



Original

**Psychometric Properties of the Family Assessment Scale
for Older Adults in Ecuador**

**Propiedades psicométricas de la escala de evaluación
familiar para adultos mayores en Ecuador**

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Abstract

Introduction: Family functioning is a key predictor of individual well-being. Aging and its limitations can disrupt family dynamics, affecting overall functioning.

Objective: Evaluate the psychometric properties of the Family Assessment Scale (APGAR) in Ecuadorian older adults.

Methodology: The APGAR-family scale was administered to assess internal consistency and reliability. Confirmatory factor analysis (CFA) using a diagonally weighted least squares estimator examined the factor structure. Model fit was evaluated through multiple indices, including chi-square, root mean square error of approximation, standardized root mean square residual, Tucker-Lewis index, and comparative fit index.

Results: A total of 1,208 participants completed the APGAR. The scale demonstrated excellent internal consistency and reliability. CFA confirmed a one-dimensional structure with significant item loadings and adequate fit indices.

Conclusion: The APGAR scale is a reliable and valid tool for assessing family functioning in Ecuadorian older adults, with potential applications in clinical and social contexts.

Keywords: older adults; APGAR; psychometrics; mental health; family.

Resumen

Introducción: el funcionamiento familiar es un factor clave en el bienestar individual. El envejecimiento y sus limitaciones pueden alterar la dinámica familiar y afectar su funcionamiento.

Objetivo: evaluar las propiedades psicométricas de la Escala de Evaluación Familiar (APGAR) en adultos mayores ecuatorianos.

Metodología: se aplicó la escala APGAR para evaluar su consistencia interna y confiabilidad. Se realizó un análisis factorial confirmatorio (AFC) con un estimador de mínimos cuadrados ponderados diagonalmente para examinar su estructura factorial. El ajuste del modelo se evaluó mediante varios índices, incluidos chi-cuadrado, error cuadrático medio de aproximación, residuo cuadrático medio estandarizado, índice Tucker-Lewis e índice de ajuste comparativo.

Resultados: un total de 1,208 participantes completaron la escala. Se demostró una excelente confiabilidad y consistencia interna. El AFC confirmó una estructura unidimensional con cargas significativas y adecuados índices de ajuste.

Conclusión: la escala APGAR es una herramienta válida y confiable para evaluar el funcionamiento familiar en adultos mayores ecuatorianos, con aplicaciones clínicas y sociales.

Palabras clave: adulto mayor; APGAR; psicometría; salud mental; familia



Introduction

Family functionality (FF) is a key determinant of well-being and quality of life, particularly in senior citizens (SC). ^(1,2) With increasing global life expectancy, ⁽³⁾ understanding family dynamics is essential to designing effective health interventions for this population. ⁽⁴⁾

As SC experience a gradual decline in functional capacities and autonomy, families play a central role in their care. This dynamic necessitates exploring older adults' (OA) satisfaction with family support, as differing expectations can lead to conflicts. ^(5,6) Tools like the Family Assessment Scale (APGAR) promote understanding of the family environment by fostering communication and assessing the fulfillment of roles crucial to the health-disease process. ^(7,9)

The APGAR-family scale, developed by Smilkstein in 1978, ⁽¹⁰⁾ measures five dimensions of FF—adaptability, partnership, growth, affect, and resolve—and has demonstrated reliability indices ranging from 0.71 to 0.83 across diverse populations. ⁽¹¹⁻¹³⁾ Its ease of use and brevity have made it a popular choice, but its psychometric performance in Ecuadorian older adults has been underexplored, limiting its adoption by mental health professionals and students.

