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Evidences of validation of an instrument to assess social support for hypertensive people by primary care professionals

Evidências de validação de um instrumento de avaliação do apoio social a hipertensos por profissionais da atenção básica

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ABSTRACT:
Current study verifies validation evidences of an instrument for the evaluation of social support for hypertensive patients from the perspective of professionals in primary care. Methodology followed stages below: consultation with specialists, imputation of data and confirmatory factor analysis (CFA). The proposed instrument was adapted from the Primary Care Assessment Tool, professional version, with the validation of six items aggregated within the conceptual dimensions "Focus on the family" and "Community Orientation", confirmed by CFA, based on the adjustment of the model (CNIN/DF = 2.256; RFI = 0.924; NFI = 0.959; IFI = 0.977; TLI = 0.956; and CFI =0.977). Significant correlation (p-value=0.000) and positive correlation between the dimensions were evidenced. Adequate internal consistency and reliability in the model´s adjustment allowed its reproduction and limitations. Managers and researchers are provided with a statistically validated instrument to evaluate social support for hypertensive patients.

Keywords: Primary care. Validation studies. Systemic arterial hypertension.

RESUMO
Este trabalho objetivou propor e verificar evidências de validação de um instrumento de avaliação do apoio social ao hipertenso na perspectiva de profissionais prestadores de serviço na Atenção Básica. Para o percurso metodológico, realizaram-se as etapas: consulta a especialistas, imputação de dados e análise fatorial confirmatória (AFC). O instrumento proposto foi adaptado do *Primary Care Assessment Tool* versão profissionais, sendo validados seis itens agregados nas dimensões conceituais "Enfoque na família" e "Orientação para a comunidade", que foram confirmados pela AFC com base no ajuste do modelo (CNIN/DF = 2,256; RFI = 0,924; NFI = 0,959; IFI = 0,977; TLI = 0,956; e CFI =0,977). Evidenciou-se uma correlação significativa (p-valor = 0,000) e positiva entre as dimensões. A adequada consistência interna e confiabilidade no ajuste do modelo permitiu a reprodução dele respeitando-se as limitações. Assim, disponibiliza-se aos gestores e pesquisadores um instrumento estatisticamente validado para avaliar o apoio social aos hipertensos.

Palavras-chave: Atenção básica. Estudos de validação. Hipertensão arterial sistêmica.

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INTRODUCTION

Arterial hypertension (AH) is one of the main public health issues in Brazil, due to its association with metabolic disorders, functional and structural changes in target organs, diabetes, and other risk factors, such as sedentary lifestyle, obesity, salt intake and aging of the population.[1] Its prevalence in Brazil varies according to the region and to the type of methodology used, with rates ranging between 21.4% and 32.3%. [1,2]

Control of arterial blood pressure levels (BP) is rather complex due to several factors. Treatment-adherence is affected by lack of information on the disease, lack of symptoms, family and community aspects, bonding with the health team, socioeconomic level, cultural aspects, cost of medicine used, difficulties in marking appointments and interference in quality of life after the start of the treatment, and others. [1,3,4]

So that AH care in Brazil could be enhanced, the Ministry of Health decentralized primary care (PC). Services, health professionals, specialized services, and encouragement in health promotion and prevention measures, with case-reporting within a computerized system have been expanded to a greater number of people[5]. However, several authors[5-7] claim PC activities have failed to be effective in controlling AH.

A possible response to the issue of the difficulties in AH control may be detected in the hypertensive social support network, in the understanding of the organization and influence of the network and in its contribution towards the control of AH.[8] Similar to other chronic diseases, the monitoring of hypertensive patients by the health service and the understanding of their daily lives through their daily needs and those of their families and their community, may together be an asset towards the treatment and control of blood pressure levels.[9]

The Primary Care Assessment Tool (PCATool)[10] evaluates PC through conceptual dimensions, especially “Focus on the Family” and “Community Orientation”, which may be related to the social support of hypertensive patients with regard to the performance of the health team. PCATool features versions for users and professionals. It has been adapted and used in several countries, as may be observed in integration reviews.[11]

Although the professional version of the tool has been adapted and validated for the Brazilian milieu[12], its adaptation and validation in the context of AH is missing. Current study investigates the contribution of professionals in the process of interaction with the family and the community and the manner its availability and services, given to hypertensive patients, occurs in practice.

This research aims at verifying validation of an instrument constructed to evaluate social support for hypertensive patients from the perspective of primary care professionals.

