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RESEARCH

PSYCHOMETRIC PROPERTIES OF THE CLINICAL-FUNCTIONAL VULNERABILITY INDEX - 20 IN PRIMARY HEALTH CARE

PROPRIEDADES PSICOMÉTRICAS DO ÍNDICE DE VULNERABILIDADE CLÍNICO- FUNCIONAL - 20 NA ATENÇÃO PRIMÁRIA À SAÚDE

PROPIEDADES PSICOMÉTRICAS DEL ÍNDICE DE VULNERABILIDAD CLÍNICO-FUNCIONAL - 20 EN ATENCIÓN PRIMARIA DE SALUD

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ABSTRACT

Objective: to analyze the psychometric properties of the Clinical-Functional Vulnerability Index - 20 in Primary Health Care. ***Method:*** methodological, analytical study, with a quantitative approach with 396 elderly people. Analyzed based on the Item Response Theory, a two-parameter logistic model was used - difficulty and discrimination. Construct validity and validity of concurrent criteria were verified. Reliability and precision were assessed by Cronbach's alpha and biserial correlation. Unidimensionality was verified through exploratory factor analysis. ***Results:*** all items showed a positive biserial correlation with the latent variable. The first factor explained 20% of the total variance; the parameters for construct validity and concurrent criteria were considered adequate. The general Cronbach's alpha was 0.73. ***Conclusion:*** the Clinical Functional Vulnerability Index - 20 has satisfactory psychometric qualities, being a valid and consistent instrument for screening frailty in the elderly in Primary Health Care.

Keywords: Mass Screening; Frailty; Psychometrics; Reproducibility of Results; Health of the Elderly; Primary Health Care.

RESUMO

Objetivo: *analisar as propriedades psicométricas do Índice de Vulnerabilidade Clínico-Funcional - 20 na Atenção Primária à Saúde.* ***Método:*** *estudo metodológico, analítico, de abordagem quantitativa com 396 idosos. Analisado com base na Teoria de Resposta ao Item, utilizou-se o modelo logístico de dois parâmetros - dificuldade e discriminação. Foi verificada a validade de construto e validade de critério concorrente. A confiabilidade e precisão foram avaliadas pelo alfa de Cronbach e correlação bisserial. A unidimensionalidade foi verificada por meio da análise fatorial exploratória.* ***Resultados:*** *todos os itens apresentaram correlação bisserial positiva com a variável latente. O primeiro fator explicou 20% da variância total; os parâmetros para a validade de construto e critério concorrente foram considerados adequados. O alfa de Cronbach geral foi de 0,73.* ***Conclusão:*** *o Índice de Vulnerabilidade Clínico Funcional - 20 possui qualidades psicométricas satisfatórias, sendo um instrumento válido e consistente para triagem da fragilidade no idoso na Atenção Primária à Saúde.*

Palavras-chave: *Programas de Rastreamento; Fragilidade; Psicometria; Reprodutibilidade dos Testes; Saúde do Idoso, Atenção Primária à Saúde.*

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RESUMEN

Objetivo: *analizar las propiedades psicométricas del Índice de Vulnerabilidad Clínico-Funcional - 20 en Atención Primaria de Salud.* ***Método:*** *estudio metodológico, analítico, con enfoque cuantitativo realizado con 396 adultos mayores. Analizado en base a la Teoría de Respuesta al Ítem, se utilizó el modelo logístico de dos parámetros: dificultad y discriminación. Se verificó la validez de constructo y la validez de los criterios concurrentes. La confiabilidad y precisión se evaluaron mediante el alfa de Cronbach y la correlación biserial. La unidimensionalidad se verificó mediante análisis factorial exploratorio.* ***Resultados:*** *todos los ítems mostraron correlación biserial positiva con la variable latente. El primer factor explicó el 20% de la varianza total; los parámetros de validez de constructo y criterios concurrentes se consideraron adecuados. El alfa de Cronbach general fue de 0,73.* ***Conclusión:*** *el Índice de Vulnerabilidad Clínica Funcional - 20 tiene cualidades psicométricas satisfactorias, siendo un instrumento válido y consistente para el cribado de fragilidad en personas mayores en Atención Primaria de Salud.*

Palabras clave: *Tamizaje Masivo; Fragilidad; Psicometría; Reproducibilidad de los Resultados; Salud del Anciano; Atención Primaria de Salud.*

