived self-efficacy, expectations about caring, and interpersonal relationships. Nevertheless, the differences were only significant in interpersonal relationships.

The female gender is also mentioned in other studies that stress the role of women as caregivers in the Portuguese culture, as well as in other cultures, since it is the woman who has the most interaction with the patient and is the strongest link in the health team. The knowledge of this profile is fitting and useful for health professionals so that they can plan and carry out activities focused on the reality of patients and their caregivers in the context of long-term illness, such as any support offered and, consequently, the costs incurred, which are almost exclusively the responsibility of the families (André, Cunha, Duarte& Students 24 CLE, 2015).

Still within the scope of the informal caregiver profile, Bica, Cunha et al. (2016) verified in their study, with a sample of 150 caregivers, that 110 were female (73.3%), with a mean age of 35.45 years, and 40 males (26.7%) with a mean age of 41,30 years. In the group of men, the largest percentage are those who have a partner (52.5%), contrary to the group of women, whose majority (57.3%) in turn has no partner. Caregivers residing in an urban environment prevailed (54.7%), who hold secondary level education (39.3%), and 78% were employed. Caregivers with high family functionality had a higher level of satisfaction with health care.

Regardless of the caregiver's profile, those who take responsibility for informal care at home assume a great commitment that is mediated by the affective relationship with the person cared for, rarely questioning their own ability to care and willingness to take on such responsibility (Diaz, 2014). According to the same author, one of the most balanced and functional ways to face the adverse conditions that emerge from the role of a home care provider entails knowing and acquiring skills to fulfil the role of the caregiver. Ngozi Nkongho (1999) proposes some skills that include cognitive and attitudinal dimensions such as knowledge, value and patience.

Regarding the skill of knowledge, characteristics such as the prevalence of positive feelings, as well as a favourable attitude to provide care and protection to the person in need of care, stand out; the ability to value is characterized by the presence of a sense of concern in knowing that someone depends on their care, as well as the courage to face the unknown. As for the ability of patience, the predisposition to support the person who is being cared for is empathically highlighted (Berdejo & Parra, 2008).

The ability of care expressed in a patient way, with knowledge and value, also contributes to the provision of care as an affective interaction that favours mutual growth between caregivers and those who receive the care (Diaz, 2014). The same author also mentions that the caring process is seen as an interpersonal intervention, in which the caregiver places his/her internal resources, that is, his/her care skills with patience, value and knowledge, at the service of the interpersonal relationship that is established.

2. METHODS

A cross-sectional observational study with a methodological focus, carried out in a communal context, to study the internal consistency and a confirmatory factorial analysis of the the *Caring Ability Inventory* by *Ngozi Nkongho* (1999).

The transcultural adaptation process, followed literary recommendations , such as: translation, retrotranslation, expert appreciation and pretests. Two independent translators, translated the instrument (CAI^1T^1 e CAI^1T^2) and the results were submitted for analysis by a group of experts, consisting of two female and two male nurses, being that one pair clinical experienced Professors and another exclusively care practice nurses. The expert group had the following requirements: Nursing Theories knowledge; Spanish language fluency; instrument translation and validation dominance. Their contributions created the CAI^2 version, which was retrotranslated to CAI Rt^1 e CAI Rt^2 versions, by two native Spanish translators ; then, after validation of the expert group, they proposed the CAI^3 version, which was studied and applied in this research.

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2.1. Participants

The sample involved 214 informal caregivers, mostly female (86.9%), with a mean age of 51.07 years; 63.6% live in rural areas; 66.8% have a partner; 57.5% studied up to the 3rd cycle of basic education, 65.9% have a highly functional family, 51.9% are in a nuclear or simple family.

2.2. Data collection instrument

As data collection methods, we chose a protocol consisting of an *ad hoc Questionnaire*, since it is the method that allows the collection of information, with informal caregivers, with the highest speed as well as with minimum interference and external influence. It contains a questionnaire of the sociodemographic characterization of the caregivers, contextual variables of the person cared for and the health status of the informal caregivers. The protocol also included the Caregiver Skills Inventory, translated and adapted from the *Caring Ability Inventory* by *Ngozi Nkongho* (1999), Spanish version of Berdejo & Parra (2008).

The basic concept of the *Caring Ability Inventory* (CAI) derives from the concept of "caring". Four assumptions were identified, these being: *caring is multidimensional, presenting a cognitive component and an attitudinal component; the ability to care is present in all individuals; the act of caring can be taught and learned; the act of caring can be quantified*.

Mayeroff (1971) identified eight essential elements for the quantification of care: knowledge, rhythm alternation, patience, honesty, trust, humility, hope and courage. These elements made it possible to construct this instrument. After several tests, the items were divided into three factors: knowledge (the ability to deal with various situations), courage (the ability to deal with the unknown) and patience (tolerance and persistence).

