

■ Generalized Anxiety Disorder-7 (GAD-7): Validation of an Illustrated Version in a Sample of Peruvian Children

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Abstract

This study investigates the validity of an illustrated version of the Generalized Anxiety Disorder 7-item (GAD-7) for children in Peru. The sample included 584 participants aged between 8 and 12 years ($M = 10.34$, $SD = 1.26$). Confirmatory Factor Analysis (CFA) techniques and reliability measures were applied, revealing a strong one-dimensional structure with correlated errors in the GAD1 and GAD2 items. Internal consistency was high ($\omega > .80$). An innovative resampling approach was used to verify the robustness of the results, finding stability in the one thousand replications performed. In addition, the relationship of the illustrated GAD-7 with parental separation anxiety was examined, showing moderate differences in scores and invariance according to sex and age. The study highlights the need for an anxiety test in children, given its potential persistence into adulthood. The results support the validity and reliability of the illustrated GAD-7, making it a useful tool for professionals and for addressing anxiety in school settings, especially post-pandemic. However, the study acknowledges limitations in its sampling and suggests future research to examine the relationship of the illustrated GAD-7 with other variables such as depression and self-esteem.

Keywords: child anxiety, psychological assessment, GAD-7 validation, psychological testing in education, psychometric properties

Resumen

Trastorno de Ansiedad Generalizada-7 (GAD-7): Validación de una versión ilustrada en una muestra de niños peruanos Este estudio investiga la validez de una versión ilustrada del Trastorno de Ansiedad Generalizada de siete ítems (GAD-7) para niños en Perú. La muestra incluyó a 584 participantes con edades entre 8 y 12 años ($M = 10.34$, $DT = 1.26$). Se aplicaron técnicas de Análisis Factorial Confirmatorio (AFC) y medidas de fiabilidad, revelando una estructura unidimensional sólida con errores correlacionados en los ítems GAD1 y GAD2. La consistencia interna fue alta ($\omega > .80$). Se utilizó un enfoque innovador de remuestreo para verificar la robustez de los resultados, encontrando estabilidad en las mil replicaciones realizadas. Además, se examinó la relación del GAD-7 ilustrado con la ansiedad por separación parental, mostrando diferencias moderadas en las puntuaciones e invarianza de acuerdo con el sexo y la edad. El estudio destaca la necesidad de una prueba de ansiedad en niños, dado su potencial persistencia en la adultez. Los resultados apoyan la validez y fiabilidad del GAD-7 ilustrado, haciéndolo una herramienta útil para los profesionales y para abordar la ansiedad en entornos escolares, especialmente post-pandemia. Sin embargo, el estudio reconoce limitaciones en su muestreo y sugiere futuras investigaciones para examinar la relación del GAD-7 ilustrado con otras variables como la depresión y la autoestima.

Palabras clave: ansiedad infantil, evaluación psicológica, validación del GAD-7, propiedades psicométricas, tests psicológicos en educación

Anxiety disorders may emerge throughout infancy and last throughout an individual's whole life, impacting around 6.5% of children worldwide (Polanczyk et al., 2015; Solmi et al., 2022). The education, socialization, and health of children are greatly affected by these problems (Asselmann et al., 2018; Creswell et al., 2022; Swan &

Kendall, 2016). The COVID-19 pandemic has worsened these problems, causing the incidence of anxiety symptoms to triple and impact around 20% of the population (Meherali et al., 2021). The increase in childhood anxiety is associated with controlling family dynamics and difficult home situations. If left untreated, this may reduce the

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quality of life and raise the likelihood of developing various mental illnesses in adulthood (Green et al., 2023; Reardon et al., 2022). In schools, anxious children may view situations as overly threatening, leading to struggles with various anxiety types, reluctance to attend classes, and poorer academic and social outcomes, potentially culminating in suicidal ideation (Bernstein & Garfinkel, 1992; Comer et al., 2019; Fernández-Sogorb et al., 2021; González et al., 2020; Kurdi & Archambault, 2018; Miers et al., 2020; Wang et al., 2017).