While studies in Latin America, including Colombia ⁽¹⁴⁾ and Peru, ⁽¹⁵⁾ highlight the scale's strengths, its validation remains limited in Ecuador, where family dynamics profoundly impact SC's health and satisfaction. Furthermore, existing research has focused primarily on the instrument's factor structure, overlooking broader aspects of construct validity and its associations with related measures. ⁽¹⁶⁻¹⁸⁾

This study aims to fill this gap by evaluating the psychometric properties of the APGAR-family scale in an Ecuadorian sample of SC. The results will provide valuable insights for future research and contribute to the development of socio-family interventions to enhance family relationships. This research focuses on Cuenca, Ecuador, a region whose cultural and socioeconomic context shapes family dynamics and influences FF perception.

Method

Participants

The sample was composed of 1,208 Ecuadorian older adults (OA) from the city of Cuenca, Ecuador, aged between 65 and 103 years (mean age = 74.1, SD = 8.94). It included 463 male and 745 female participants. All participants self-reported not having been diagnosed with a



mental disorder, and no additional inclusion criteria were applied. Participants were recruited and included in the study between June 1 and August 30, 2024. A non-probability convenience sampling method was employed, based on the accessibility and willingness of older adults residing in Cuenca to participate in the study.

Instruments

The APGAR is a 5-item scale that assesses the user's perception of their satisfaction with family support, analysing basic functions such as adaptation, participation, gradient of resources, affection and problem-solving capacity, present in all families according to their structure, development, integration or demographics. The response options of the items of the scale determine degrees of frequency of certain dynamics, these are: "never", indicating that the evaluated aspect never occurred in the family; "almost never", indicating that it happened very rarely; "sometimes", indicating that it happened on some occasion; "almost always", indicating that it occurred frequently and "always", indicating that the evaluated aspect always occurred in the family. Each question is scored using a Lickert scale on values of 0-2, where answers such as "never" and "almost never", receive 0 points; "sometimes" they receive 1 point; "almost always" and "always" receive 2 points, obtaining a quantitative index of 0 - 10 at the end. Three cut-off point scales are considered: a) normal function (7-10 points), b) moderate dysfunction (4-6 points), and c) severe dysfunction (0-3 points).

An *ad hoc* survey was applied with sociodemographic variables (age, marital status, educational level, ethnic self-perception, economic income in the last month, way of obtaining income and socioeconomic level).

Procedure

Researchers visited 1009 homes in Cuenca, providing a brief description of the study objectives, procedures, confidentiality measures, and the voluntary nature of participation. Participants signed informed consent to confirm their understanding and willingness to participate.

The questionnaire was administered at home, allowing participants to complete it at their convenience. No identifiable information (e.g., names) was collected to ensure privacy. Responses were securely stored in an encrypted database accessible only to the principal investigator, adhering to data protection regulations.

Analyses

Psychometric properties of the APGAR-family scale were assessed in three stages. Internal consistency was evaluated to determine the reliability of the items and the overall scale, with reliability benchmarks interpreted as follows: $\geq .70$ acceptable, $\geq .80$ good, and $\geq .90$ excellent.



The factor structure was examined using confirmatory factor analysis (CFA) with the diagonally weighted least squares (DWLS) estimator, appropriate for ordinal data. Model fit was evaluated using several indices: chi-square (X^2), root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), Tucker-Lewis index (TLI), and comparative fit index (CFI). Additionally, factor loadings and correlations between latent factors were analyzed to confirm the model's suitability. Items with factor loadings ≥ 0.50 were retained, indicating strong contributions to their respective factors.

Ethical considerations

This study was conducted in full compliance with the provisions of the Declaration of Helsinki (1964) and the provisions of the General Health Law on research. It was submitted to the Research Ethics Committee of the Catholic University of Cuenca, Ecuador and approved with the code: CEISH-UCACUE-18102022. The confidentiality of the information was protected with informed consent were used. All authors agree to be mentioned in the article.