The CAI is made up of 37 items, evaluated on a Likert scale ranging from 1 to 7 points, where one corresponds to *"never"* and seven to *"always".* It presents three factors: knowledge, courage and patience. The *"knowledge"* factor consists of 14 items (2,3,6,7,9,19,22,26,30,31,33,34,35,36), the *"courage"* factor presents 13 items (4,8,11,12,13,14,15,16,23,25,28,29,32) being quoted inversely, and the factor *"patience"* (1,5,10,17,18,20, 21,24,27,37) consists of 10 items. The inter-correlation between the factors is moderate in size and reflects several domains of the concept of caring. Thus, by varying the range of answers from 1 to 7, the maximum score (7) indicates a high degree of care for a positive response to the scale item. For the responses answered in a negative way, the quotation is inverse, that is, it obtains the minimum score (1). The answers of each question are added to obtain a total for each factor. Due to the fact that the *"knowledge"* factor has 14 items, it varies from 14 to 98. The *"courage"* factor varies from 13 to 91 points and the *"patience"* factor varies from 10 to 70 points, respectively. The overall score is composed by the score of each factor.

In the present study, the *Caregiver Skills Inventory* (Spanish version) was used by Berdejo & Parra (2008), translated into Portuguese.

Given that the answers from 1 to 7 have a greater demand for comprehension, Berdejo & Parra (2008) modified the CAI's quotation scores to a Likert scale with scores of 1 to 4, in which 1 is never, 2 almost never, 3 almost always and 4 always. Thus, by varying the range of responses from 1 to 4, the maximum score (4) indicates a high degree of care for a positive response to the scale item. For the questions answered in a negative way, the quotation is inverse, that is to say, it obtains the minimum score (1). The answers of each question are added to obtain a total for each factor. Because the *"knowledge"* factor presents 14 items, it varies from 14 to 56. The *"courage"* factor varies from 13 to 52 points and the *"patience"* factor varies from 10 to 40 points, respectively (see Table 1). The answers to the items add up to each factor, therefore obtaining an overall score for each. Higher scores indicate a greater degree of care if the item presents itself positively; the score is reversed if the item is negative.

Table 1 - Classification of the Results of the Caregiver Skills Inventory (CAI) in categories for the total and for the factors

Categories	CAI Total	Factors		
		Knowledge (ability to deal with the various situations)	Courage (ability to deal with the unknown)	Patience (tolerance and persistence)
High	148-111	56-43	52-40	40-30
Medium	110-74	42-28	39-26	29-20
Low	73-37	27-14	25-13	21-10

2.3. Legal requirements

Bearing in mind that any research process requires a follow-up action of standards of conduct on the part of the researchers, some preliminary steps have been taken so as to protect the rights and freedom of the participants.

Therefore, the first step consisted in requesting permission from the authors of the scale in order to use it. This was followed by the opinion of the Ethics Committee of the School of Health of the Polytechnic Institute of Viseu, which was favourable (no.

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010605 3). Subsequently, some caregivers from the personal aspect of each member of the research group were contacted informally. They were invited to join the study, as well as refer other informal caregivers to include them in the study group, being chosen in a snowball type system.

In the development of the research, the rights of the participants and the fundamental ethical principles were safeguarded. This was done through the guidelines of the questionnaire, which include: the theme and the objective of the research, request for collaboration to fill out all questions and the need to answer all of them, so that they would not be eliminated, guarantee of anonymity and confidentiality regarding their answers, release of results, acknowledgment of collaboration and availability throughout.

2.4. Procedures

For the analysis of the data, we used descriptive statistics and analytical or inferential statistics. For this purpose, the statistical treatment was processed through the SPSS program (Statistical Package for the Social Sciences) version 21.0 (2013) for Windows and AMOS version 24, 2017.

The psychometric study of the scale encompasses two steps: internal consistency and factorial analysis, whose aim is to describe the structure of the covariance between variables in terms of a smaller number of variables, called factors. Factor analysis studies the interrelationships between variables, in an effort to find a set of factors (to a lesser extent than the set of original variables) that express what the original variables have in common (Pestana & Gageiro, 2014). According to the same authors, the factor analysis model is motivated by the following: assuming that the variables can be grouped taking into account the correlations among them, that is to say, all the variables of a given group are strongly correlated with each other, but have relatively small correlations with variables of the other group. It is permissible for each group of variables to represent one factor, which is responsible for the observed correlations. On the whole, the first step to be taken in this type of analysis is to examine the relationships between variables using the correlation coefficient as a measure of association between each pair of variables. The correlation matrix may allow the identification of subsets of variables that are highly correlated with each other within each subset, but a bit associated with variables from other subsets. In this case, the application of the factorial analysis will allow us to conclude whether it is possible to explain this pattern of correlations through a smaller number of variables - the factors.

A data collection instrument has a good reliability when the results provided by it are accurate or reliable, in other words, when they vary relatively little from one occasion or context to another (Pestana & Gageiro, 2014). The same authors report that the reliability of the results obtained refers to the consistency of the overall results or to the internal consistency of the items. Reliability refers to the degree of consistency or agreement between two or more independent samples, and for this there is a set of estimation techniques that allow it to be calculated. The methods for estimating reliability can be of the following type: test-retest, parallel forms, split-half, and internal consistency like Cronbach's Alpha, also known as Cronbach's Alpha internal consistency, which is the most commonly used method in psychometrics. This is an internal consistency index that presents values between 0 and 1 and where α is a squared correlation coefficient that measures the homogeneity of the questions correlating the means of all the items to estimate the consistency of the instrument, according to Pestana and Gajeiro (2014): - Very good: alpha greater than 0.9; - Good: alpha between 0.8 and 09; - Reasonable: alpha between 0.7 and 0.8; - Weak: alpha between 0.6 and 0.7; - Inadmissible: alpha <0.6.

