Original Article

Cross-cultural and psychometric validation of the Fraboni scale of ageism in Peruvian nursing students

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ARTICLE INFO

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ABSTRACT

Background & Aim: The elderly population has increased in the last decades and they are often discriminated against in society due to their age. This study aimed to perform the cross-cultural and psychometric validation of the Fraboni Scale of Ageism in Peruvian nursing students.

Methods & Materials: This is a cross-sectional methodological study, carried out in four universities in Peru in which 959 nursing students participated. For the adaptation process, the forward-backward method of the original English version into Spanish was used. For the content analysis, the study was carried out with the participation of specialist judges, while confirmatory factor analysis was used for the internal structure of the construct as invariance of measurement. Reliability was estimated by internal consistency for categorical items.

Results: The total content validity estimated with CVI was 0.97. The internal structure of the construct was found to be appropriate for the respecified 20-item model (CFI and TLI=0.94, RMSEA=0.07, and SRMR=0.05). The 20-item bi-factor model presented excellent fit indices (CFI=0.96 and TLI=0.95, RMSEA=0.06 and SRMR=0.04), being the best model for construct validity. Measurement invariance by sex was confirmed for all four models (configural, metric, strong, and strict). The three-dimensional model (ω=0.93) as well as the bi-factor model (ωH=0.88) showed high reliability for the scale scores.

Conclusion: This study demonstrates that the 20-item Peruvian version of the Fraboni Scale of Ageism shows validity and reliability for its scores. In addition, the scale score is invariant by sex.

Introduction

The world is experiencing a process of aging globalization. In 2020, there were one billion people aged 60 and over worldwide, representing 13.5% of the population, and it is predicted that by 2050 this figure will double to 2.1 billion (1). In Latin America and the Caribbean by 2030 it will increase to 17% and by 2050 to 25% (2).

The next 26 years will be marked by a rapid increase in the aging process, given that the population aged 75 and over will be the age group that will grow the fastest (3) In Peru, in 2023, 4,598,000 (13.6%) citizens were elderly adults out of a total population of 33,726,000 inhabitants, and it is expected that by 2050 there will be approximately 9,000,504,000 elderly people, representing 24.1% of the Peruvian population (4).

With the population aging, problems such as age discrimination become evident, and despite the several contributions made by elderly people (EP), negative views towards this population are still present and commonplace. In this context, half of the world's population is ageist, holding stereotypes, prejudice, and discrimination towards EP (5).

The EP perceive and suffer the presence of ageism and discrimination in their community, in healthcare services, and even in their own

family circle, which tends to undermine their social integration and quality of life (6). In this sense, age discrimination occurs when people are categorized and divided in ways that lead to harm, disadvantage, and injustice, eroding solidarity between different generations, and can cause lifelong discrimination (7).

Prejudice and ageism are inherent to different cultures, societies, and times. This fact has led to the creation of a specific term, *Ageism* in its English origin, or *Edadismo* in its Spanish version described by Butler, who is a psychiatrist and gerontologist, as a process of age discrimination and stereotypes that directly influences EP, who, by assuming such characteristics as those inherent to age, consolidate and perpetuate the stereotypes surrounding old age that are prevalent in contemporary society (8).

The World Health Organization (WHO) defines ageism as age discrimination that involves stereotyping (how we think), prejudice (how we feel), and discrimination (how we act) towards people based on their age and can be: institutional, related to laws, rules, social norms, institutional policies, and practices; interpersonal interactions between two or more individuals; and self-directed, internalized, and turned against oneself (7).

Ageism has serious and far-reaching consequences for the health, welfare, and human rights of EP because it is associated with shorter life expectancy (9), worse physical and mental health, slower recovery from disability, and the presence of cognitive impairment (10). It can also reduce young people's commitment to their employer, contribute to poverty and economic insecurity (11), at great cost to society, and constitute an obstacle to effective policy formulation and adoption of measures related to healthy aging (12).