Results

Sociodemographic variables

The results show the dataset of 1208 participants. Most were women ($n = 745$; 62 %). 51 % of the subjects were married or in a common-law union ($n = 613$) and 30 % were widowed ($n = 368$). 39 % had attained primary education. Most participants self-identified as mestizos (97 %, $n = 1,167$). The income obtained from the last month came from family support ($n = 466$) or from retirement or pension ($n = 452$). Finally, 71 % belonged to the middle socioeconomic stratum ($n = 853$).



Table 1. Descriptive of the sociodemographic variables

Sociodemographic variables	n	%
Gender		
Man	463	38
Woman	745	62
Marital status		
Single	87	7.2
Married – Free union	613	51
Separated – Divorced	140	12
Widower	368	30
Education		
Primary	469	39
High school	409	34
Technical or higher	160	13
Superior	5	0.4
None	165	14
Ethnicity		
White	18	1.5
Mixed	1,167	97
Indigenous	21	1.7
African american	2	0.2
Income on the last month		
No	345	29
Yes	863	71
Means of economic income		
Retirement / pension	452	37
Family support	466	39
Rent / basic income	113	9.4
Subsidies	68	5.6
Formal employment	39	3.2
Informal employment	70	5.8
Socioeconomic level		
High	143	12
Low	212	18
Medium	853	71

Source: own elaboration

Internal consistency

The results of the internal consistency analyses (table 2) showed excellent reliability for the scale-independent items (item F1 $M = 3.81$ and $SD = 0.953$ / $\omega = 0.948$ / Correlation with

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the other items 0.841; item F2 M = 3.85 and SD = 0.954 / Correlation with the other items = 0.894 / ω = 0.939; item F3 M = 3.83 and SD = 0.949 / Correlation with the rest of the items = 0.877 / ω = 0.942; item F4 M = 3.79 and SD = 0.946 / Correlation with the rest of the items = 0.862 / ω = 0.945; item F5 M = 3.83 and SD = 0.947 / Correlation with the other items = 0.881 / ω = 0.941) M = 3.81 and SD = 0.953. The α Cronbach coefficients obtained were quite similar to those obtained from ω in all cases (Cronbach's α F1 = 0.948; Cronbach's α F2 = 0.939; Cronbach's α F3 = 0.942; Cronbach's α F4 = 0.944; Cronbach's α F5 = 0.941). The total score of the scale also had a mean of 3.82 and a standard deviation of 0.872 (Cronbach's alpha and McDonald's ω 0.954), demonstrating an excellent overall reliability of the scale. These results indicate that the APGAR-family scale is a highly consistent and reliable tool to measure family satisfaction in Ecuadorian older adults.

Table 2. Global and item reliability of APGAR in Ecuadorian older adults

Items	Mean	SD	Correlation of the elements with others	α	ω
F1. I am satisfied with the help I receive from my family when I have a problem and/or need.	3.81	0.953	0.841	0.948	0.948
F2. I am satisfied with how we talk and share our feelings in my family.	3.85	0.954	0.894	0.939	0.939
F3. I am satisfied with how my family accepts and supports my wishes to start new activities.	3.83	0.949	0.877	0.942	0.942
F4. I am satisfied with how my family spends our time together, the places we share and our money.	3.79	0.946	0.862	0.944	0.945
F5. I am satisfied with how my family expresses affection and responds to my feelings.	3.83	0.947	0.881	0.941	0.941
Score	3.82	0.872		0.954	0.954

Source: own elaboration

Note: F1 measures satisfaction with family help, F2 with problem solving, F3 with acceptance of changes, F4 with expression of affection, and F5 with time shared with family.

Factor structure

Figure 1 shows model 1 of the APGAR-family, showing the relationships between the global construct and its five items. The standardized factor loads were high: F1 (0.87), F2 (0.92), F3 (0.91), F4 (0.89) and F5 (0.90), indicating strong relationships between the construct and each independent item. Measurement errors were low, which reinforces the reliability of the model. Overall, these results suggest that the APGAR-family items are strongly related to the general construct of family satisfaction in Ecuadorian older adults, confirming the validity and reliability of the model.