The analysis of the internal consistency of a psychological measure is a need that is accepted in the scientific community. Among the different methods that provide estimates of the degree of consistency of a measure, the Cronbach index is highlighted as it is highly trusted among the majority of researchers. Any reference to questions of reliability of a measure raises a reference to Cronbach's alpha index (Marôco, 2014).

The trifactor solution that emerged from exploratory studies that have already been attempted using the Confirmatory Factor Analysis (CFA) was tested using the AMOS 24 software (Analysis of Moment Structures). This statistical procedure confirms whether or not the hypothesized factorial structure is adjusted for the data of the sample that is intended to study.

For the development of the CFA, the covariance matrix and algorithm for parameter estimation MLE (*Maximum-Likelihood Estimation*) was considered.

The assumptions made by Marôco (2014) were taken into account, namely:

- The global adjustment quality indicators of the model, whose reference values are: for the ratio between chi-square and degrees of freedom **(x²/$_{gl}$),** the adjustment is considered good if the ratio (x²/$_{gl}$) is less than 2, acceptable if less than 5 and unacceptable if greater than 5; for the Root mean square residual (**RMR**) **and** Standardized root mean square residual (**SRMR**) - the smaller the better, and when (RMR=0) the adjustment is said to be perfect; Goodness fit index (**GFI**) and Comparative Fit Index (**CFI**) are recommended values above 0.90 for a good fit; Root Mean Square Error of Approximation (**RMSEA**), between 0.05 and 0.08 the adjustment is good, and very good when the index is lower than 0.05.

- Quality of the model's local adjustment - the factorial weights designated by lambda coefficients (λ) and the individual reliability of the items (δ) whose reference values are 0.50 and 0.25, respectively, were taken into account.

- Composite reliability (CR) - for the study of the internal consistency of the items in relation to each factor, which is a measure similar to Cronbach's alpha.
- Convergent validity (CV) - to determine whether the items that are reflective of a factor strongly saturate that factor.

As reference indicators, indexes above 0.70 for the CR are suggested, although for exploratory investigations lower values may be acceptable. Concerning the CV, values greater than or equal to 0.50 may be considered and this limit may be 0.40 (Marôco, 2014). The study of the normality of the items was made using the coefficient of asymmetry (Sk) and kurtosis (k) and by the multivariate coefficient of Márdia whose reference values are respectively <= 3.0, <= 7.0 and 5.0.

3. RESULTS

The analysis of reliability results indicates the statistics (means and standard deviations) and the correlations obtained between each item and the overall value, giving an insight into how the item combines with the overall value. According to the average rates, they range from 1.59 (item 23) "*I am afraid of letting go of those who I love, because I am afraid of what might happen to them*" and 3.69 (item 19) "*People can count on me to do what I promised*." Through Cronbach's alpha, the items are classified as reasonable, ranging from α=0.769 in item 34 "*I like to talk to people*" and α=0.795 in item 12 "*I do not feel comfortable knowing that there is someone who needs me*". Cronbach's alpha values for the overall value also show a reasonable internal consistency (α=0.783).

A conservative analysis of the results, show that items 2, 3, 6, 8, 9, 12, 15, 16, 22, 23, 25, should be excluded from the research, because they present correlation coefficients less than 0.20, however we decided to maintain the results and submit them to confirmatory factor analysis, thus respecting the original factor structure (see Table 2). Therefore the mentioned items appear in the Initial Model (cf. Figure 1).

Table 2 - Internal consistency of the items from the Caregiver Skills Inventory by Ngozi Nkongho (1999)

Item N.º	Items	Mean	Sd	r/item total	α without item
1	I believe learning takes time.	3,49	0,563	0,361	0,776
2	Today is full of opportunities.	2,94	0,813	0,185	0,782
3	I normally tell others what I think.	3,04	0,643	0,164	0,782
4	I can do very little for someone who is helpless.	2,67	0,878	0,215	0,781
5	I can see the need for change in myself.	3,07	0,637	0,268	0,778
6	I able to like people, even those who do not like me.	2,69	0,788	0,020	0,789
7	I understand people easily.	3,10	0,621	0,387	0,774
8	I've seen enough in this world for what I need to know.	2,45	0,897	0,188	0,782
9	I make time to meet new people.	2,72	0,797	0,184	0,782
10	Sometimes I like to be involved, other times I don't.	2,77	0,621	0,073	0,785
11	There's nothing I can do to make life better.	2,59	0,910	0,198	0,782
12	I do not feel comfortable knowing that there is someone who needs me.	2,02	0,926	-0,055	0,795
13	I do not like to stray from my path to help others.	3,06	1,005	0,358	0,774
14	In relationships with people it is very difficult to show my feelings.	2,58	0,874	0,411	0,771
15	It does not matter what I say as long as I do the right thing.	2,00	0,877	-0,018	0,792
16	It's hard for me to understand what other people feel, since I haven't had the same experience.	2,46	0,871	0,203	0,781
17	I admire people who are calm, serene and patient.	3,61	0,552	0,409	0,774
18	I believe it is important to accept and respect the attitudes and feelings of others.	3,65	0,559	0,488	0,772
19	People can count on me to do what I promised.	3,69	0,491	0,422	0,775
20	I believe there is room for improvement.	3,60	0,546	0,400	0,775
21	Good friends look out for each other.	3,60	0,595	0,496	0,771
22	I find a meaning for all situations.	3,10	0,570	0,168	0,782
23	I am afraid of letting go of those who I love, because I am afraid of what might happen to them.	1,59	0,732	-0,227	0,797
24	I like to encourage people.	3,52	0,596	0,533	0,770
25	I do not like to commit beyond the present moment.	2,00	0,774	-0,071	0,792
26	I really like myself.	3,28	0,663	0,464	0,771
27	I see qualities and weaknesses in each person.	3,17	0,629	0,269	0,778
28	New experiences are often scary for me.	2,46	0,871	0,285	0,778

