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Analysis of psychometric properties of family APGAR with elderly in northeast Brazil

Análise das propriedades psicométricas do APGAR de família com idosos do nordeste brasileiro

Análisis de las propiedades psicométricas del APGAR familiar con ancianos del noreste de Brasil

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Abstract

The aim of the research was to analyze the psychometric properties of Family APGAR, in a sample of 430 elders in the municipality of Fortaleza, Brazil. The reliability was tested through Cronbach's alpha, the constructed validity was confirmed with an exploratory factorial analysis (Varimax rotation), and the validity of criterion was seen in the correlation between Family APGAR and the defining characteristics of the nursing diagnoses of "Discontinue family processes". The results demonstrated a Cronbach's alpha value of 0.80 and a discrimination coefficient between 0.52 and 0.68. The value of Cronbach's alpha had a different result when one of the items was suppressed, varying from 0.73 to 0.78. The factorial analysis demonstrated a single factorization nature of the instrument used in the research. The validity of the criterion showed a coefficient of correlation of 0.76. The Family APGAR in the elderly living in Northeast Brazil demonstrated to be reliable and valid for population screening. However, to implement such interventions, it is suggested a simultaneous use of instruments that gather all dimensions to evaluate family functionality.

Keywords: Validation studies; Family relations; Aged.

Resumo

O objetivo do estudo foi analisar as propriedades psicométricas do APGAR de Família com amostra de 430 idosos do Município de Fortaleza-CE, Brasil. Foi avaliada a confiabilidade através do alfa de Cronbach, a validade de construto por análise fatorial exploratória (rotação varimax) e a validade de critério pela correlação entre APGAR de Família e características definidoras do diagnóstico de enfermagem processos familiares interrompidos. Os resultados demonstraram alfa de Cronbach 0,80 e coeficiente de discriminação entre 0,52 e 0,68. O valor do alfa de Cronbach com um dos itens suprimido variou de 0,73 a 0,78. A análise fatorial revelou unifatorialidade do instrumento. Validade de critério mostrou coeficiente de correlação de 0,76. O APGAR de Família em idosos do nordeste brasileiro mostrou-se confiável e válido para *screnning*. Entretanto, para implementação de intervenções, sugere-se emprego simultâneo de instrumentos que reúnam todas as dimensões de avaliação da funcionalidade familiar.

Palavras-chave: Estudos de validação; Relações familiares; Idoso.

Resumen

El objetivo del estudio fue analizar las propiedades psicométricas del APGAR Familiar con una muestra de 430 ancianos residentes en Fortaleza-CE, Brasil. Se evaluó la confiabilidad mediante el alfa de Cronbach, validez de constructo mediante análisis factorial exploratorio (rotación varimax) y validez del criterio por la correlación entre el APGAR Familiar y las características definidoras del diagnóstico de enfermería procesos familiares interrumpidos. Los resultados demostraran alfa de Cronbach de 0,80 y coeficiente de discriminación entre 0,52 y 0,68. El valor de alfa de Cronbach con un de los elementos eliminados varió de 0,73 hasta 0,78. El análisis factorial reveló unifatorialidad del APGAR Familiar. La validez de criterio reveló coeficiente de correlación de 0,76. El APGAR Familiar en ancianos del Noreste de Brasil es confiable y válido como *screnning*, sin embargo, para poner en práctica las intervenciones, se sugiere que cumplan los demás aspectos de la evaluación de la funcionalidad familiar.

Palabras-clave: Estudios de validación; Relaciones familiares; Anciano.

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INTRODUCTION

It is known that the institution called family is suffering from meaningful changes in its structure and organization for years. These changes are related to the insertion of women into the labor market, the progressive reduction of fertility rate, the control of birth rate, and the changes seen in social, cultural, economical and political spheres[1].

It is perceived that the tendency will lead to confirm that traditional families become even more nuclear, with a frequent coexistence of multi-generational settings, which means children and teenagers may pose higher demands and place potential interferences to support the elderly[1,2].

For the elders, family is reported as the main responsible to support their social and health demands[1,2]. Hence, to know the dynamics in how the family system works is an essential part in elderly care, over the many different scenarios of professional care. In other words, to know how the family functionality finds a way to fulfill and harmonize its essential roles in an appropriate manner, respecting the identity and the tendencies of its members, in order to work in a realist format to deal with the dangers and the opportunities that are seen in the social environment[3].