METHODOLOGY

EVALUATION TOOL

PCATool has self-applicable versions for children, adults, health professionals and coordinator or administrator in health service. It has been forwarded by Starfield[10] and developed by Johns Hopkins University to assess critical aspects related to PC in industrialized countries. It measures aspects of structure, process and results in health services.[13]

The professionals original version of the tool is made up of essential attributes for the evaluation of PC: access at first encounter, longitudinality, integration of care, information system, available services, services, family and community monitoring.

FOLLOW-UP OF HYPERTENSION PATIENTS IN PRIMARY CARE

Through projects developed by Paes[14,15], a cohort of hypertension people, 19-year-old or over, in the primary care services of the cities of João Pessoa and Campina Grande, both in the state of Paraíba, Brazil, has been established, with segment follow-up of users for 2009, 2010, 2011 and 2016, to evaluate the satisfaction of hypertension people in PC services.

In the first year of the cohort´s establishment, the state´s capital city João Pessoa had an estimated population of 693,082 inhabitants, with primary care given by 180 family health teams, or rather, a coverage of 88.8%. According to the Information System of Primary Care (Siab), in the case of AH, the 2008 coverage comprised 43,953 enrolled hypertension people. In the case of Campina Grande, in the interior of the state, population in 2008 reached 381,422 inhabitants, with 92 health teams and an 85% coverage. The number of enrolled people with hypertension was 17,658.

The tool employed in the Project was an adapted PCATool for AH with the validated version for users[6]. Professionals and administrators of Family Health Strategy were also interviewed, with adapted tools, to evaluate their satisfaction with regard to services given to people with hypertension.

Projects were conducted in collaboration with researchers of the Universidade Federal da Paraíba (UFPB), Universidade Estadual da Paraíba (UEPB) and Universidade Federal do Rio Grande do Norte (UFRN), coupled to municipal administrators, health professionals and postgraduate students in planning and data collection.

SAMPLE DESIGN

In the case of projects developed[14,15], a sample representing people with hypertension enrolled in primary health care for João Pessoa and Campina Grande was calculated based on the process of simple casual sampling in successive stages, selected by conglomerates in a single stage with

proportional probability to size. Results comprised 36 conglomerates for João Pessoa and 30 for Campina Grande. A conglomerate corresponded to a Family Health Unit (FHU). Sample comprised FHUs with the number of enrolled hypertensive people (2006 and 2007), considered sufficient for the study, coupled to patients´ cards and clinical sheets.[6]

Selection of professionals was based on FHUs chosen for the interviews with users. Data collection of each FHU included physicians, nurses and 50% of all health community agents (HCA), selected at random. Consequently, 137 professionals were chosen for João Pessoa and 121 for Campina Grande, with a total of 258.[7] Interviews were scheduled at FHUs and executed by trained and monitored personnel.

Current study was approved by the Committee for Ethics and Research of the Center of Social Sciences (Protocol 0101 of 29/4/2009) and of the Hospital Lauro Wanderley (Protocol 341/10 of 29/6/2010) of the Universidade Federal da Paraíba.

ADAPTATION AND VALIDATION OF THE EVALUATION TOOL FOR THE SOCIAL SUPPORT OF HYPERTENSIVE PEOPLE

The adaptation and validation process of the tool "Evaluation of social support to hypertensive people within the perspective of primary care professionals" comprised the following stages: consultation with experts (validation of contents), data imputation and confirmatory factor analysis (CFA). Social support in current study comprises "Focus on the Family" and "Community Orientation" which integrate the PCATool adapted version, professional version.

Validation phase complies with recommendations proposed by the Consensus-based Standards for the Selection of Health Measurement Instruments (COSMIN). Assessment of reliability and validity were the main measurement features of the tool since they measure the quality of evidences of a validation through results obtained.[16]

Professionals with experience in research on AH were consulted to analyze the relevance and representativity[17] of the items that composed the dimensions of social support after the adaptation of the original PACTool, professional version, for the theme AH and for the cities where it would be applied.

The tool, adapted after recommendations by experts, included, for each dimension, questions and answers within a preestablished scale of possibilities (Likert-type scale), with rates between 1 and 5 for answers: 1 ("never"), 2 ("almost never"), 3 ("sometimes"), 4 ("almost every time") and 5 ("always"), with option 0 ("does not apply" or "does not know/did not reply").

Answers such as "does not know/did not reply" and incomplete data were given as missing data. They were replaced by Likert-type scale answers

through an imputation method called hot deck.[18]

Confirmatory factor analysis (CFA) confirms how well the analyzed variables represent a smaller number of constructs and ratify the tool´s structural model.[16,19,20] The above was associated with the constructs´ validation tests and tested how the measured items corresponded to the constructs (reliability and internal consistency), coupled to better understanding of the measurements´ quality.