INTRODUCTION

Aging is considered a sequential, individual, accumulative, irreversible, universal, non-pathological process of deterioration of a mature organism and proper to all organisms. This event, natural to every human being, can be understood from chronological, biological, psychological, social and cultural perspectives.[1] The Brazilian Institute of Geography and Statistics (IBGE) estimates that by the year 2060 Brazil will have an elderly population consisting of approximately 58 million individuals.[2]

Aging can lead to more organic vulnerability to diseases and in this context there is the development of frailty in the elderly.[3] A frail elderly person is not simply an elderly person, but an elderly person with falling reserve and resistance to stressful factors in the body, leading to a reduction the ability to maintain homeostasis; increased risk of mortality and adverse health events, such as dependence, falls, injuries, acute illnesses, hospitalizations, institutionalization and death. Thus, the concept of fragility must be broad to respond to the needs of this population and, with this, maintain and promote their autonomy and independence.[4]

The prevalence of frailty is described in international studies carried out with elderly people from communities in different countries. Meta-analysis study conducted with 29 surveys and 43,083 elderly people from the community in Latin America and the Caribbean identified an average prevalence of frailty of 19.6%, with a range between 7.7 and 42.6%.[5] In Brazil, in a recent study conducted with the elderly in the community, the prevalence of frail individuals was 5.2% and pre-frail individuals was 49.9%.[6]

In this context, the strengthening of Primary Health Care (PHC) through the Family Health Strategy (FHS) provides assistance to the elderly population and becomes a strategy to circumvent the growing demand for health services for the elderly.[5]

Thus, the evaluation of the determinants that may influence the installation of frailty in the elderly in PHC and, consequently, its correct stratification is a fundamental element for the early detection and implementation of appropriate multidisciplinary interventions in order to delay the onset, in addition to improve the situation of those who are already fragile.[5]

A systematic review study recommends that the health professional in the process of identifying frailty in the elderly should be based on simple tests that require little time and resources and that can be interpreted by non-specialist professionals.[7] Several instruments are identified in the literature for rapid screening for frailty, although those that could be used in PHC have their validation for practical use still incipient.[8]

The Functional Clinical Vulnerability Index- 20 (IVCF-20) is an interdisciplinary screening tool, with quick and easy application, which assesses both the physical, cognitive and psychological dimensions of the elderly, that is, it contemplates multidimensional aspects of the health condition of the elderly. old man. It was built by a multidisciplinary team specialized in elderly care, with the contribution of Community Health Agents (CHA), in addition to assistants, Nursing technicians and managers.[9]

However, information about the psychometric properties of the IVCF-20 is still scarce when applied in PHC, so it is necessary to have a valid and reliable instrument for screening for frailty, whether in application with users or in the development of research, which reinforces the importance of the validation process.

Considering the impact of fragility on the quality of life of the elderly, families, caregivers, as well as on the health system, this study is a topic of public interest. It is believed that health professionals, when using this instrument in PHC, have the opportunity to detect frailty and its risk factors early in order to intervene in preventive and restorative actions, in order to preserve and maintain autonomy and functional capacity in the elderly.[10]

Thus, the objective of the study is to analyze the psychometric properties of the Clinical Functional Vulnerability Index - 20 (IVCF-20) in Primary Health Care.

METHOD

This is a methodological, analytical study with a quantitative approach, developed in the center-south region of *Belo Horizonte/ Minas Gerais*, which has 12 basic health units (BHU) in addition to other health services. The population is 51,715 registered elderly, constituting the largest regional with elderly population in the capital of *Minas Gerais*.[11] Data were collected in 12 BHU and at

home when the elderly person was bedridden, from January to April 2018.

To calculate the sample, we used the method to estimate proportions for finite populations at random, with proportional allocation by BHU.[12] It was considered p of 50%, margin of error of 5%, significance level of 5% and increase 20% for losses. Thus, the sample size would be 458 elderly people, however, the minimum sample required for any possible result that may occur is 381 elderly people. Then, 458 elderly people were invited, and 396 elderly people accepted the participation.

The sample was probabilistic, and the recruitment of participants was through simple random selection, using the Microsoft Excel program (version 2016). Initially, BHU managers were asked to list the elderly registered in the FHS and in the Community Health Agents Program (CHAP). The following sociodemographic information was obtained: username, medical record number, age, date of birth, street address, contact phone number, micro area where he lives and mother's name. The data were collected by a researcher and four previously trained undergraduate students of the Nursing course, under the coordination of the main researcher.