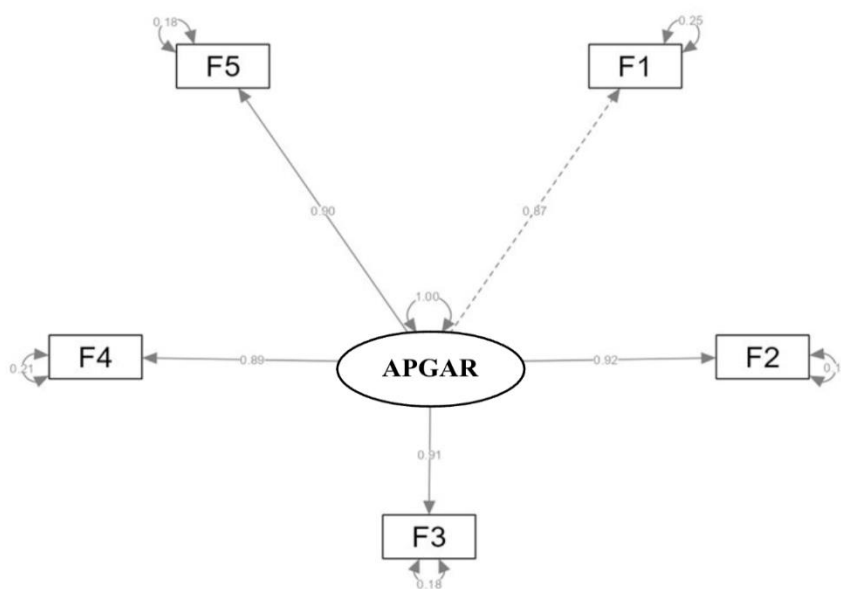


Figure 1. APGAR global model

Source: own elaboration

Note: standardized factor loads between 0.87 and 0.90

To contrast the hypothesis with the relationship between indicators and latent dimensions, confirmatory factor analysis was performed. The analysis of the internal structure of the instrument verified that the APGAR-family evaluates the construct for which it was designed.

The second model (figure 2) of APGAR-family invariance according to gender, analyzed the behavior of various adjustment indices. All factor loads were above 0.5. The Comparative Fit Index (CFI) showed a value greater than 0.95 (0.985), suggesting that the model fits the sample. The Tucker-Lewis Index (TLI) was 0.970, exceeding the recommended cut-off of 0.90, and the Bentler-Bonett Non-Normalized Fit Index (NNFI) showed excellent value of 0.970. The relative non-centrality index (RNI) and the normalized Bentler-Bonett fit index (NFI) presented values of 0.985 and 0.984, respectively, which reinforces the adequacy of the model. The Bollen Relative Fit Index (RFI) had a value of 0.967 and the Bollen Incremental Fit Index (IFI) showed a value of 0.985, both indicating a strong fit. The standardized mean square residual (SRMR) was 0.013, indicating minimal discrepancies between the model and the observed data.

Finally, the large sample size allowed the determination of the mean square error of

approximation (RMSEA) which had a value of 0.064, which suggests a reasonably good fit suggesting a good equality between the model observed in the covariance matrix and the covariance matrix of the implicit model. Taken together, these indices showed that Model 2 of APGAR-familial invariance according to gender was well aligned with the data, confirming the validity of the model for both genders.