The early screening of anxiety signs in childhood holds significant clinical relevance, particularly due to its association with harmful behavior patterns (Pérez-Pascual & Sánchez-Mascaraque, 2022), and the prevalence rate of anxious symptoms falls between 10% and 20%, surpassing that observed in cases of depression (Espa, 2020). Consequently, anxiety symptoms in childhood serve as a risk factor in the adaptation process, resulting in negative consequences for mental health and an individual's quality of life (Lisøy et al., 2022). In this regard, to optimize the early detection of anxiety disorders, organizations such as the U.S. Preventive Services Task Force (Consolie et al., 1970), the American Academy of Pediatrics (AAP, 2021), and the World Health Organization (OPS; Organización Panamericana de la Salud, 2018) have suggested the need to identify and treat anxiety in primary care. However, it is estimated that nearly 80% of children and adolescents with anxiety disorders receive no form of treatment (Martinelli et al., 2018).

In fact, recent studies indicate that there are differences in anxiety levels according to sex and age in children and preadolescents, highlighting the importance of having fair psychological tests in their assessment. For example, preadolescent girls show more psychological distress and poorer sleep quality, indicators of anxiety, compared to boys (Jamieson et al., 2023). Additionally, a Spanish study found that social and dental anxiety is more frequent in girls (Canals et al., 2019; Katanec et al., 2018). These variations between boys and girls demonstrate the need for invariant instruments according to sex (Faro et al., 2021; Jelínek et al., 2021). On the other hand, differences in anxiety levels according to age have also been documented. Thus, preadolescents show more social anxiety symptoms compared to younger children, who present more pronounced generalized anxiety (Varela et al., 2020). Similarly, younger children tend to have more fear of first-time dental visits than those with previous experiences (Santos et al., 2019). These age-related differences in anxiety underscore the importance of reviewing the invariance of an anxiety instrument, as has been done in previous studies (González et al., 2019; Ornelas et al., 2021).

The Generalized Anxiety Disorder 7-item (GAD-7) is the most widely used instrument for evaluating the detection of generalized anxiety symptoms (Serván et al., 2020). There exists a shorter version of the questionnaire, the GAD-2, which specifically focuses on two aspects: affective and cognitive aspects of anxiety manifestation (Byrd-Bredbenner et al., 2021). Regarding early detection, only the GAD-7 can comprehensively and accurately assess the frequency and degree of distress caused by generalized anxiety and symptoms experienced over the past two weeks (Franco-jimenez et al., 2022). There are instruments that also assess anxiety, such as the State-Trait Anxiety Inventory (STAI; Spielberger, 1983), Beck Anxiety Inventory (BAI; Beck et al., 1988), and Hospital Anxiety and Depression Scale-Anxiety (HADS-A; Zigmond & Snaith, 1983); however, these instruments are considered time-consuming and present significant difficulties when used by non-specialists (Christodoulaki et al., 2022; Gilbody et al., 2002). In contrast, the GAD-7 stands out for its easy accessibility and reduced number of items, making it an especially useful tool for researchers and clinicians who need a quick and economical assessment of anxiety symptoms (Crockett et al., 2022).

Similarly, the validity of the GAD-7 in relation to depression has been confirmed, but its applicability in the child population has not been explored yet. However, research has been conducted in nearby populations. For instance, a study with adolescents in Chile (Crockett et al., 2022) demonstrated a positive and significant relationship with the measure of depressive symptoms ($r = .78$). Furthermore, studies conducted with adults in Peru (Osorio-Martínez et al., 2022) and the United States (Byrd-Bredbenner et al., 2021) have shown a high positive correlation ($r = .72$ and $.77$, respectively).

Despite limited research on the GAD-7's psychometric properties in children, studies from various countries have confirmed its reliability and structural integrity. Consistent alpha values include $.86$ in Chile (Crockett et al., 2022), $.93$ in China (Sun et al., 2021), $.91$ in Finland (Tiirikainen et al., 2019), and $.93$ in the United States (Yalin et al., 2018). Notably, a large-scale study in China involving over 67,000 preadolescents supported its one-dimensional structure, although some fit concerns exist (Tiirikainen et al., 2019). In the United States, research using Exploratory Factor Analysis confirmed the one-dimensional structure despite using the criticized Kaiser rule and Varimax rotation (Booth & Murray, 2018; Yalin et al., 2018). In Latin America, a Chilean study using Confirmatory Factor Analysis showed excellent fit indices (Crockett et al., 2022). These findings underscore the GAD-7's utility across different age groups and cultural contexts but also highlight the scarcity of studies specifically validating it for children (Gong et al., 2021; Mossman et al., 2018).