The inclusion criteria established were: elderly people aged 60 years or over, of both sexes, who lived in the south-central region of *Belo Horizonte/Minas Gerais* and were duly registered with the Family Health Team (FHT) and/or in the Community Health Agents Program (CHAP). Exclusion criteria were elderly people without telephone contact and residents of long-term care facilities (LTCF).

The evaluations were previously scheduled, via telephone contact, carried out by a member of the research team. All participants were instructed on the research and, if they agreed to participate, signed the Free and Informed Consent Form (ICF), with confidentiality and anonymity guaranteed.

For data collection, an instrument was built by the researchers with sociodemographic information such as: sex, age, marital status, housing, education, religion, if they had a caregiver, income and current occupation. The Mini Mental State Examination (MMSE), the Clinical-Functional Vulnerability Index - 20 (IVCF-20) and the Edmonton Fragility Scale (EFS) were also used.

The elderly were submitted to cognitive screening evaluation using the MMSE. The cutoff points were defined according to the participant's education: illiterate, 13 points; with low or medium education, 18 points; and with a high level of education, 26 points.[13] If the MMSE was below the cutoff point, the companion was interviewed, due to the suspicion of cognitive impairment in the elderly.

The IVCF-20 is an instrument that contemplates multidimensional aspects of the health condition of individuals aged 60 and over. It was built by the team of Geriatrics and Gerontology at the *Hospital das Clínicas* of the *Universidade Federal de Minas Gerais* (HCUFMG) in an interdisciplinary way, with the contribution of community health agents (CHA), Nursing assistants and technicians, nurses, doctors, teams of the Nucleus Support for Family Health (NAFH) and PHC managers. It also had the participation of several elderly health professionals from the Southeast, Midwest, North and South regions of Brazil, as well as meetings at the Brazilian Ministry of Health (MS), with the participation of researchers from the *Fundação Oswaldo Cruz* (FIOCRUZ).[9]

In a study that aimed to evaluate the adequacy of IVCF-20 at the Reference Center for the Elderly (RCE) and PHC, the authors demonstrated that the instrument is positively correlated with the Comprehensive Geriatric Assessment (CGA), the results of validation by the curve Receiver Operating Characteristic (ROC) was 0.903 (95% CI 0.871–0.934) and Cronbach's alpha coefficient was 0.74.[9]

The IVCF-20 consists of 20 items distributed in eight sections on different health domains. It makes the maximum value of 40 points, identifying the clinical-functional condition of the elderly as robust, at risk of fragility and frail elderly. The higher the score of the IVCF-20, the worse the clinical-functional condition of the elderly.[9]

The Edmonton Fragility Scale (EFS) was used as an external criterion. This scale was adapted and validated in Brazil; it consists of 11 items divided into nine domains. The maximum EFS score is 17 and represents the highest level of fragility.[14]

For the construction of the database, the double entry validation technique was used in the Epi Info Program version 3.5.1 (2008).

The construct validity of the IVCF-20 was analyzed using the Item Response Theory (IRT) and the two-parameter logistic model (discrimination and difficulty) was used. IRT is a set of mathematical models that relate to a latent trait, that is, a variable that cannot be observed directly, but that can be inferred through the analysis of variables related to it, in this case, the latent trait is the frailty of the elderly. These models seek to represent the likelihood that an individual will give an affirmative answer to an IVCF-20 question, given that individual's ability.[15]

To verify the validity of the IVCF-20's concurrent criterion, EFS was used as an external criterion. To ensure the precision and reliability of the scale, Cronbach's alpha (CA) and the biserial correlation were used. The biserial correlation characterizes the correlation of each question with the total score, indicating the individual importance of each one.[16]

IRT is centered on the estimation of the latent trait, represented by the Greek letter theta (θ). In this study, the two-parameter logistic model associated the parameters of difficulty (β) and discrimination (α) for each item. The difficulty parameter (β), which is measured on the same scale as the latent trait, indicates how "difficult" a particular item is, that is, the lower the

frequency of occurrence of the item, the less it tends to be fragile and the more "difficult" "Tends to be the item. The discrimination parameter (α) characterizes the item's ability to differentiate individuals with different levels of fragility. It is noteworthy that for this analysis, age and self-perceived health were dichotomized. The first was from 60 to 84 years old and 85 years old or more, and the age above 85 years old or more was considered a risk factor. The second in excellent to very good and regular to bad. Items with α parameters greater than 0.65 are considered as moderate discrimination.[15]