Item N.º	Items	Mean	Sd	r/item total	α without item
29	I'm afraid of opening up and letting others know who I am.	2,63	0,910	0,389	0,772
30	I accept people just as they are.	3,42	0,614	0,383	0,774
31	When I like someone, I do not have to hide my feelings.	3,24	0,805	0,383	0,773
32	I do not like being asked for help.	3,23	0,945	0,408	0,771
33	I can express my feelings for a person in a warm and caring way.	3,31	0,666	0,323	0,776
34	I like to talk to people.	3,56	0,543	0,581	0,769
35	I consider myself sincere in my relationship with others.	3,60	0,563	0,530	0,770
36	People need space to think and feel.	3,63	0,539	0,497	0,772
37	I can be approached by people at any time.	3,38	0,616	0,360	0,775
	Global Cronbach's Alpha Coefficient				**0,783**

The descriptive analysis of the items of the questionnaire revealed that all items had a minimum value of 1 and a maximum of 4, with absolute values of asymmetry lower than 3, varying between 0.027 and 1.358. The flattening was less than 7 with an oscillation between 0.032 and 1.432, hence we proceeded with the confirmatory factorial analysis without excluding any items. The Márdia multivariate coefficient with a value of 7.344 is slightly higher than the reference value (5.00), which suggests a deviation from the normal distribution.

Figure 1 presents the hypothesized trifactorial model where the items distributed by the respective factors, their respective factor weight and their individual reliability are observed. Since this is a preliminary study, we proceeded to eliminate all items in the three factors that presented saturations below 0.40. The overall fit quality of the first model was adequate for the ratio of (x2/gl=2.170), for RMSEA=0.074 and RMR=0.061 and inappropriate for the remaining indexes: GFI=0.737, CFI=0.659, SRMR=0.109.
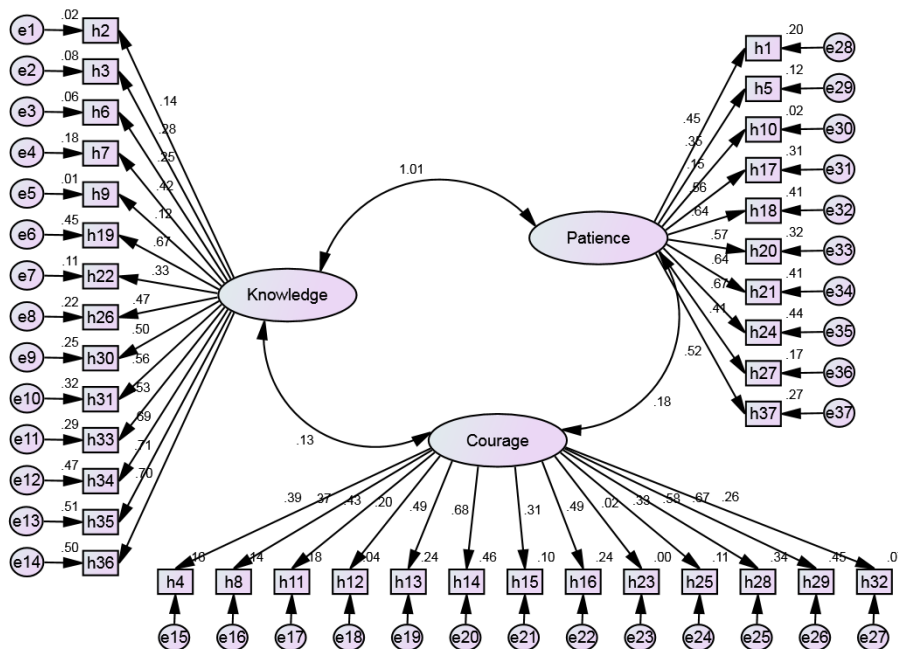