Reliability of scale constructs was verified by Cronbach´s Alpha, coupled to compound reliability (CR).[20] Measurement was calculated by factor loads of the construct items and estimated their internal consistency, with rates between 0 and 1. It is expected that Cronbach´s alpha and CR are equal to or higher than 0.7 so that evaluated construct is internally consistent and reproduceable.

CFA involves factor validity, convergent validity and discriminating validity.[21] Factor validity is related to the items´ correct specificity so that they measure correctly the construct. So that it could be validated, one has to verify whether the factorial loads of all items are equal to or greater than 0.5 or whether the factorial validity is equal to or greater than 0.25. Convergent validity examines whether items saturate (load) strongly within the respective construct. On the other hand, the convergent validity of each construct may be calculated by the mean variance extracted, which must be equal to or greater than 0.5. Discriminating validity verifies whether a factor´s items are correlated with other factors of the scale. The latter is analyzed by comparing estimates of constructs´ extracted and shared variance.[19-21]

Adjustment indexes[20,21] employed to measure the overall quality of the estimated model were: chi-square of degree of freedom (CMIN/DF) with a rate up to 3; Normalized Adjustment Index (NFI), Relative Adjustment Index (RFI), Incremental Fit Index (IFI), Tucker Lewis Index (TLI) and Comparative Fit Index (CFI), with rates greater than 0.90; Parsimony Ratio (PRATIO), Normalized Parity Adjustment Index (PNFI) and Parsimony Comparative Fit Index (PCFI), greater than 0.5; Root Mean Square of Approximation (RMSEA), with adequate rate less than 0.05 (p-value $\geq$ 0.05).

The model was estimated by statistical package AMOS 22, in Statistical Package Social Science-SPSS 22.

RESULTS

Professional sample in the city of João Pessoa, Brazil, was composed of community health agents (CHAs), with 52.6% (n = 72); physicians, with 21.2% (n = 29); and nurses, with 26.3% (n = 36). Most worked in the same service at the most for the last two years (68.1%), whilst 31.9% has experience in other areas within the last two years. Further, 60.7% were physicians and 66.7% were nurses with

specialist degrees; 72.9% of CHAs had high school education level.

In Campina Grande, sample comprised CHAs with 50.9% (n = 56), physicians with 23.6% (n = 26) and nurses with 25.5% (n = 28). Further, 36.4% of health professionals worked in the same job during two years, at the most, and 45.5% for more than four years. The group was comprised of physicians (80%) and nurses with a specialist degree, whilst 10.7% of CHAs had incomplete high schooling (82.1% failed to inform schooling).[7]

The model also tested the hypothesis for a co-relationship between the constructs "Focus on Family" and "Community Orientation". Results of significance tests for CFA maintained the presence of the two constructs and of all the items proposed. Table 1 shows results on the overall quality of adjustment, reliability and internal consistence by Cronbach´s alpha, factorial load, compound reliability measure, and convergent and discriminant validities.

Table 1. Confirmatory factor analysis and internal consistence for the final composition of the questionnaire on the assessment of social support to people with hypertension from the point of view of primary care professionals

	Item	Factorial load	Specificity	Factorial validity
Focus on family (F)	F1 – Do health professionals of your health unit try to know the people who live with patients with high arterial pressure?	0.659	0.341	0.434
	F2 – Do health professionals of the health unit talk to people who live with patients with high arterial pressure on the disease, lifestyle, medical treatment and other health issues?	0.888	0.112	0.788
	F3 – Do health professionals talk on the relevance of the involvement of the family of the patient with hypertension during treatment?	0.792	0.158	0.708
Cronbach´s Alpha: 0.817 **Compound reliability: 0.903** **Convergent validity: 0.859**				
Community orientation (C)	C1 – Do health professionals talk on the importance of the patient and the family in participating in the institutions of the Community (church meetings, district associations etc.) as a support for the solution of health problems?	0.563	0.437	0.316
	C2 – How often do health services develop activities on arterial hypertension with churches, district institutions, schools etc.?	0.365	0.635	0.133
	C3 – Do health professionals talk on the influence of friends and colleagues in the treatment of the patient´s arterial hypertension?	0.879	0.121	0.772
Cronbach´s Alpha: 0.618 **Compound reliability: 0.732** **Convergent validity: 0.556**				

Source: research data. 2020.