Another novelty of this study is that it is an illustrated test. In fact, specialized literature emphasizes the importance of incorporating illustrations in child assessments because the pictorial format stimulates their interest, captures the attention of children, and enhances their participation (Ernst et al., 1994; Valla et al., 2000). Additionally, research has shown that children older than 4 years can identify and differentiate between different emotions (Eisenberg et al., 1997). Therefore, using images representing children to assess anxiety is effective and appropriate for their development (Dubi & Schneider, 2009). The article outlines four benefits of using illustrated tests for children: Improved readability by reducing language barriers, increased interest through engaging visuals, enhanced reliability by minimizing interpretation variability, and better external validity with images that reflect real-life situations, thereby improving behavioral predictions.

In this context, the aim of the study is to validate an illustrated version of the Generalized Anxiety Disorder 7-item (GAD-7) for children in Peru by examining its internal structure, reliability, invariance according to sex and age, and validity in relation to parental separation anxiety. The goal is to enhance the detection and understanding of childhood anxiety in educational settings, especially in a post-pandemic context. Based on the literature, the following hypotheses can be derived: (a) The illustrated version of the GAD-7, developed specifically for children in Peru, will exhibit a strong unidimensional structure; (b) its association with parental separation anxiety will be of the expected magnitude and direction; (c) it will have reliability with an omega coefficient above 0.70; and (d) it will demonstrate invariance according to sex and age.

Method

Participants

A total of 584 children from the Lima Metropolitan area participated in this study. The study encompassed a diverse group of 8 to 12-year-olds ($M = 10.34$, $SD = 1.26$), with a slight majority of girls

(55.50%) over boys (44.50%). The distribution of participants across school grades was as follows: 17.8% were in 3rd grade, 24.5% in 4th grade, 19.7% in 5th grade, and 38.0% in 6th grade. Regarding their place of birth, 75.7% of the children were born in Lima, while 24.3% were born outside of Lima. Additionally, 26.9% of the children reported feeling anxious when their parents leave the house, indicating a notable level of separation anxiety among the participants. The children came from various districts within the Lima Metropolitan area, with the following distribution: 28.8% from Callao, 10.8% from Jesús María, 12.3% from Magdalena, 6.34% from San Miguel, 1.71% from San Juan de Lurigancho (SJL), 27.9% from San Juan de Miraflores (SJM), 5.31% from San Martín de Porres (SMP), and 6.85% from Surco.

The sample size was estimated using the 'semPower' package (Moshagen & Erdfelder, 2016), with a priori setting of 14 degrees of freedom [$k(k-3)/2$]; RMSEA = .05; power of .80, and alpha of .05, suggesting a minimum size of 526 participants. Therefore, the minimum required sample size was achieved for this study. The sampling process used in this research was non-probabilistic convenience sampling (Maxwell, 2012). This choice was primarily due to difficulties in accessing schools to collect information, stemming from the COVID-19 pandemic.

Instruments

Sociodemographic Questionnaire. A questionnaire was developed for the study, inquiring about age, gender, grade in school, and whether they experienced fear when their father or mother left home.

Generalized Anxiety Disorder-7 (GAD-7; Spitzer et al., 2006). This tool includes just seven straightforward questions, scored from 0, meaning 'not at all,' to 3, 'nearly every day.' It's designed to give us a snapshot of the anxiety symptoms experienced in the past two weeks. Higher scores indicate more anxiety. The GAD-7 is reliable (Cronbach $\alpha = .92$) and aligns well with other anxiety measures like the Beck Anxiety Inventory ($r = .72$) and the Symptom Checklist-90's anxiety subscale ($r = .74$). Its items also match well with the Patient Health Questionnaire, capturing 63% of the total variance, affirming its accuracy in measuring anxiety.

Procedure

Before starting the study, we complied with the ethical standards of the Declaration of Helsinki (World Medical Association, 1964) and obtained approval from the Research Ethics Committee at Universidad Privada del Norte (UPN) in Peru, under resolution N° 0018-2023 and informed consent was obtained from all participants.

The authors conducted an extensive literature on psychometric assessments using images in child psychology (Dubí & Schneider, 2009; Harter & Pike, 1984; Ruocco et al., 2018; Tietjens et al., 2018) to inform our test adaptation. Two child psychology experts contributed to the image creation process to ensure alignment with the GAD-7 scale. They also suggested changes in the wording of the items to better suit the language and context of the study population. A professional illustrator was then engaged, following guidelines to produce gender-neutral images that aid in measuring response frequencies (Mackiewicz & Ciecuch, 2016), incorporating approaches from previous stress assessment studies (Bustos et al., 2009; White, 2014).