Quality measures were obtained from the IRT model itself and the verification of unidimensional was performed via exploratory factor analysis, following the criterion of Reckase (1979).[17] According to the author, the results indicate unidimensional when the first factor corresponds to the less than 20% of the total variance, called the dominant factor. In addition, the chi-square (X^2) and Root Mean Errorof Aproximation (RMSEA) statistics were used to verify the fit. A value equal to or less than 0.08 indicates a good adjustment of the RMSEA. The X^2 statistic indicates the adequacy of the model to the database, considering $p < 0.05$.[17] The software used in the analyzes was R (version 3.4.3).

This study was approved by the Research Ethics Committee of the *Universidade Federal de Minas Gerais* (CAAE: 75797617.6.0000.5149) and by the *Belo Horizonte* Municipal Health Department (CAAE: 75797617.6.3001.5140).

RESULTS

Sociodemographic data and stratification of the frailty of the elderly in the south-central region of *Belo Horizonte, Minas Gerais*

Four-hundred and fifty-eight elderly people were invited to participate in the study, but due to the refusal and losses (n = 62), the consent and participation of 396 elderly people was obtained, but of these and the number initially calculated, two were bedridden and were evaluated in their households.

The predominant age range in the sample was between 60 and 74 years old (64.81%), with an average of 71.8 years and predominantly female (65.4%). The elderly had an average of 7.13 (SD ± 5.25) years of study, 43.69% were married or had a stable relationship, 80.81% had their own home; 91.33% were retired and the average number of income dependents per elderly person was two people (SD ± 1.74). The majority (84.60%) did not live alone; 12.37% had a caregiver; 70.33% declared themselves Catholic and 91.33% were retired. The median income was one minimum wage (R$ 1,045.00).

The mean of the MMSE was 24.35 (SD±4.48) points. Considering the cutoff points of the MMSE, 17.92% of the elderly had suspected cognitive impairment. It is noteworthy that in these cases, the companions answered the instruments.

Most of the elderly, according to the IVCF-20, were considered robust (44.9%), while 42.4% were classified as at risk of frailty and 12.6% were fragile.

The Edmonton Fragility Scale found in relation to the study population: 52.3% did not have fragility, 23.5% reported vulnerability and 24.2% had fragility, of which 16.7% had mild fragility, 6.0% moderate fragility and 1.5% intense fragility.

Reliability and Validation of the Clinical-Functional Vulnerability Index-20 (IVCF-20)

The general Cronbach's alpha was 0.73, which translated into good internal consistency.

All items had a positive biserial correlation with the latent variable. Items I3 ("Because of your health or physical condition, did you stop shopping?") And I4 ("Because of your health or physical condition, did you stop controlling your money, expenses or paying household bills? "), Showed the highest correlation (r=0.60) with the latent variable; while items I1 ("Age"), I16 ("Have you had two or more falls in the last year?") and I19 ("Hearing problems capable of preventing you from performing everyday activities?") reported the lowest correlation bi-serial with the latent variable (r=0.27).

Item Response Theory (IRT) Modeling

Table 1 shows the adjustment of the logistic model of two parameters of the Item Response Theory (IRT).

Items I10 ("In the last month, did you feel discouraged, sad or hopeless?") (α=0.61) and I16 ("Did you have two or more falls in the last year?") (α=0.39) presented a parameter of low discrimination (less than 0.65), that is, these items were less informative.

Items I4 ("Because of your health or physical condition, did you stop controlling your money, expenses or paying your household bills?") (α=6.69) and I6 ("Because of your health or physical condition), did you stop bathing alone?") (α=9.56) showed the biggest parameter of discrimination, being characterized as items with more information about the latent variable.

Items I7 ("Did any family member or friend say that you are getting forgotten?") (β=-0.71) and I17 ("Do you accidentally lose urine or feces at any time?") (β=0, 05) had the lowest parameters of difficulty, that is, they are items that "demand" the lowest level of fragility in order to be answered in the affirmative.

Items I1 ("Age") (β=3.08) and I19 ("Hearing problems capable of preventing the performance of daily activities?")