Therefore, functional family systems are a therapeutic resource for the person that is aging[2]. Then, injuries in family functionality can significantly interfere over the demands of elder's health, with harmful effects over the person's independence, autonomy and quality of life[4,5].

To evaluate family functionality, Smilkstein developed the instrument called Family APGAR, which acronym comes from the following domains: Adaptation, which involves the offered family resources when assistance is necessary; Partnership, regarding the reciprocity in family communications and problem solving; Growth, related to the availability of the family to the changes of roles and emotional development; Affection, which includes intimacy and emotional interactions in family context; and Resolve, associated to the decision, determination or resoluteness in a certain family unit[6,7].

Family APGAR proposes an evaluation of family functionality that is independent of the stage of life of the members of this same family. Literature demonstrates that it has been used with families with children, teenagers and elders[5,8-11]. In Brazil, it has been used in clinical practice in public health service, specially in Family Health Strategy programs, once it is mentioned as a facilitating instrument of observation and analysis of family units, the main focus of intervention of this model of Basic Health Care. The use of this instrument enables the detection of dysfunctions in the family system, permitting the generation of interventions aimed to reestablish the balance of the relationships within this system[2].

Family APGAR is recognized by the Brazilian Ministry of Health to evaluate the functionality of families with elders, as part of the Basic Care Guidelines number 19 "Aging and the health of the elderly", in which is described its usage in interviews with elders' relatives[2]. The instrument was translated, had a transcultural adaptation and a psychometric analysis done with elders living in a municipality located in the Southeast region of Brazil[8].

According to the recommendation for gerontology care[2], it is common that, in Brazil, the scientific research use, for the evaluation of functionality of families with elders, the Family APGAR[11]. Except for three studies performed in municipalities of the Brazilian states of Ceará, Bahia and São Paulo, it is not known any other publication in the country that proposed to evaluate the functionality of families with elders using other instruments on the elders themselves[4,5,8].

To know the functionality of families with elders from the perception of the elder himself is a relevant issue, as it permits to visualize the value this individual gives to his most elemental source of psychosocial support, permitting to evaluate in which level is the family capable to satisfactorily attend the elder's caring demands[2,5,12].

Furthermore, it is seen that during the use of Family APGAR by Brazilian researchers, by journals in general, were aimed to classify family functionality[4,5,11]. A bibliographical research performed in an electronic database, which has scientific articles from many countries in Latin America and in the Caribbean, showed that only one Brazilian study performed in the Southeast region of Brazil demonstrated the evaluation of the psychometric proprieties of Family APGAR, but on the other hand, it is not recognized that the results were also published in an article[8].

Investigations that proposed a psychometric analysis of the qualitative measurement instruments are important, once their reliability and validation are essential aspects to estimate the scientific quality of standardized instruments[13,14]. The lack of validation studies is a disturbing fact, once the clinical decision making process must be based on the use of criteria and instruments that are clearly adequate to be consumed by specific groups, because there are sociocultural particularities present among different population segments and geographic scenarios, thus not enabling great generalizations of the results of adequacy of certain procedures. Only after the verification that an instrument has satisfactory psychometric characteristics within a certain context of application it can guarantee that its usage is appropriate[13,14].

The evidence of adequate parameters of reliability and validity of Family APGAR used with elders residing in the Northeastern region of Brazil will ensure that the use of such tool is adequate to evaluate family functionality with elders in many cities of this region. Likewise, this will also provide a higher level of safety regarding the professional interventions aimed to the families, based on the information gathered with this instrument. Despite being validated in a state of a distinct geographical region[8], another new situation of administration requires a new psychometric analysis, as an instrument is not validated by its measurement, but by its application[13]. Furthermore, a new validation of this instrument over a specific group will help the scientific research in gerontology.

METHOD

This is a methodological research, that deals with the development, validation and evaluation of research tools[13]. The sample was composed by 430 elders, calculated from the formula of finite populations, using the level of trust of 95%, sample error of 5%, and prevalence of elders of 50%, in order to guarantee a maximum sample size.