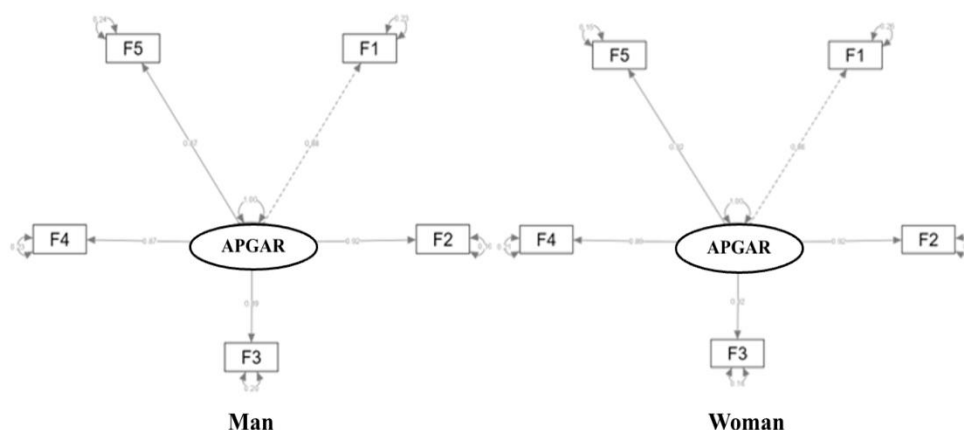


Figure 2. Invariance by sex

Source: own elaboration

Note: Gender factor analysis model for the APGAR scale. (man α and ω_1 (0.948), AVE (0.786) and woman α and ω_1 (0.957), AVE (0.816).

Discussion

The APGAR-family is one of the most widely used scales to measure the perception of family functioning due to its easy applicability, easy understanding, limited time of application and psychometric properties. However, their psychometric performance in Ecuadorian OA has been undervalued, which limits their preference in mental health professionals.

The present study aimed to evaluate the psychometric properties of APGAR-family in a sample of Ecuadorian OAs, providing evidence for its use in Spanish-speaking contexts and, specifically, in Ecuador, where family functioning represents a significant social and public health problem. The results obtained support the use of the questionnaire in this population, both in terms of internal consistency and construct validity.

First, the internal consistency analyses showed that the APGAR items, as well as the overall score, have excellent reliability. This finding is consistent with previous studies conducted in different languages and cultural contexts, such as American English ($\alpha = 0.86$),⁽¹⁷⁾ Spanish in Peru ($\alpha = 0.72$),^(15, 19) and Portuguese in Brazil ($\alpha = 0.73-0.78$)⁽²⁰⁾ and Portugal ($\alpha = 0.86$),

⁽²¹⁾ where only some report results of exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to account for construct validity. ⁽²²⁾

A study conducted in Brazil showed acceptable reliability results according to Cronbach's α , and both the alpha score on the total scale ($\alpha = 0.80$) and the correlation coefficient were similar to those of the instrument in its original version. On the other hand, the individual behavior of the items showed little variation (α from 0.73 to 0.78) in their internal consistency. ⁽²⁰⁾

Other researchers found similar results, in different populations and sociocultural/geographical contexts, for example, Bellon et al., applied the APGAR-family to 656 people over 60 years of age from a Spanish health center and found intraclass correlation coefficients of the 5 items greater than 0.55. ⁽¹⁷⁾ There were no differences in the results of the self-assesses ($\alpha = 0.86$) or with the participation of a companion ($\alpha = 0.81$). The item-scale correlation ranged from 0.61 to 0.71. Cronbach's α was 0.84 and no item increased alpha when taken off the scale. Factor analysis separated a single factor.

The factor structure may vary, also if the participants have little knowledge about the construct that evaluates the instrument. ⁽²³⁾ In this sense, a population of Colombian adolescents who are high school students between 13 and 17 years old (mean, 16.0 ± 0.8); mostly women, 60.3% had a PCA estimate of the statistics χ^2 ($\chi^2 = 9.11$; $df = 5$; $p = 0.105$), RMSEA 0.024 (90 % CI, 0.000-0.048), CFI = 0.998, TLI = 0.996 and SMSR = 0.009 with favorable results. The internal consistency of the dimension was calculated with Cronbach's α and McDonald's ω coefficients with results of 0.819 and 0.820 respectively, confirming the one-dimensional structure of the APGAR-family scale in high school students in Colombia and the validity and reliability for the measurement of family function in this population group. ⁽²⁴⁾