Initially, a pilot study was conducted with ten children to check the comprehension and clarity of the illustrations. Following this, the GAD-7 was administered in the classroom, coordinated with school authorities who managed the necessary permissions through informed consent provided by the researchers. This consent specified

the research objective, guaranteed the confidentiality of the information, and emphasized the voluntary nature of participation. The GAD-7 was administered by four trained research assistants to ensure consistency and minimize bias, as well as to handle any unforeseen situations since it was conducted in groups. The study took place from October to December 2023, with each session lasting approximately 15 minutes to administer the test. Participants' responses were recorded in a database for later analysis. Finally, the collected data has been archived in the open repository OSF: <https://osf.io/we5ty>

Data Analysis

Data analysis was conducted using the R programming language within the RStudio environment (RStudio Team, 2023). Specifically, the 'lavaan' package (version 0.6-18; Rosseel, 2012) was used for confirmatory factor analysis, and visualizations were created using the 'semPlot' package (version 1.1.6; Epskamp, 2022). The 'PsychMetricTools' package (version 1.0.0; Ventura-León, 2024) was utilized for performing CFA resampling and invariance testing in a more user-friendly manner. The 'semTools' package (version 0.5-6.941; Jorgensen et al., 2024) was used to conduct different levels of invariance.

Due to the ordinal nature of the variables, response rates were preferably reported using a bar graph. This was done specifically to examine the presence of low response rates in categories, i.e., values below 10%, which could indicate potential estimation issues (Linacre, 2002).

The chosen factor analysis was confirmatory because there is ample literature supporting the one-dimensionality of the GAD-7. Therefore, a restrictive model in which items are fixed to a single factor and the aim is to "confirm" the factorial structure is most suitable (Brown, 2015; Lorenzo-Seva & Ferrando, 2020). The Weighted Least Square Mean and Variance Adjusted (WLSMV) estimator was used since response options are ordinal (Brown, 2015). Model suitability was assessed using dynamic cut-off values (McNeish & Wolf, 2023) for the Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), and Comparative Fit Index (CFI). Values of SRMR ≤ 0.035 , RMSEA ≤ 0.067 , and CFI ≥ 0.99 are considered optimal. Additionally, the Correlation Root Mean Square Residual (CRMR), a non-standardized fit measure, was reported, which can be interpreted without cut-off values. A CRMR of 0.01 will be interpreted as a very small average residual correlation in the model population, while 0.20 will be judged as unacceptably large.

Reliability was assessed using the omega coefficient in the version by Green and Yang (2009), referred to as categorical omega by Kelley and Pornprasertmanit (2016). This coefficient calculates the correlation between item responses while considering the factorial structure and item thresholds.

Since a question was asked to participants, "Do you get scared when your dad or mom leaves the house," differences between those who answered yes, or no were examined. This allowed for the examination of criterion-related relationships, i.e., how test scores relate to a relevant criterion (American Educational Research Association et al., 2014). In this context, it is expected that children who express fear when their parent leaves the house would exhibit higher anxiety traits than those who do not (Basyouni, 2018; Feriante et al., 2023). Factor scores, which are composite scores providing information about an individual's position on the factor, were used for these purposes (DiStefano et al., 2009).

To assess the accuracy of the results, a resampling analysis was conducted using custom code. In this regard, 1000 samples were generated based on resampling with replacement. For each of the sub-

samples, fit indices and reliability calculations were performed. These results were represented using Boxplot graphs, and descriptive statistics for the dataset were calculated, including mean, standard deviation, minimum, and maximum values.

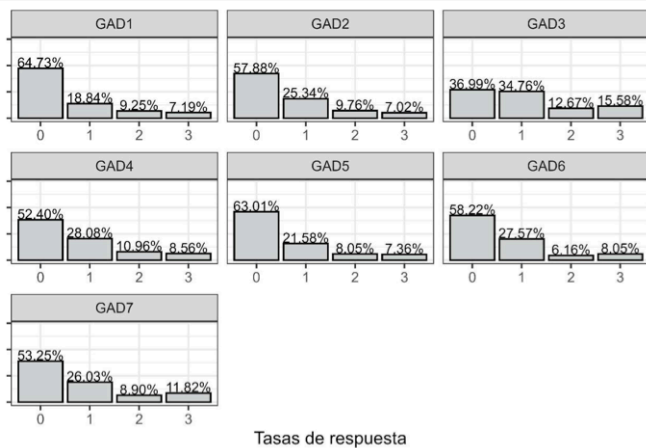
A factorial invariance (FI) analysis was performed according to sex and age range, following the recommendations of Wu and Estabrook (2016), by sequentially imposing restrictions on a set of parameters. First, a configural model was estimated (M1: Invariance of the GAD-7 structure between groups). Subsequently, constraints were added to the model to establish equality between groups on the thresholds (M2: Threshold invariance), factor loadings (M3: Metric invariance), intercepts (M4: Scalar invariance), and residuals (M5: Strict invariance). To evaluate the models, the following cut-off points were used to determine minimal differences: RMSEA (Δ RMSEA) < .015 and CFI (Δ CFI) \leq .010 (Finch & French, 2018; Hirschfeld & Von Brachel, 2014).