Figure 1 – Initial model with all items

The model was refined with the elimination of the items, which is expressed in figure 2. It is observed that all items presented as corresponding factors have factorial weights greater than 0.40. The global adjustment indexes are already adequate except for GFI=0.886 and CFI=0.881 (x2/gl=1.945; RMSEA=0.067; RMR=0.030 and SRMR=0.065).
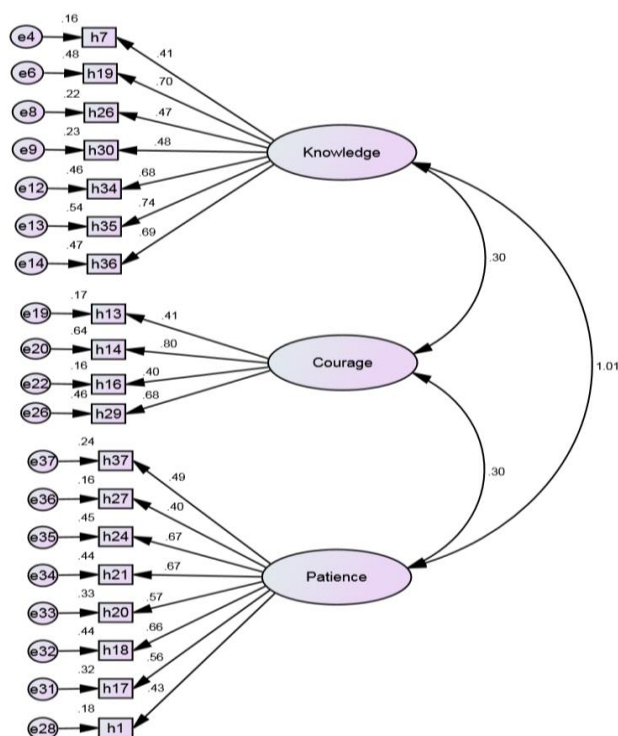
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Figure 2 – Model with eliminated items

Still, the model was then adjusted according to the modification indexes proposed by AMOS, and it was verified that there was only an association of errors corresponding to items 17 and 18. With this change, the global adjustment indices presented adequate rates for CFI=0.906, but remained unsatisfactory for GFI=0.886 (see Figure 3).
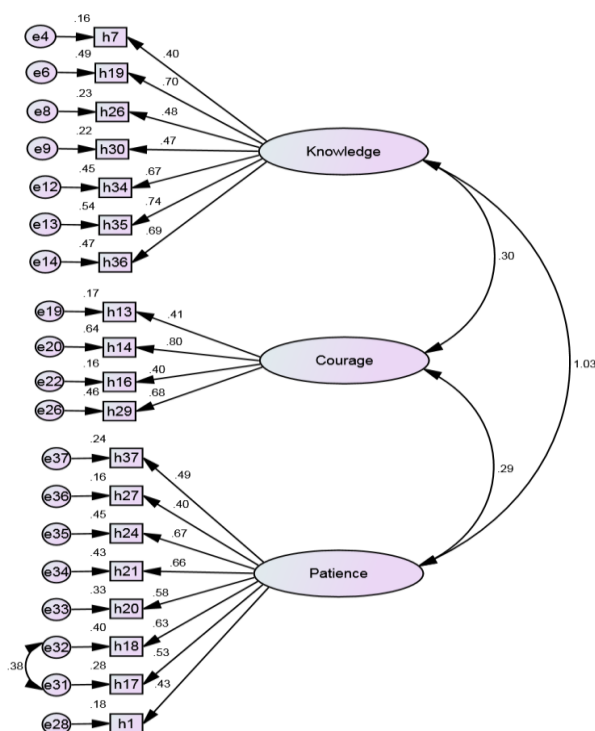

Figure 3 – Model with modification indexes

Although the correlational values found among the factors were not suggestive of a second-order model, a hierarchical structure with a 2nd-order factor was proposed, which we called "caregiver skills". It can be seen that the indices related to goodness of the global adjustment maintained the same values, but the correlation of skills regarding knowledge and patience is higher than 1.0, which explains 107% and 99% respectively. Thus, this second order model should not be taken into account for the global factor (Figure 4).
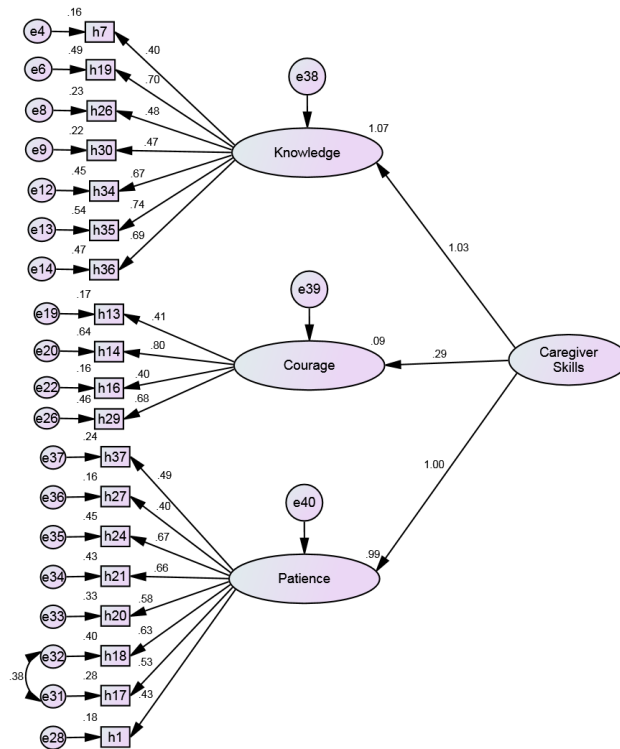

Figure 4- Second-order model

The chart 1 shows the goodness indices of the overall adjustment recorded in all models performed. It is observed that these indices improved as the model was refined.