A simple draft of 15 Family Health Centers (FHC) from the municipality of Fortaleza, Brazil, was performed. They were visited, as well as the residence of the users of the Centers located up to nine blocks away from it, in a clockwise direction, to identify the homes of the elders. In the sample, all elders that were autonomous, with functional communication and cognitive capacity -indifferently from the level of functional independence, and that freely adhere to this study, were added. The participants were explained about the objectives of the study. The elders that lived alone were excluded from the research. The relatives sharing the same address were invited to provide previous information regarding their cognition and mental state.

The data was collected between October 2009 and February 2010, by sponsored and volunteer researchers of the Research Project Elderly Health, linked to the Research Group of Health Policies and Practices, from the Graduate Program in Nursing, at the Ceará Federal University. The ones responsible to collect the data were previously trained to apply the research instruments. Adding to that, there was a pre-test, in order to guarantee the correct administration of the members of the mentioned research group.

The instruments used were: (i) the Family APGAR, composed by five questions, one for each evaluation domain, which the answer options were: always (2), sometimes (1) and never (0) - score varies from 0 to 10; classification varies from 0 to 4, elevated family dysfunction; from 5 to 6, moderate family dysfunction; and from 7 to 10, good family functionality[2]; (ii) a questionnaire, for a socio-demographic characterization of the elders; and (iii) one instrument to evaluate the defining characteristics of the nursing diagnose "Discontinued family processes"[15].

This last instrument was specifically developed by the authors of this study to facilitate the analysis to validate the criteria of Family APGAR. Closed questions were generated, in order to deal with every defining characteristic of the nursing diagnose mentioned. This instrument was selected because it contemplates the characteristics present in all dimensions involved in the concept of family functionality. The definition of the nursing diagnose "Discontinued family processes" is similar to the characterization of family dysfunction[6,15].

According to the content, each one of the 18 defining characteristics of the nursing diagnose was associated to one of the domains of the Family APGAR (adaptation, partnership, growth, affection or resolve). Two open questions were designed to contemplate each defining characteristic. In order to do so, the definitions/descriptions of the mentioned domains worked as the base of the debate. The options to the questions generated were the same used in Family APGAR: always (2), sometimes (1), never (0). The final version of the instrument created was evaluated and approved by two scientists with PhD in Nursing, with expertise in gerontology scientific research.

The scores needed to analyze the correlation using Pearson's r coefficient between the instrument created and Family APGAR were acquired from the calculation of the average of the scores found. Considering a set of 36 questions, equivalent to the 18 defining characteristics, the total score could vary from 0 to 72 points, generating the following classification regarding family functionality: from 0 to 35 points, high family dysfunction; from 36 to 45, moderate family dysfunction; and from 46 to 72, good family functionality.

The organization of data and statistical tests were set using the Statistical Package for the Social Sciences (SPSS) software, version 18.0. To determine the reliability of Family APGAR, the method of Cronbach's alpha was used, through the coefficient of discrimination of the items, considering as a satisfactory result if values were above 0.20. The cutting point of the value of Cronbach's alpha in compressed items was 0.70, thus considering that level with a satisfactory internal consistency[16]. The technique of "Hotelling's t-square" was also applied, which tests the blank hypothesis that all averages from all items are the same.

To analyze the validity of the construct, there was an exploratory factorial analysis, using the technique of analysis of main components, with the orthogonal Varimax rotation. In the process of determination of the number of factors, the criterion of eigenvalues higher than one was used. Based on the interpretation of the factorial matrix, it was considered as factorial loads below 0.30 without proper support[17].

To measure the adequacy of the sample, the Kaiser-Meyer-Olkin (KMO) technique was used, as well as the Bartlett's sphericity test. The KMO result was 0.83, thus considered excellent[17], an indication that the factorial analysis was appropriate.

In the analysis of criterion validity, there was the calculation of the correlation between the Family APGAR scores and the scores achieved in the instrument designed to evaluate the defining characteristics of the nursing diagnose "Discontinued family processes". In order to do so, the Pearson's r correlation coefficient was used. The mentioned nursing diagnose is defined by a "change in the relationship and/or function of the relatives of a family", thus presenting the same construct evaluated by Family APGAR. Because of that, it was considered an adequate criterion, which was also the reason why it was taken, in this study, as the benchmark, once it was used and validated diagnose by NANDA International[6,13,15].