In this context, the identification of ageist behavior in the population is a priority, with special emphasis on the training of healthcare professionals, including nursing students, who will have to interact with this population at different levels of care. Hence the important to know the discriminatory actions and behaviors of nursing students towards old age, because both the social and scientific perceptions highlight the negative aspects associated with old age, especially when it is focused on illness, disability, and dependence.

Discriminatory behaviors are further reinforced in the teaching process of healthcare professionals as it is rare for students to be trained in managing the priorities and the multiple and complex health problems of EP, or their priorities. Generally, reference is made almost exclusively to aging problems, and the positive aspects are overlooked, providing students with a skewed picture of the aging process (2).

Different studies conducted worldwide, such as in Jordan, South Korea, and Romania, used instruments that have been validated for their population and found insufficient knowledge, as well as discriminatory actions and behaviors (13,14), and that it is not easy to identify, prevent, and fight age discrimination identified by different instruments.

In light of the above, the identification of actions and behaviors of nursing students by instruments that have been validated for a given country is of utmost importance, and the objective of the study was to perform the cross-cultural and psychometric validation of the Fraboni Scale of Ageism in Peruvian nursing students.

Methods

This is a quantitative methodological study that is part of the study entitled "Attitudes and perceptions of nursing students in Brazil and Peru", conducted with nursing students from four universities in Peru, including Universidad Peruana Unión, Universidad Nacional Federico Villarreal, Universidad Nacional de Trujillo, and Universidad Nacional de la Amazonia Peruana.

A total sample of 959 nursing students who met the following criteria participated in the study: aged 18 years or older, of both sexes, enrolled in the nursing course at their university, and with access to the Internet. The exclusion criteria were not attending the course during data collection, having health problems that prevented them from participating and failing to adequately fill out the instruments.

The validation process of an instrument corresponds to several pieces of evidence. In the first instance, an English-to-Spanish translation was carried out by three translators, who compared the versions and developed a Spanish version, which

was then forwarded backward translation from Spanish to English and compared with the English version.

Then, the content validation was carried out in order to determine the representativeness of the items included in the proposed instruments. Specialist judges in this field were consulted (15) which allowed them to effectively explore the requirements for measuring the phenomenon being researched. A committee of specialist judges in the field of gerontology was formed, consisting of eight specialists, selected for their professional experience and post-graduate studies in the field. An online meeting was held to discuss the instrument in order to carry out the modifications and develop the final version of the instrument (16).

Next, the content validity index (CVI) was used to analyze the judges' responses. This index allows the analysis of the instruments in their entirety, and each item individually, using a Likert-type scale ranging from 1 to 4. Its purpose was to measure the ratio of specialists who agreed with the content presented (16). The study met the minimum number of specialists recommended in the literature (17). In addition, values of at least 0.78 were considered for the validity of each item within the instruments, and of at least 0.90 for the validity of the instrument in its entirety (15).

For the validation based on the internal structure of the construct, the instrument was applied to nursing students, with the interviews lasting approximately 20 minutes and conducted by trained nurses. Data collection was carried out from February to August 2023 and the following instruments were used to collect data on the different study variables in a systematic and orderly manner:

Sociodemographic profile: This was a questionnaire designed ad hoc to obtain information on age (in years), gender (female, male, and others), marital status (single, married, living together, widowed, separated, and divorced), level of education (in years), paid work (yes and no), student's income (insoles), number of people living in the household (number), the people living in the household (description of the people), children (yes/no, how many), living with elderly people (yes/no), academic year (according to academic cycle/year), and religion.

The Fraboni Scale of Ageism (FSA)

It evaluates explicit age discrimination through cognitive and affective aspects of prejudice from three levels: antilocution, avoidance, and discrimination (18).

Antilocution occurs when a target group, in this case elderly people, is referred to in a derogatory way on the basis of inaccurate and/or misleading information. Avoidance, in turn, occurs when contact with the target group is restricted or limited. Discrimination, in turn, is the differential and often exclusive treatment of the target group.