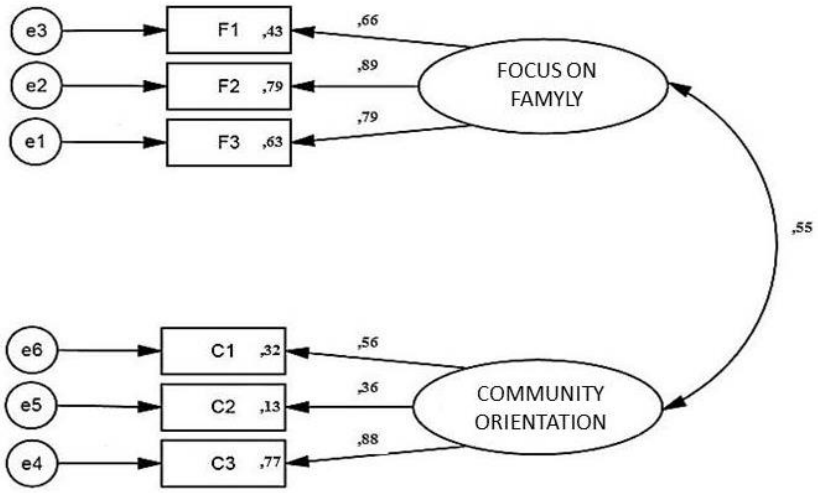
Table 2 gives results of adequation indexes tested for the model´s confirmation.

Table 2. Adequation indexes of models tested in confirmatory factor analysis (CFA)

Adjustment indicator	Final model
CMIN/DF[1]	2.256
NFI[2]	0.959
RFI[3]	0.924
IFI[4]	0.977
TLI[5]	0.956
CFI[6]	0.977
PRATIO[7]	0.533
PNFI[8]	0.512
PCFI[9]	0.521
RMSEA[10]	0.072

[1] Qui-square freedom degrees; [2] Normalized Adjustment Index; [3] Relative Adjustment Index; [4] Incremental Fit Index; [5] Tucker Lewis Index; [6] Comparative Fit Index; [7] Parsimony Ratio; [8] Normalized Parity Adjustment Index; [9] Parsimony Comparative Fit Index; [10] Root Mean Square of Approximation.
Source: research data. 2020.

A graphic representation of parameters estimated in the final model may be seen by the following pathway diagram (Figure 1).



F1. F2 and F3: items composing dimension “Focus on family”; C1. C2 and C3: items composing dimension “Community Orientation”; and 1-5: model´s error.

Figure 1. Pathway diagram – result of confirmatory factor analysis (CFA) for the final model under hypothesis
Source: research data. 2020.

The final structure of the evaluation tool for social support to hypertensive people, professional version, comprised six items organized according to the dimensions of primary care: Focus on Family and Community Orientation, as seen in Chart 1.

Chart 1. Evaluation tool for social support to hypertensive people from the point of view of primary care professionals

F. FOCUS ON FAMILY		
Answer according to the following scale: 1 – Never; 2 – almost never; 3 – sometimes; 4 – almost always; 5 - always; 0 – Not applicable		**Answer**
F1	Do health professionals of your unit try to know the people who live with the patient with arterial hypertension?	
F2	Do health professionals of your unit talk to people who live with the patient with arterial hypertension on the disease, lifestyle, treatment and other health issues?	
F3	Do health professionals talk on the relevance of involvement of the AH patient´s family with regard to treatment?	
C. COMMUNITY ORIENTATION		
Answer according to the following scale: 1 – Never; 2 – almost never; 3 – sometimes; 4 – almost always; 5 - always; 0 – Not applicable		**Answer**
C1	Do health professionals talk on the importance of the patient and the family in participating in the institutions of the Community (church meetings, district associations etc.) as a support for the solution of health problems?	
C2	How often do health services develop activities on arterial hypertension with churches, district institutions, schools etc.?	
C3	Do health professionals talk on the influence of friends and colleagues in the treatment of the patient´s arterial hypertension?	

Source: research data. 2020.

DISCUSSION

Current study comprised the adaptation and validation of a PC original tool (PCATool), professional version, proposed by Starfield[10], for the assessment of professional assistance to hypertensive people in health units, focusing on social support constructs ("Focus on Family" and "Community Orientation"). Methodology is based on a study[6] which adapted and validated the tool to measure satisfaction of hypertensive patients with regard to services given by health units in João Pessoa and Campina Grande, state of Paraíba, Brazil.