Table 1 - Logistic model of two parameters of the Theory of Response to the Clinical-Functional Vulnerability Index Item - 20. *Belo Horizonte*, MG, Brazil, 2018 (n = 396)

Description of the items	Initial Model / Final Model	
	α*	B**
I1 – Age	1.01	3.08
I2 - Self-perceivedhealth	0.88	1.10
I3 - Because of your health or physical condition, did you stop shopping?	3.12	1.25
I4 - Because of your health or physical condition, did you stop controlling money, spending or paying bills?	6.69	1.47
I5 - Because of your health or physical condition, did you stop doing small housework?	4.91	1.48
I6 - Because of your health or physical condition, did you stop bathing alone?	9.56	1.74
I7 - Did any family member or friend say you are getting forgotten?	0.70	-0.71
I8 - Is this forgetfulness getting worse in recent months?	1.12	1.05
I9 - Is this forgetfulness preventing the performance of some daily activity?	1.97	1.97
I10 - In the last month have you felt discouraged, sad or hopeless?	0.61	0.20
I11 - Have you lost interest or pleasure in previously pleasurable activities?	1.02	1.54
I12 - Are you unable to raise your arms above shoulder level?	2.56	2.10
I13 - Are you unable to handle small objects?	2.61	2.24
I14 - Do you have any of the 4 conditions (unintentional weight loss; BMI*** <22 kg/m****; calf <31 cm; gait (4 m)> 5 seconds??	0.86	1.34
I15 - Difficulty walking capable of preventing the performance of some daily activity?	2.13	1.76
I16 - Have you had two or more falls in the past year?	0.39	2.92
I17 - Do you accidentally lose urine or feces at some point?	0.66	0.05
I18–Do you have vision problems?	0.90	2.44
I19–Do you have hearing problems?	0.67	3.50
I20 –Do you have any of the 3 conditions: poly-pathology; polypharmacy; recent hospitalization??	0.78	0.43

*Discrimination parameter; **Difficulty parameter;***Bodymass index;****Kilogram per meter.

(β=3.50) reported the highest parameters of difficulty, that is, these items "demand" a higher level of fragility in order to be answered in the affirmative.

Table 2 shows the quality parameters of the model shown in Table 1. The final model presented a Cronbach's alpha value greater than 0.70; the first factor explained 20% of the total variance; the adjustment was adequate according to the chi-square test (p-value = 0.001); the RMSEA values indicated good adjustments.

Table 2 - Quality parameters of the model adjustment. *Belo Horizonte*, MG, Brazil, 2018 (n = 396)

Quality measures	Initial Model \ Final Model
Number of questions	20
Cronbach's alpha	0.73
% explanation of the 1st factor	0.20
Chi-square	435.46
Root-Square Error of Aproximation	0.06

All items described satisfactory inclinations (discrimination parameter), with the exception of items I10 ("In the last month did you feel discouraged, sad or hopeless?") And I16 ("Did you have two or more falls in the last year?").

There was a positive and significant correlation (r=0.92; p-value <0.001) between the final IVCF-20 score and the IRT score - the higher the final IVCF-20 score, the higher the score IRT model, and vice versa. There was a positive and significant correlation (r=0.75; p-value <0.001) between the total EFS score and the IRT score, and the higher the total EFS score, the higher the IRT model score tends to be, and vice versa. Finally, there was a positive and significant correlation (r=0.77; p-value <0.001) between the final score of the IVCF-20 and EFS questionnaires - the higher the final score of the IVCF-20, the higher the score of EFS, and vice versa.

Figure 1 illustrates the results between the correlation of the IRT model score and the final score of IVCF-20 and EFS.

DISCUSSION

The IVCF-20 instrument obtained a general Cronbach's alpha of 0.73. This means that the items in this instrument have internal consistency. In a study carried out in 2016 with the aim of assessing the suitability of the IVCF-20 for use by PHC, Cronbach's alpha coefficient was 0.74, when applied to the elderly at the Elderly Reference Center (ERC) (n=397) and 0.86 when applied to the elderly in PHC (n = 52).[9]