The scale consists of 29 items and the response format is a four-point Likert-type with the following response categories: 1= strongly disagree, 2= disagree, 3= agree, and 4= strongly agree. The higher the scores, the greater the age discrimination towards the individual (18).

To examine the validity of evidence based on the internal structure of the construct, confirmatory factor analysis was used using the Weighted Least Squares Means and Variance adjusted (WLSMV) estimation method recommended for categorical items (19).

The underlying internal structure of the factorial models is evaluated using the chi-squared goodness-of-fit test ($\chi2$), which must yield a p-value greater than 0.05 to be considered a good fit, but as the literature illustrates, the $\chi2$ statistic usually has significant odds ratios of less than 0.05 when the sample is large, which is why it is recommended that robust fit indices such as the Comparative Fit Index (CFI), Tucker Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR) should be analyzed together.

A CFI and TLI ≥ 0.90 indicate adequate fit and good fit when they are ≥ 0.95, an RMSEA index≤ 0.08 indicates adequate fit and good fit when it is ≤ 0.05, likewise when SRMR is ≤ 0.08 means adequate fit and≤ 0.06 means good fit (20,21). Once the validity of the internal structure had been examined, invariance tests were carried out hierarchically by sex using multigroup confirmatory factor analysis (MG-CFA).

The first invariance model corresponds to the configural invariance which, if met, indicates the same factor structure of the instrument for both sexes. In the nested models with restrictions set at

each step, it was examined in the following order: metric invariance (means that the latent construct has the same meaning for both sexes), scalar invariance (the score on the items and the latent score of the instrument are equivalent for both sexes), and finally strict invariance (the items are measured with the same accuracy for both sexes). Invariance is met when the difference in fit indices is within the recommended cut-off values of ΔCFI < -0.01 and ΔRMSEA < 0.015 (22,23).

The confirmatory factor analysis (CFA) and MG-CFA were run with the R program version 4.3.1 and the RStudio 2023.06.2 environment with the Lavaan and semTools libraries. Reliability assessment for the FSA scores was estimated with internal consistency methods for categorical items such as ordinal alpha and omega, H coefficient for the latent construct, and hierarchical omega for the bifactor model (24).

The study was approved by the ethics committee of each university, namely the National University of Trujillo n° 001-2022-UNT-VIN-DIN-CIEI, Faculty of Medicine Hipólito Unanue of the Federico Villarreal National University n° 07-2022, National University of the Peruvian Amazon by the Institutional Ethics and Research Committee n° 060-CIEI-2022, and Peruvian Union University n° 2022-CR-FCS-UPeU-011.

Results

Regarding the instrument content validity to evaluate the FSA items, after the evaluation had been performed by the specialists, it was found that the 29 questions in the instrument all had a CVI applied to questions up to 0.93. In addition, the total CVI was 0.97.

Analysis of the internal structure of the FSA construct

Table 1 presents the evaluation of three models via confirmatory factor analysis. The first model (M1) corresponds to the original version consisting of 29 items; this model does not present an acceptable fit as the goodness of fit indices do not reach the minimum cut-off values suggested to support the validity of the model (CFI and TLI < 0.90, RMSEA and SRMR > 0.08).

The second model (M2) was re-specified by removing items with poor factor loadings (< 0.45), and items that, according to the modification indexes, suggested that they corresponded to another factor. In the antilocution dimension, three items were removed (4, 5, and 16), in discrimination, four items were removed (2, 8, 18, 23), and in avoidance, two items were removed (19 and 28).

As shown in Table 1, model two containing 20 items and retaining the three factors, presents acceptable fit indices (CFI and TLI > 0.90, RMSEA and SRMR < 0.08), however, the covariances between the factors were high, which could be due to the presence of a general factor (Figure 1). The third model (M3), assessed with the 20 items from M2, corresponds to the bi-factor model, which presented quite good fit indices (CFI and TLI ≥ 0.95, RMSEA > 0.07, and SRMR > 0.05), representing the best model to support validity based on the internal structure of the construct.