Chart 1 - Quality indices for the adjustment of all models

Model	$x^2/_{gl}$	GFI	CFI	RMSEA	RMR	SRMR
Model 1 – initial model	2.170	0.737	0.659	0.074	0.061	0.109
Model 2 – with eliminated items	1.945	0.876	0.881	0.067	0.030	0.065
Model 3 – with modification indexes	1.755	0.886	0.906	0.060	0.029	0.062
Second-order model	1.755	0.886	0.906	0.060	0.029	0.062

Analysing the results of the composite reliability, it is observed that only factor 2 presents indices of an internal consistency outcome. On the other hand, the CV values do not allow this conclusion to be made due to the convergent validity of the factors in the sample under study, since they are less than 0.50. Nonetheless, there is a discriminant validity between the factors, except for the relation Factor 1 vs. Factor 3 (see Chart 2).

Chart 2 - Composite reliability, mean extracted variance and discriminant validity

Factors	CR	CV	Discriminant Validity	
			F2	F3
F1- knowledge	0.795	0.367	0.09	1.06
F2 – courage	0.672	0.358		0.024
F3 – patience	0.776	0.309		

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The psychometric study was continued by studying the internal consistency of the final items that make up the scale (see Table 2). Pertaining to the **Knowledge** factor, we are able to see through the mean values that the item which seems most favourable in our view is 19 "*People can count on me to do what I promised*" and the least favourable item is 7 "*I understand people easily*". The Cronbach's alpha coefficients obtained in the seven items that oscillated between α=0.726 in item 35 "*I consider myself sincere in my relationship with others*" and α=0.779 in item 7 "*I understand people easily*", provide us with a reasonable internal consistency, with a total alpha of 0.780. The highest correlation value is found in item 35 (r=0.634) with a variability of 48.5%, whereas the one with the lowest correlation is item 7 (r=0.378) with an explained variance percentage of 16.2%.

As far as the **Courage** factor is concerned, in average terms the most favourable item is 13 "*I do not like to stray from my path to help others*" and the least favourable is item 16 "*It's hard for me to understand what other people feel, since I haven't had the same experience*". Nevertheless, the results show that they are well centred given the mean values and the respective standard deviations. Cronbach's alpha coefficients of the four items in this dimension that ranged from α=0.493 in item 14 "*In relationships with people it is very difficult to show my feelings*" and α=0.655 in item 13 "*I do not like to stray from my path to help others*", are an indication of an internal consistency between weak and reasonable, with a total alpha of α=0.651. The highest correlation value is in item 14 (r=0.562) and the item with the lowest correlation is item 13 (r=0.366), with variabilities of 36.1% and 12.7%.

Regarding the **Patience** factor, the best average is recorded in item 18 "*I believe it is important to accept and respect the attitudes and feelings of others*" with 3.65 and the lowest recorded in item 27 with 3.17, "*I see qualities and weaknesses in each person*". Cronbach's alpha coefficients vary between α=0.733 in item 21 "*Good friends look out for each other*" and α=0.779 in item 27 "*I see qualities and weaknesses in each person*", with an overall Cronbach alpha coefficient of α=0.778, which shows that there is reasonable internal consistency. The highest correlational value was found in item 21 (r=0.594) and the lowest was item 27 (r=0.399), with explained variance percentages of 39.3% and 18.0%, respectively.

Table 3 - Internal Consistency according to factors of the Caregiver Skills Inventory by Ngozi Nkongho (1999)

Item N.º	Factors	Mean	Sd	R item/ total	r^2	α without item
	Knowledge	**Global Alpha for Knowledge 0,780**				
7	I understand people easily.	3,11	0,622	0,378	0,162	0,779
19	People can count on me to do what I promised.	3,70	0,491	0,563	0,415	0,744
26	I really like myself.	3,29	0,663	0,416	0,193	0,773
30	I accept people just as they are.	3,42	0,613	0,429	0,208	0,768
34	I like to talk to people.	3,56	0,543	0,592	0,403	0,736
35	I consider myself sincere in my relationship with others.	3,59	0,572	0,634	0,485	0,726
36	People need space to think and feel.	3,63	0,539	0,581	0,411	0,738
	Courage	**Global Alpha for Courage 0,651**				
13	I do not like to stray from my path to help others.	3,07	1,005	0,336	0,127	0,655
14	In relationships with people it is very difficult to show my feelings.	2,59	0,877	0,562	0,361	0,493
16	It's hard for me to understand what other people feel, since I haven't had the same experience.	2,46	0,875	0,362	0,134	0,628
29	I'm afraid of opening up and letting others know who I am.	2,64	0,912	0,487	0,320	0,543
	Patience	**Global Alpha for Patience 0,778**				
1	I believe learning takes time.	3,49	0,563	0,378	0,167	0,770
17	I admire people who are calm, serene and patient.	3,61	0,552	0,519	0,404	0,747
18	I believe it is important to accept and respect the attitudes and feelings of others.	3,65	0,558	0,572	0,453	0,738
20	I believe there is room for improvement.	3,60	0,546	0,489	0,299	0,752
21	Good friends look out for each other.	3,60	0,594	0,594	0,393	0,733
24	I like to encourage people.	3,52	0,595	0,552	0,328	0,741
27	I see qualities and weaknesses in each person.	3,17	0,630	0,339	0,180	0,779
37	I can be approached by people at any time.	3,39	0,616	0,417	0,188	0,765
						Global Alpha 0,839