Results

In Figure 1, the description of response alternatives is presented. In general, there is a tendency towards low scores. Thus, the category “Not at all” has the highest percentage, with items GAD1 (65%) and GAD5 (63%) standing out as the most representative. On the other hand, GAD3 has the highest percentages in the “Several days” and “Nearly every day” categories, with the other items in these categories ranging between 7-9%, except for GAD7, which reaches 12%.

In Table 1, statistical comparisons are made between models M1 and M2. It is observed that M2 generally outperforms M1 in terms of fit, with lower values in the Chi-square, SRMR, WRMR, RMSEA, and CRMR. Although both models yield good results in CFI and TLI, M2 achieves perfection in CFI and surpasses M1 in TLI. Finally, despite M1 slightly outperforming M2 in the indicator of internal reliability (ω), overall, M2 appears as the more suitable model.

Figure 1. Descriptive analysis



Note. No day: 0, Several days: 1, More than half of the days: 2, Almost every day: 3

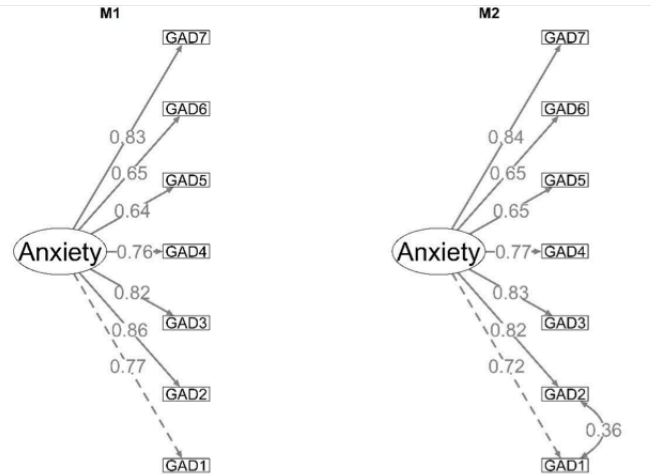
Table 1. Goodness-of-fit indices of factorial models

Model	χ^2	df	SRMR	CFI	RMSEA	CRMR	ω
M1	55.47	14	.04	.99	.07	.03	.88
M2	29.28	13	.03	1.00	.05	.02	.86

Note. M1: original model, M2: model with correlated error in item1-item2.

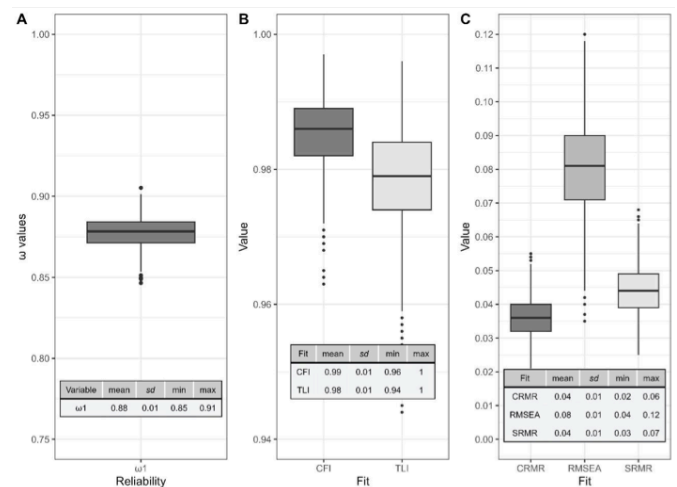
In Figure 2, the factor loadings of the two examined models are observed. In M1, item GAD2 shows the highest loading ($\lambda = .86$), while in M2, item GAD7 stands out in this way ($\lambda = .84$). However, between both models, the differences in factor loadings are minimal, suggesting similar behavior.