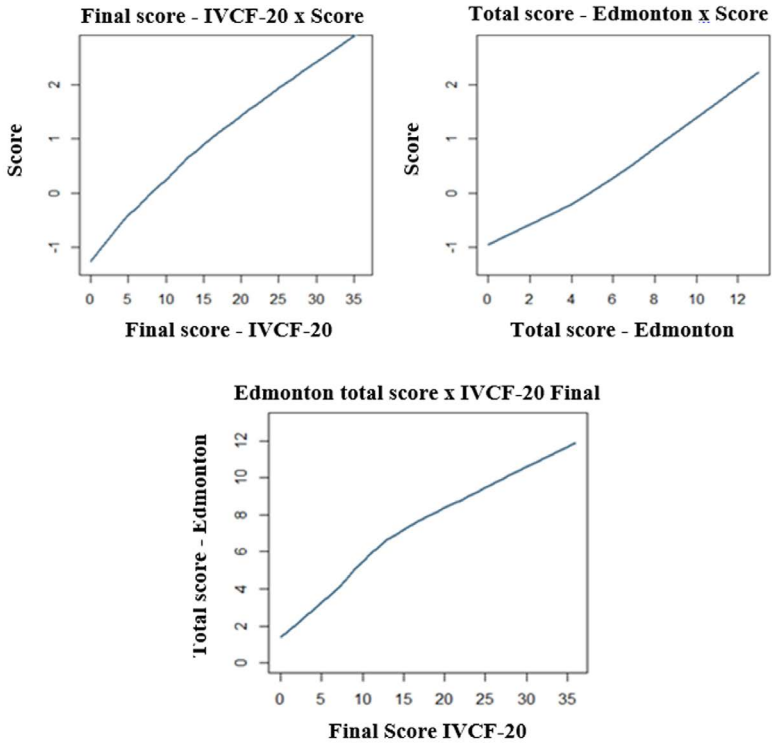

Figure 1 - Correlation between the score estimated by the IRT model, the final score of the Clinical Functional Vulnerability Index - 20 and the Edmonton Fragility Scale. *Belo Horizonte*, MG, Brazil, 2018 (n = 396)

In this study, the biserial correlation was also used to verify the reliability of the IVCF-20. Thus, all items showed a positive biserial correlation with the latent trait, with emphasis on items I3 ("Because of your health or physical condition, did you stop shopping?") And I4 ("Because of your health or condition physical, no longer controlling money, expenses or paying bills?"), which exhibited the greatest correlation (r=0.60) with the latent trait.

This result can be explained by the fact that these items refer to instrumental activities of daily living (AIVDS). The literature highlights a positive correlation between the loss of AIVDS and the occurrence of frailty in the elderly.[18]

In the IRT model, to check the evaluation of the items, the two-parameter logistic model was used. In the discrimination parameter, items I4 ("Because of your health or physical condition, did you stop controlling your money, expenses or paying your household bills?") And I6 ("Because of your health or physical condition, do you stopped bathing alone?"), from the IVCF-20, were more able to discriminate the latent trait.

These two items (I4 and I6) refer to instrumental activities of daily living (IADL) and basic activities of daily living (BADL), respectively. The greater ability to discriminate against both items may be related to the ability to perform activities that enable one to take care of himself/herself and live independently. These are aspects considered important for the discrimination of a situation of fragility since their measurement is a broader indicator than morbidity.[19]

Still regarding the parameter of discrimination, items I10 ("In the last month did you feel discouraged, sad or hopeless?") And I16 ("Did you have two or more falls in the last year?") presented a low parameter of discrimination in relation to the latent trait. That is, for the studied population, these items provided less information to the latent trait, which can be seen in the percentage of positive responses -47.2 and 25.6%, respectively.

It is worth mentioning that, for item I10, the discrimination parameter 0.60 was close to the reference parameter adopted in the study, of 0.65. The literature demonstrates that the problems associated with lowering mood or low motivation vary from isolated sadness to depression.[20] It is assumed that in the participants of this study, when asked about this item, feelings of sadness, discouragement and hopelessness were not determinants to influence fragility.

On the other hand, item I16 presented a low parameter of discrimination in relation to the latent trait, it is assumed that these results occurred because the study participants did not report falls in the last year, when the IVCF-20 was applied.