Table 4 presents the Pearson correlation matrix between the three factors and the global value of the Caregiver Skills Inventory that reveals positive and statistically significant values, ranging from 0.252 between knowledge vs. courage with a variability of 6.35 % and 0.803 between knowledge vs. patience with a variability of 64.48%. With the global factor the correlations are higher, with explained variance percentages above 35%.

Table 4 - Pearson Correlation Matrix among the factors of the Caregiver Skills Inventory by Ngozi Nkongho (1999)

Factors	Courage	Patience	Overall Caregiver Skills
Knowledge	0,252**	0,803**	0,881**
Courage		0,207**	0,599**
Patience		-	0,870**

The study in connection with the internal consistency of the inventory was finalised and the convergent/divergent validity of the items with the corresponding factors was presented in Table 5. The results clarify the existence of convergent and divergent validity when higher correlation values of the items with the factors to which they belong to are recorded, in which the second correlational value is higher with the overall factor.

Table 5 - Convergent/divergent validity of the items from the Caregiver Skills Inventory by Ngozi Nkongho (1999)

Factors / Items	Knowledge	Courage	Patience	Overall Caregiver Skills
1. I believe learning takes time.	0,383***	0,043 n.s.	0,537***	0,420***
7. I understand people easily.	0,569***	0,219**	0,358***	0,486***
13. I do not like to stray from my path to help others.	0,228**	0,659***	0,198**	0,448***
14. In relationships with people it is very difficult to show my feelings.	0,261***	0,772***	0,167*	0,493***
16. It's hard for me to understand what other people feel, since I haven't had the same experience.	-0,012n.s.	0,639***	0,011n.s	0,255***
17. I admire people who are calm, serene and patient.	0,480***	0,188**	0,650***	0,570***
18. I believe it is important to accept and respect the attitudes and feelings of others.	0,564***	0,226**	0,694***	0,639***
19. People can count on me to do what I promised.	0,682***	0,109n.s	0,628***	0,612***
20. I believe there is room for improvement.	0,511***	0,091n.s	0,625***	0,532***
21. Good friends look out for each other.	0,581***	0,155*	0,718***	0,629***
24. I like to encourage people.	0,625***	0,215**	0,686***	0,657***
26. I really like myself.	0,611***	0,193**	0,464***	0,541***
27. I see qualities and weaknesses in each person.	0,405***	0,043n.s	0,524***	0,423***
29. I'm afraid of opening up and letting others know who I am.	0,221**	0,734***	0,195**	0,474***
30. I accept people just as they are.	0,607***	0,122*	0,436***	0,499***
34. I like to talk to people.	0,716***	0,253***	0,600***	0,671***
35. I consider myself sincere in my relationship with others.	0,753***	0,191**	0,634***	0,677***
36. People need space to think and feel.	0,707***	0,064n.s	0,645***	0,611***
37. I can be approached by people at any time.	0,476***	0,087*	0,584***	0,497***

Legend: ns p> 0.05   * p < 0.05   ** p < 0.01   *** p < 0.001

The comparative analysis of the results found in the present study with those of the original CAI psychometric study by Ngozi Nkongho (1999) and with the Care Skills Inventory of Berdejo & Parra (2008), reveals that the alpha value in the factor of

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courage in the present study, is lower than the original one and the Spanish version, too. The alpha value for the dimension of patience obtained a higher value than the original (English version). Nonetheless, it was lower than the Spanish version. For the present study, the alpha value of the dimension knowledge was lower in comparison with the two versions. The overall Alpha value of the present study is equal to the overall Alpha value of the Ngozi Nkongho study (1999) and lower than the study by Berdejo & Parra (2008) (see Table 6).

Table 6 - Reliability comparison between the English version and the Spanish version of the Caregiver Skills Inventory with the present study

Confiança	Estudo de Ngozi Nkongho (1999)	Nº Itens	Estudo de Berdejo & Parra (2008)	Nº Itens	Presente Estudo Cunha, et al (2017)	Nº Itens
	Alfa Cronbach		Alfa Cronbach		Alfa Cronbach	
CAI Total	0,84	37	0,86	37	0,84	19
Coragem	0,75	13	0,78	13	0,65	4
Paciência	0,71	10	0,84	10	0,78	8
Conhecimento	0,79	14	0,80	14	0,78	7

• *Adequacy of caregiver skills*
To determine the adequacy of the caregivers' skills, the 25th and 75th percentile were considered and, with the overall score as a reference, three groups were obtained: percentile ≤ 25 inadequate skills, 26-74 adequate skills, and percentile ≥75 very adequate skills. On the whole, 45,3% of the participants have adequate skills to care for, 27,6% had very adequate care skills, and 27,1% have inadequate skills. (see Table 7).