Table 1. Comparative factor model analysis with confirmatory factor analysis

	$\chi2$(*df*), p	CFI	TLI	RMSEA [90% CI]	SRMR
1	3376.974 (374), 0.000	0.839	0.825	0.092 [0.089, 0.094]	0.089
2	1036.682 (164), 0.000	0.944	0.935	0.075 [0.070, 0.079]	0.058
3	761.406 (150), 0.000	0.961	0.950	0.065 [0.061, 0.070]	0.048

M1 = original model consisting of 29 items, M2 = re-specified model, M3 = bi-factor model, $\chi2$ = Chi square, *df* = degree of freedom, CI = confidence interval

Figure 1 presents the factor structure of the FSA for the re-specified 20-item model. The model tested shows a structure configured by three dimensions as established by theory. It can also be seen in this figure that the factor loadings for the antilocution dimension are mostly adequate (≥ 0.44) while the factor loadings for the discrimination and avoidance dimensions range from good (> 0.50) to excellent (> 0.71). Individual parameters such as the global fit indices could support the validity evidence based on the internal structure of the construct for the re-specified 20-item model and with covariances in residuals, were it not for the bifactor model.
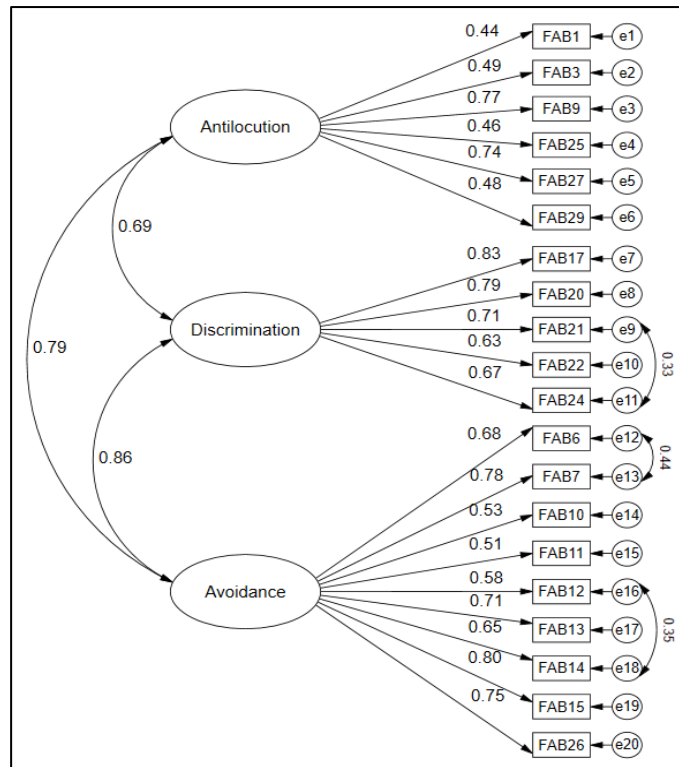
Figure 1. Multidimensional model of the Fraboni Scale of Ageism (M2)