All ethical recommendations for researches involving human beings were followed, according to the specifications described in the Resolution 196/96 and other complementary documents, produced by the Brazilian National Health Council/Brazilian

Ministry of Health, accepted during the moment of the study. The study project was previously submitted and approved by the Ethics in Research Committee, from Ceará Federal University, under protocol #255/09. The participants were informed about the goals of the study; eventual questions about the research were answered, and it was guaranteed the right to anonymity and confidentiality of data. Furthermore, all signed the Statement of Informed Consent.

RESULTS

The socio-demographic characteristics of the 430 elders that composed the sample showed that: 74.4% were women, 47.4% were between 61 and 70 years old and 14.2% were above 80 years old. The majority of the elders (45.8%) were married and 36.3% of them were widowers; 47.4% had at least three years of education; 64.0% were retired and 53.5% had personal monthly income of one minimum wage.

In regards to the component members of their family, 47.8% were above 50 years old; 57.6 were women; 36.1% had at least six years of education; 35.4% did not work and 34.8% had no income. The average amount of relatives was 3.96 people. When they were asked about the quality of the relationship with their relatives, 91.6% of the elders classified it as "good", in a scale that the options were "good", "there are ups and downs" and "bad". The family bonds demonstrated that 16.9% of the relatives were spouses, 39.1% were their children and, in 27.0% of the cases, grandchildren.

The results regarding the score of the Family APGAR instrument presented an average of 6.8, and standard deviation of 2.2, divided according to the following classification: 9.5% with elevated family dysfunction; 8.8% with moderate dysfunction, and 81.6% had good family functionality.

The Hotelling t-square test presented a significant difference ($F = 6.28$ to $p = 0.001$). As a consequence, there was no agglutination of answers in one single category. The analysis of internal consistency of Family APGAR demonstrated a Cronbach's alpha of 0.80. According to the demonstration in Table 1, it was seen that the discrimination coefficient oscillated between 0.52 and 0.68; the Cronbach's alpha result when one item was suppressed oscillated between 0.73 and 0.78.

At the factorial analysis of the Family APGAR instrument, the KMO result was 0.83, and Barlett's sphericity test $\chi^2 = 605.8$ to $p = 0.001$. After extracting the factors, it was identified that only one factor had eigenvalue higher than one, with accumulation of explained variation of 56%, demonstrating that the instrument is unifactorial. The factor identified is the offered family support to the elder (Table 2).

The validation of the criteria demonstrated a Pearson's r correlation coefficient result of 0.76, indication that there is evident correlation between the Family APGAR results and the defining characteristics of the nursing diagnose "Discontinued family processes".

DISCUSSION

To understand the functionality of families with elders is an essential component to a successful planning of health interventions, specially in Primary Care, reinforcing the relevance of the usage of the Family APGAR instrument in gerontology care as tool to facilitate healthcare procedures[2,5,11].

It is important to highlight the use of Family APGAR recommended by the Brazilian Ministry of Health in the country[2], thus supposing it is already adequate regarding semantic, conceptual, operational and item-wise equivalence[18]. Furthermore, despite being transculturally adapted with a sample from the Southeast region of Brazil[8], Family APGAR has only five evaluation items, described by short sentences, easy to comprehend, without regional expressions, and with simple and clear answering options, allowing to support the adequacy of the instrument, as well as to be used with samples from other parts of the country.

In regards to the application of the instrument in elders, as seen in the context of the studied municipality of the Northeast region of Brazil, the reliability results, evaluated by its internal consistency using Cronbach's alpha demonstrated scores neat to one, thus being categorized as a reliable element[16]. Another positive aspect to be considered was that both the alpha score in a total scale (0.80) and the coefficient of correlation were similar to those of the instrument in its original version[7].

In the analysis of the behavior of each item, in regards to the contribution to the internal consistency of the instrument, it was seen a small variation (from 0.73 to 0.78) of alpha results, indicating individual items as congruent or complementary. Similar results were found by other researchers, in different populations, in different socio-cultural/geographical contexts[10,12].

In regards to the exploratory factorial analysis of the Family APGAR used with the elderly residing in the Northeast region of Brazil, after the extraction of the factors and rotation of the matrix of initial solution, to the orthogonal Varimax rotation, the results demonstrated that the scale was unifactorial, analogue to the results of the original validation study, as well as in the investigation that the psychometric analysis performed with Colombian young students[7,10].