In the first stage of adaptation and validation, experts contributed towards the adjustment of items, adequations with regard to interest in investigation and local conditions. Adaptation to situation in which the service is offered, coupled to vocabulary and cultural modes, is an essential item in the tool´s validation.[22]

In the wake of data tabulation after their collection by professionals, the descriptive measures identified and analyzed missing data. Missing data reached 3.7% for items of the two constructs, considered negligible. However, imputation occurred by hot desk method in which the missing data were replaced by response averages observed in other indicators of the same dimension since these had a minimum of 50% of registered answers. Imputation method was justified by qualification of internal consistence.[23]

Besides its contribution for the scale´s validity, the model tested an important hypothesis, or rather, the co-relationship between the constructs "Focus on Family" and "Community Orientation", demonstrating that co-relationship was

significant (p-value = 0.000), positive and of moderate size, equal to 0.55 (Figure 1). Significant co-relationship between constructs reveal that they are related and function together and complementary within health care of the hypertensive person, from the PC professional´s point of view.

So that the final composition of the factors may be determined, the factorial loads of each item were assessed. Harzheim et al[23] took a factorial load over 0.35 as satisfactory for the model´s explanation. On the other hand, Hair et al[20] recommended rates above 0.50 as satisfactory. Item C2 (Table 1) was estimated with a factorial load (0.365), lower than rate recommended by these authors. This boils down to a factorial validity lower than 0.25 from that recommended.[20] Although item C2 does not show the expected size, it was deemed to be significant, with a contribution that may be interpreted as reasonable for the model. Further, the item was a complement to the information of item C1. Another justification for its maintenance was the result favorable to indexes that confirm the model's good adjustment.

It would not be enough if later reconsidered, when necessary, to have a possible change in the reformulation of the item or its script. Some type of interpretation bias in the answer may have occurred. Consequently, further research would be required with a sample representing the hypertensive population in primary care. It may be recommended that, when the tool is employed in different populations, special attention should be taken in the case of the question asked.

Cronbach´s alpha is a measure that has been widely used to assess the construct reliability of a measurement scale. However, it has been criticized due to the influence of the number of construct items since many items trigger for a higher coefficient rate and fewer items decrease coefficient rate. In the case of the constructs under analysis, with only three items, it may be observed that Cronbach's alpha was influenced by smaller number of items and presented the following values: 0. 817 for "Family Focus" and 0. 618 for "Community Orientation" (Table 1).

As from the final established model, the model´s measurement was verified, based on compound reliability, convergent validity and discriminant validity. Compound reliability estimated the internal consistency of the construct´s reflective items, with acceptable rates ≥ 0.7.[20, 24] The later was satisfactory within the proposed dimensions (Table 1).

Convergent validity verifies the extent to which indicators of a specific construct converge or share a high proportion of variance, with usual rates at ≥ 0. 5.[22] "Focus on family" and "Community Orientation" presented convergent validities of 0.859 and 0.556, respectively (Table 1).

Discriminant validity analyzes how much a construct is truly distinct from the others, in terms of how much it correlates with other constructs and how distinctly

the measured items represent only this single construct.[20] It may be verified when the factors´ convergent validity is equal to or higher than the square of the correlation between the factors "Focus on family" and "Community Orientation" (r = 0. 549; r^2 = 0. 301). This condition is accepted for the evaluated constructs (Table 1).

With regard to the proposed model, Table 2 showed that CMIN/DF (2. 255), which represents the chi-square by degrees of freedom, was deemed satisfactory (< 3) It indicates good adjustment, similar to index RFI (0.924). Indexes NFI (0.959), IFI (0.977), TLI (0.956) and CFI (0.977) evidenced adjustment > 0.95, considered excellent. Indexes PRATIO (0. 553), PNFI (0.512) and PCFI (0.521) also evidenced an acceptable adjustment (> 0.5) and RMSEA (0. 072) was regarded excellent.[20]

Since parameters estimated in the final model were significant and the adjustment indexes were accepted, there is statistical evidence that the proposed scale (Chart 1) to evaluate social support for hypertensive patients from the perspective of primary care professionals showed good applicability and validity, with easy application since it has only two dimensions and six items.

CONCLUSION

Evidences of tool validation forward an alternative to assess support services and care for hypertensive people to get the relevant dimensions related to primary care. In similar regions, such as the cities under analysis which served as a base for the tool´s validation, it may be a useful tool that features a support network necessary for these people in their health care.

It should be underscored that tools employed in current research have certain limitations. Although the study is rather comprehensive, it has been restricted to two cities in the state of Paraíba. Consequently, its extension to other municipalities or regions should be done with caution and care should be taken in its usage. Further research work may improve the tool studied in current analysis.

Although research has been undertaken some time ago, its validity has not been jeopardized since the evaluation context has not been impaired by time or by exceptional facts. One should underscore the pioneering stance in the instrument´s validation and the services offered to hypertensive people from the point of view of health professionals and of the social support within the dimensions "Focus on Family" and "Community Orientation".

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