Table 7 – Adequacy of Caregiver Skills

Skills	Inadequate		Adequate		Very adequate		Total		x^2	p
Gender	n (58)	% (27,1)	n (97)	n (45,3%)	n (59)	% (27,6%)	n (214)	% (100,0)		
Male	13	22,4	7	7,2	8	13,6	28	13,1	7,388	0,025
Female	45	77,6	90	92,8	51	86,4	186	86,9		
Total	58	100,0	97	100,00	59	100,0	214	100,0		

4. DISCUSSION

After having applied the Caregiver Skills Inventory to the study sample, the psychometric properties were tested.
The study of the validation of psychometric properties was based on the three "c's": construct, content and criterion. In this validation, only the validity of the construct was taken into account. According to Jaeger (1983), referenced by Costa, Nunes, Duarte and Pereira (2012, page 66), "*construct validity subordinates all others, trying to identify if the instrument actually measures what it intends to measure*." However, even according to the same authors, "*its validity is never proven, but simply accepted, inasmuch as the evidence in its favour is higher than the evidence against*" (Costa et al., 2012, page 66).
The study of the items' homogeneity of the inventory was determined using Cronbach's alpha coefficient, revealing a global value α=0.783 in the internal consistency of the items, presenting a reasonable internal consistency. In the final version of the internal consistency by factors, the overall value was α=0.839, which suggests a good internal consistency.
By studying the internal consistency of the final items that make up the inventory, a total alpha of 0.780 was obtained for the Knowledge factor; in the Courage factor, the total alpha was α=0.651, for the Patience factor a Cronbach alpha coefficient of α=0.778 was obtained, which reveals a reasonable internal consistency.
The evaluation of the validity of the exploratory factorial analysis revealed that all items had a minimum value of 1 and a maximum of 4, with absolute values of asymmetry less than 3, which was followed by a confirmatory factor analysis without item exclusion. Since this was a preliminary study, all items were eliminated in the three factors that presented saturations below 0.40. Thus, the overall fit quality of the first model was adequate for the ratio of ($x2/_{gl}$=2.170), for RMSEA=0.074 and RMR=0.061 and inadequate for the remaining indexes: GFI=0.737, CFI=0.659, SRMR=0.109, which resulted in a refinement of the model with item deletion. Accordingly, it was verified that all items would then have corresponding factors, factorial weights

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higher than 0.40. In terms of overall adjustment indices, they were adequate except for GFI=0.886 and CFI=0.881 ($x2/_{gl}$=1.945; RMSEA=0.067; RMR=0.030 and SRMR=0.065).

The adjustment of the model according to the change indexes revealed that there was only the association of the errors corresponding to items 17 and 18. With this change, the global adjustment indexes started to present adequate indexes for CFI=0.906, but not for GFI=0.886.

It was verified that the indexes of the global adjustment of goodness presented the same values. Nevertheless, the correlation of the factor *Knowledge Skills* and with the factor *Patience* was higher than 1.0, explaining 107% and 99%, respectively. Hence, the results must be analysed with parsimony, insofar as they are suggestive of multicollinearity.

It was found that the indices under analysis improved as the model was refined.

The results of the composite reliability revealed that only the *Courage* factor presented indices of internal consistency. The CV values do not allow to conclude the convergent validity of the factors in the study sample, insofar as they were lower than 0.50. However, discriminant validity was found among the factors, except for the relationship between the *Knowledge* factor vs. *Patience* factor.

Given the results, it is proposed to replicate the psychometric validity study of the Caregiver Skills Inventory in samples with a greater number of participants.

CONCLUSIONS

The theoretical framework documents that the caring process is an interpersonal intervention, in which the caregiver coordinates his/her internal resources, his/her patience, courage and knowledge skills in the interpersonal relationship that he/she has with the person cared for.

Considering the relevance of the current number of dependent people, it is justified to assess the impact of caregiver skills on the person cared for. To this end, it is urgent to assess the quality of the instruments for measuring informal care skills.

This research applies the Caring Ability Inventory psicometrics in a sample of Portuguese population

The validation methodology of the factorial structure of the Caregiver Skills Inventory proves that it is considered as a reliable and valid instrument in the assessment of the caregiver's skills, with adequate reliability and evidence of validity.

This research results compared to Ngozi Nkongho (1999) results, revealed that in the present study, the factorial structure is the same and the internal consistency values are coincident in a Global score (α = 0.84); however, Knowledge and Courage factors are lower and Patience factor is higher.

Given these results, it is considered that in the future this inventory can be tested against other scales in order to complement the information obtained and identify areas that are sensitive to a greater investment in the skills of caregivers.

The creation of the measurement of caregivers abilities instrument, provides nurses the ability to use it on a daily basis, measuring and evaluating their clinical patients, finding more vulnerable clusters, which means less skilled caregivers and proposing an aid intervention/formal intervention.

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