The factor identified was the support given by the family, under the domain "partnership", with results of 56% over the total explained variation, which means that it has a considerably high level of importance to explain family functionality on the studied sample[17].

The domains "adaptation", "growth", "affection" and "resolve" were not identified as factors in the matrix of correlations of exploratory factorial analysis, thus leading to believe that during the use of Family APGAR, specifically among elder respondents of Brazilian Northeast region, other elements of evaluation of the family functionality construct besides "partnership" were not properly contemplated by the mentioned instrument.

Therefore, with this specific public there was the confirmation that the instrument must be used only for screening,

Table 1. Coefficient of discrimination and results of Cronbach's alpha with a suppressed item of Family APGAR used in elders. Fortaleza, Brazil, 2010

Item	Coefficient of discrimination	Cronbach's alpha with suppressed item
I am satisfied, because I can count on my family in the case I need help when there is a disturbance or preoccupation.	0.52	0.78
I am satisfied with the way my family and I talk and share problems.	0.68	0.73
I am satisfied with the way my family accepts and supports my desires to begin or to search for new activities and to search for new paths and directions.	0.54	0.77
I am satisfied with the way my family demonstrates affection and reacts to my emotions, such as anger, regret or love.	0.61	0.75
I am satisfied with the way my family and I spend time together.	0.57	0.76

Table 2. Exploratory factorial analysis of the Family APGAR instrument used in elders. Fortaleza, Brazil, 2010

Item	Factor
I am satisfied, because I can appeal to my family for heal when something is bothering or worrying me.	0.69
I am satisfied with the way my family and I talk and share problems.	0.83
I am satisfied with the way my family accepts and supports my desires to begin or search for new activities and to search fr new paths or directions.	0.71
I am satisfied with the way my family demonstrates affection and reacts to my emotions, such as anger, regret or love.	0.77
I am satisfied with the way my family and I spend time together.	0.73

to estimate family functionality, as it does not allow a complete evaluation of the construct. This reinforces the idea that when using Family APGAR, it is necessary the support of other instruments, or even other types of professional evaluation to justify and implement effective interventions related to the dynamics of family functioning in a clinical context[6,7,10].

The analysis of the validity of Family APGAR criterion, in this study, demonstrated to be satisfactory, which can be seen by the Pearson's r correlation coefficient found: over 0.70, which is considered adequate by literature[13,17]. This results permits to affirm that Family APGAR classified as a dysfunctional family (total results between zero and six points) the elders that also achieved family dysfunctionality under the defining characteristics of the nursing diagnose "Discontinued family processes" (results between zero and 45 points generated after the application of the instrument specifically designed for this evaluation)[15].

In regards to the limitations and innovations generated in this study, it is important to emphasize that the performance of interviews at the homes of the elders adduced advantages because it enabled higher proximity with the interviewees, as well as the participation of a great number of elders with different family characteristics; and disadvantages, once the presence of other family members during interviews may have possibly influenced the type of answer given to the interviewers. This practice should be considered favorable, as it allowed to visualize the psychometric performance of the instrument in different circumstances found in other studies[7,10,12].

CONCLUSION

Despite the restrictions found in the analysis of the validity of the contruct, it is possible to state that Family APGAR, when used in elders in the Brazilian Northeast region, is an adequate instrument to evaluate family functionality, as it gathers satisfactory requirements of internal consistency and validity of criterion, which gives it a characteristic of a screening instrument appropriate to the necessary estimate. However, for a wider intervention planning, it is suggested that other measuring instruments are used simultaneously, in order that the evaluation of all dimensions of family functioning are observed properly.

There is a recommendation to continue the process of validation of the instrument with the elderly, specially when dealing with its validity in the construct. Further analysis of the factorial structure can clarify how the instrument in fact, evaluates the family functionality construct.

There is a strong suggestion to perform future investigations that may evaluate the psychometric proprieties of Family APGAR, not only over the regional scenario of Brazilian Northeast region, but also in many other sociocultural environments of the different geographical regions of the country. This approach will enable satisfactory comparison and discussion of the results found by other studies of analysis of reliability parameters and validity of instrument, reinforcing the relevance of its usage in gerontology practice.

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