Despite items I10 and I16highlighted reduced discrimination with the latent trait, having been maintained in the model due to its clinical and functional importance as a determinant in the occurrence of frailty in the elderly. The percentage of feelings

of sadness, discouragement and hopelessness identified with the use of both instruments was 47.2 and 36.9% for the IVCF-20 and SFE, respectively. In a study that aimed to investigate the association between frailty, loneliness and depressive symptoms in elderly people who care for the elderly, the results showed that there was an association between frailty, loneliness and depressive symptoms. Elderly lonely caregivers had a 158% increased chance of presenting pre-frailty and 360% of frailty. Elderly caregivers with depressive symptoms had a 242% increased chance of presenting frailty.[21]

In the item of having two or more falls in the last year, the percentage was 25.6% in IVCF-2 and this item is not addressed in EFS. It is noteworthy that frailty has a relative increase of 11.1% on average for elderly people who have suffered falls.[22]

Regarding the difficulty parameter, the higher the level of difficulty, the items require a higher level of latent trait. These parameters in the IVCF-20 ranged from -0.71 to 3.50. Items I1 ("Age") and I19 ("Hearing problems capable of preventing daily activities?") Described greater parameters of difficulty. In other words, only the elderly who demanded a higher level of latent trait were able to respond positively to the items. This result is also demonstrated by the percentage of elderly (6.3%) over 85 years old. The percentage of positive responses regarding hearing problems capable of preventing daily activities was 10.10%.

Although age is not the only parameter of frailty, older adults over 85 require more attention and care, although many of them, due to personal and environmental support, remain independent for activities of daily living (ADL).[22]

Over the years, physiological and functional changes occur that result in hearing loss, vision and the installation of chronic-degenerative diseases. Nevertheless, these health conditions, when treated, have little or no impact on the functionality of the elderly. Item I19 ("Hearing problems capable of preventing daily activities?") Showed a higher degree of difficulty, that is, for the elderly who responded positively to hearing loss, they may present isolation from social life, frustration, depression and, consequently, fragility.[23]

Still with regard to the difficulty parameter, items I7 ("Did any family member or friend say that you are getting forgotten?") And I17 ("Do you accidentally lose urine or feces at some point?"), Reached the lower parameters of difficulty for the latent trait. The percentages of positive responses for items I7 and I17 were 61.11 and 49.24%, respectively.

According to these results, complaints of memory loss should suggest to health professionals a better investigation of the elderly's cognition, since such complaints may indicate the onset of a dementia.[24] With regard to urinary incontinence, this is a problem of health that affects many elderly people, however, is sometimes perceived as something inherent in the aging process. Hence the importance of early detection for the development of a therapeutic plan.[25]

The estimate of the validity of the IVCF-20 concurrent criterion was demonstrated by the significant correlations with the EFE score. This instrument is widely accepted and has characteristics similar to the IVCF-20, precepts considered important for this type of validation in the literature. Therefore, both instruments measure the same construct, andthrough the IRT, this result showed adequacy and satisfactory fit quality.

The unidimensionality of the IVCF-20 was verified based on exploratory factor analysis. Thus, when all items were analyzed, it was evident that the first dominant factor explained at least 20% of the variance of the item responses, indicating unidimensionality, a necessary condition to build a scale based on the IRT. The main adequacy indexes of the model showed satisfactory chi-square (X2) and RMSEA values. Thus, it can be said that the latent structure of the IVCF-20 construct (fragility) has been confirmed.

It is observed that the IVCF-20 is able to better estimate information about individuals with high levels of the latent variable. This result is believed to be due to the low percentage of affirmation in most items. Thus, it can be said that the test has high discriminatory power for individuals with high levels of the latent trait.

As a limitation in this study, the sample belongs only to a region of *Belo Horizonte*-MG. It is suggested that its psychometric qualities be tested in new research, which will provide sustainability to consolidate the validity of the instrument. The results of the present study highlight significant contributions to Nursing knowledge, mainly gerontology, as there will be scientific support for nurses to plan assistance to the elderly. The use of the instrument can help to stratify the elderly and understand which dimensions of multidimensional evaluation were affected, so that, in this way, Nursing activities can be implemented, in addition to guiding referrals and counter-referrals to elderly reference centers.

CONCLUSION

The results obtained in this study guarantee satisfactory psychometric qualities, which indicates that the IVCF-20 is an instrument capable of identifying the frailty of the elderly in PHC. This instrument can be applied by any health professional and by mid-level professionals, such as previously trained Nursing technicians and community health agents (CHA). However, it is worth noting that it is an initial screening instrument.

The results of this investigation serve as a basis for the advancement of geriatric-gerontological science by offering an instrument with satisfactory psychometric properties. The IVCF-20 can be used as a tool to screen frailty in the elderly quickly and easily, in addition to being used in research with elderly people in PHC.

The information obtained from the application of this instrument can provide subsidies for the planning of preventive interventions and monitor the high-risk population and treatment when frailty is installed in the elderly.

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