The results of the confirmatory analyses supported the original two-factor correlated model, despite a poor fit indicated by the chi-square statistic. However, other adjustment indices, such as RMSEA, SRMR, TFI, and TLI, suggested that the model is adequate. These results are consistent with previous studies with dental patients where a dataset of 227 Colombian dental patients between 22 and 94 years of age was analyzed, finding an internal consistency and construct validity, using exploratory (AFE) and confirmatory (AFC) factor analyses with acceptable values. The overall mean of the family APGAR was 17.07 ± 3.15 and the prevalence of family dysfunction was 44.4 % (95 % CI: 38 – 51 %). The internal consistency was 0.90. The EFA reported a single factor that explained 64.1 % of the total variance. The TFA showed adjustment indices $\chi^2 = 702.960$; $df = 10$, $p\text{-value} = 0.001$ RCEMA = 0.155 (90 %CI: 0.107-0.209); AQI = 0.961, ITL= 0.922. ⁽²⁵⁾



Studies in the general population ^(26, 27) and caregivers showed indicators of Cronbach's $\alpha > 0.87$ and intraclass correlation coefficient > 0.69 , which also underscore the validity of the dimensions of perception of family functioning as related constructs. The high factor loads of the items reinforce the stability of the model in these populations.

The results of this study are also consistent with the results of this study by Mayorga-Muñoz et al., in a Chilean multiethnic sample in which a Cronbach's alpha of 0.992 was obtained for the five-item scale. The confirmatory factor analysis determined a unifactorial model, whose goodness-of-fit indices were satisfactory (WLS-ANOVA- $\chi^2 = 20.097$; $p < 0.01$), CFI = 0.997, TLI = 0.995 and RMSE = 0.079) with 90 % confidence intervals: 0.049-0.091). ⁽⁵⁾

Despite favorable assessments regarding the content validity of the APGAR-family, authors such as Gómez et al. have concluded that the interpretation of the instrument's scores is not congruent with the content of the construct it assesses. ⁽¹⁸⁾ In addition, Valencia-Vargas, et al., referred to it in similar terms when listing several negative aspects of the scale. According to these authors, the range of the values of the items that make up the instrument is low, and the qualification of the scoring strata cannot be made based on the content of the instrument, recommending that it be done based on percentiles. ⁽¹⁴⁾ Gardner et al., on the other hand, questioned the psychometric properties of the APGAR-family and found little correlation between baseline and follow-up scores, as well as discrepancies between test scores and medical assessments of families. ⁽²⁸⁾

Conclusions

This study has important practical implications for the prevention of family malfunction in Ecuador. The validation of APGAR-family in this population allows its application in social and clinical settings, where it could be used to identify families at risk and design preventive interventions. In addition, the focus on protective factors highlights the importance of promoting positive psychological resources as part of prevention efforts. This approach complements traditional strategies focused solely on risk identification, offering a more comprehensive perspective to address the complexity of family functioning where seniors live.

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Conflict of interest disclosure

The authors declare no conflict of interest.

Author contributions

José Alejandro Valdevila Figueira: Conceptualization of the study, methodological design, supervision of the research process, acquisition of funding, critical revision of the manuscript, and correspondence with the journal during the submission and revision process.

Andrés Ramírez Coronel: Statistical analysis, interpretation of results, and drafting of the methods and results sections.

Vanessa Quito-Calle: Literature review, data collection, and initial drafting of the manuscript.

Pedro Andrés Muñoz-Arteaga: Data processing, preparation of tables and figures, and

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verification of references.

María Lorena Cañizares-Jarrin: Validation of the questionnaire design, final editing of the manuscript, and coordination among authors.

Indira Dayana Carvajal Parra: Critical content review, drafting of the discussion section, and ensuring compliance with the journal's editorial guidelines.

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The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