Figure 2 shows the bifactor model for the internal structure of the FSA. This model establishes the existence of a general factor that contains all the items even when three dimensions are configured. As previously mentioned, the bifactor model is the one that presents the best-fit indices. Therefore, the validity based on the internal structure of the construct for the FSA scores corresponds to this model. The explained common variance (ECV= 0.74) and the percentage of uncontaminated correlations (PUC= 0.68) reaffirm the presence of a bifactor model and dismiss a false positive.
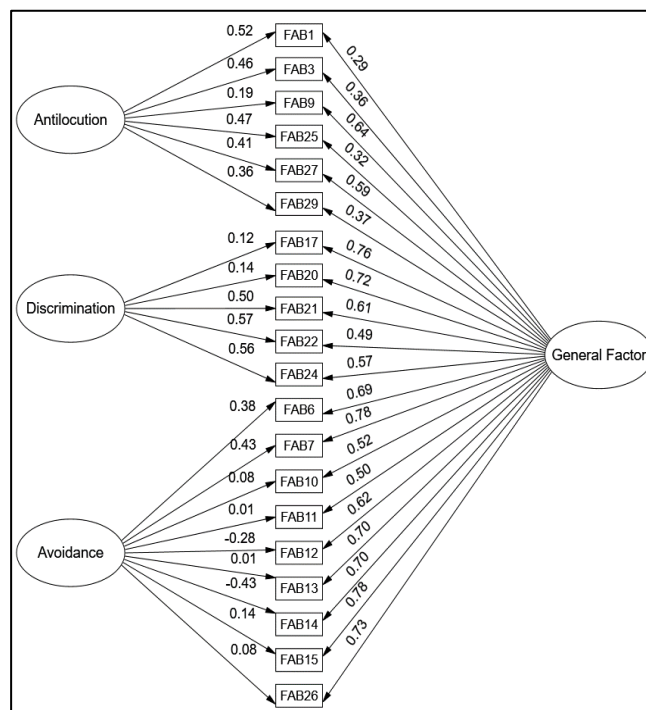

Figure 2. Bifactor model of the Fraboni Scale of Ageism (M3)

Measurement invariance of the Fraboni Scale of Ageism

Table 2 presents the results of the factorial invariance by sex for the FSA. The initial model corresponds to the configural variance (unrestricted) which presents CFI and RMSEA fit indices that show adequate fit, implying that there is a similar factorial structure for males and females.

Regarding the gradually restricted invariance models (metric, strong, and strict), all of them present adequate fit indices as the difference values are within the recommended thresholds (ΔCFI > -0.01 and ΔRMSEA< 0.015).

Table 2. Adjustment indices for measurement invariance by sex

	χ^2	df		I CFI	Δ CFI	RMSEA	Δ RMSEA
Configural	688.782	328	<0.001	0.924	-	0.048	-
Metric	612.829	345	<0.001	0.943	-0.019	0.040	0.008
Strong	645.967	362	<0.001	0.940	0.003	0.040	<0.001
Strict	652.383	382	<0.001	0.943	-0.003	0.038	0.002

χ^2= Chi-squared, *df* = degree level of freedom, p = probability of significance; CFI: Comparative Fit Index; RMSEA: Root Mean Square Error of Approximation, Δ = differences

Evidence of reliability of the Fraboni Scale of Ageism

As shown in Table 3 the reliability for the overall score of the multidimensional model of the FSA according to ordinal alpha and McDonald omega indicates high accuracy, while for the bifactor model, the hierarchical omega coefficient also indicates high reliability for the overall score.

In addition, the H coefficient shows that the reliability of the construct is of high accuracy. Finally, the reliability for the three factors varies between adequate ($\geq$ 75) and excellent ($\geq$ 0.85) according to the ordinal alpha and McDonald's omega coefficients.

Table 3. Reliability coefficients for the Fraboni Scale of Ageism

Domains	Items	$\alpha_{ordinal}$	ω	H	ωH
Antilocution	6	0.75	0.82	0.79	
Discrimination	5	0.85	0.89	0.86	
Avoidance	9	0.88	0.91	0.89	
General scale	20	0.92	0.93	0.95	0.88

Note: $\alpha_{ordinal}$= ordinal alpha, ω= McDonald's omega, H = H coefficient, ωH= hierarchical omega

Discussion

Ageism is often expressed through behaviors based on social and cultural beliefs that create a barrier to healthcare for elderly people (25), which can lead to further discrimination. Several authors have described that the actions and perceptions of healthcare professionals have an influence on elderly people receiving healthcare services (12,26).

In this setting, this study validated the psychometric properties of the FSA in nursing students. The cross-cultural adaptation of an instrument is imperative when it is applied across different cultural settings in order to reduce biases (27).

As a result of the confirmatory factor analyses, it was found that model three (bifactor) of the FSA with 20 items presented very good fit indices, being considered the best model for the validity of the construct's internal structure. In addition, all the restricted invariance models presented adequate fit indices. These results indicate that for men and women, the construct has the same meaning and that the scores obtained are equivalent and are measured with the same precision. On the other hand, the hierarchical omega for the bifactor model evidences a high reliability for the overall score which denotes a high measurement accuracy.

The number of retained items of the scale under study, consisting of 20 items, was significant and comparable to the Chinese version, which was validated in medical students and also removed 6 items from the original scale (1, 2, 8, 12, 22, and 29) (28); likewise, in the Turkish version of the FSA, four items (2, 8, 22 and 24) were removed from the

original scale, and the index of the split-half reliability coefficient indicated that the scale is highly reliable (29).

In a study conducted in China with 392 caregivers, the results showed that the number of items and the structure of the factors were somewhat different from previous validations with medical students. A total of 27 items remained in the validated instrument, with the removal of questions 16 and 22 (30), whereas the previous validations consisted of 22 items, with six questions being removed (29,31).

Another study in Turkey determined the psychometric properties and cut-off value for the FSA in a sample of healthcare professionals with a mean age of 37.96 ± 9.12 years, the reliability for the 29 items was a Cronbach's alpha of 0.72. No items were removed since they did not affect the total Cronbach's α value for the scale (31).

However, it is worth noting the contradictory or incongruent results presented by the authors since the exploratory factor analysis reported shows the factorization of three dimensions, but without the saturation of items within the factors of the instrument's original version, for instance, in the original version, factor three (avoidance) is composed of 11 items, however, the Turkish version only presents four items.

Furthermore, the same authors report that according to eigenvalues greater than 1, there are eight factors (when there should be only three), which is why their percentage of accumulated variance for three factors barely covers 30.225. Likewise, the reported CFI fit index (0.85) is evidence that the three-factor factorial model with 29 items lacks adequate fit (32).

The differences in reported models could be related to the language and culture of each country, with conditioning factors at the individual, interpersonal, and social levels (30). But also, the differences in the models reproduced for the internal structure of the FSA construct correspond to the different estimation methods used, such as the use of maximum likelihood in CFA (28,30) which is recommended for quantitative items, in addition to the excessive use of respecifications in the covariance of residuals.

Regarding the validation with caregivers, they are quite different from healthcare or university students in terms of age, level of education, work experience, and contact experience with the elderly. The fact that there are disparities in psychometric properties may be related to population differences between long-term caregivers and students.

Other findings related to the scale are that, from the results obtained, this instrument was well accepted by most participants, since it is easy to apply and requires less time to answer the questions.

The study has limitations; the validity evidence based on the construct's internal structure was satisfactorily verified, however, further validity evidence is needed, such as that related to other constructs (e. g. quality of life, depression, loneliness). Another limitation is related to the study sample, which only corresponds to nursing students; future validation studies should use samples of students from other professional fields, in addition to using random samples.

The knowledge gap covered by the validation of the present study is related to obtaining and interpreting an overall score for the FSA supported by the bi-factor model, as well as obtaining and interpreting scores for each of its three dimensions supported by the multidimensional model. Likewise, a key strength of the present study is the use of state-of-the-art psychometric theory and methodology, which factors in the ordinal scaling nature of the items, the relevant factor estimation matrix (polychoric correlation matrix rather than Pearson's correlation matrix), as well as robust estimation methods, measurement bias analysis (invariance), among others. Another equally important contribution is the adaptation of the original version of the FSA that has met the technical and methodological criteria in the translation of the instrument into Spanish, which will be of interest for research and professional use in the Latin American context.

Conclusion

The FSA adapted to the Peruvian version with 20 items showed acceptable validity and reliability in its three dimensions in nursing students, having solid value to assess age discrimination of people in the aging process.

In addition, the scale can provide valuable information to those responsible for the creation and application of health policies for the care of elderly people. This study will contribute to improving the age discrimination scenario, thus improving the training of new nursing professionals and the quality of care for elderly people.

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