Figure 2. Factor structure of the two models analyzed



In Figure 3A, it can be observed that, on average, the reliability obtained through categorical omega is 0.88, which can be considered good. The standard deviation reflects low variability ($SD = 0.01$), with values ranging between 0.85 and 0.91. On the other hand, Figure 3B displays replications of the comparative fit measures CFI and TLI, both with a mean of 0.99. Their standard deviation is minimal (0.01), with minimum values of 0.96 and 0.94, respectively. Finally, Figure 3C presents replications of the absolute fit measures such as RMSEA, SRMR, and CRMR. The values range between 0.035 and 0.08, indicating reasonable fit. However, RMSEA has a maximum value of 0.12, which indicates that in some of the replications, this index exceeded the allowed limits.

Figure 3. Reliability accuracy and goodness-of-fit indices of the M2 model.



Note. A: Boxplot of the omega coefficient; B: Boxplot of the comparative goodness-of-fit; C: Boxplot of the absolute measures of fit.

Table 2 presents the GAD-7 scores based on whether the participants experienced fear when their father or mother left home. In relation to the Anxiety variable, those who reported feeling fear had an average score of 0.31, while those who did not experience such fear had an average score of -0.08. The difference between these two groups was 0.39. The confidence intervals for this difference range from -0.51 to -0.28. The effect size, measured by Cohen's *d*, was -0.55, indicating a moderate effect.

Table 2. GAD-7 scores of agreements with being afraid when a parent leaves the house

Variable	Yes	No	Diff	t-Welch	p	df	CI		d
							Low	High	
Anxiety	0.31	-0.08	0.39	6.84	< .001	306.45	-0.51	-0.28	-0.55

Note. CI: Confidence intervals; d: Cohen's *d* (effect size).

In Table 3, the results of the FI analysis according to the sex and age of the GAD-7 are presented. It is observed that the configural model (M1) does not show differences greater than the established cut-off points ($\Delta RMSEA < .015$; $\Delta CFI \leq .010$) when compared with the other models where factorial loads, thresholds, intercepts, and residuals are restricted. Thus, it is confirmed that the GAD-7 is invariant across sex and age groups. For age groups specifically, even when some parameters (GAD3 and GAD7) were released to their thresholds to achieve invariance, the partial invariance model still meets the criteria, supporting the robustness of the GAD-7 across different age groups.

Discussion

The importance of studying childhood anxiety is highlighted by its potential to persist into adulthood if not addressed early (Reardon et al., 2022). Effective early intervention is crucial, as symptoms are unlikely to resolve spontaneously (Steinsbekk et al., 2022). Valid and reliable tools are essential for assessing anxiety in children. While the GAD-7 is commonly used to identify generalized anxiety symptoms, it is not tailored for children (Crockett et al., 2022; Sun et al., 2021;

Tiirikainen et al., 2019; Yalin et al., 2018), and no brief, illustrated version exists in Peru to aid symptom detection in this demographic. This underscores the need to validate a pictorial scale that is accessible and suitable for professionals and researchers. The study confirms the GAD-7's robust one-dimensional structure despite some correlated errors in items GAD1 and GAD2, and it shows strong internal consistency in scoring. Detailed analysis of these findings will follow.

The data review shows a predominant trend towards low scores ("Not at all"), indicating a potential negative framing in responses. This trend may stem from social desirability bias, especially since items like GAD5 and GAD6 assess behaviors perceived as disruptive in educational settings, and GAD1 and GAD2 involve intense emotional states, which might exaggerate anxiety due to perceived uncontrollability (Capobianco et al., 2020; Sulbarán & León, 2014). Additionally, the low response rates for the options "More than half the days" and "Nearly every day" (below 10%) suggest potential estimation issues, although these rates are within normal bounds for this type of research (Linacre, 2002).

To validate the internal structure, Confirmatory Factor Analysis (CFA) was conducted, revealing a unidimensional structure. However, this led to a secondary model (M2) where errors in GAD1 and GAD2 were correlated, proving to be more suitable. Both models showed minimal differences, but M2 achieved a perfect Comparative Fit Index (CFI), confirming an excellent fit with the theoretical model. This finding aligns with literature suggesting the first two GAD-7 items capture core anxiety symptoms and could potentially stand alone in an ultra-short scale (García-Campayo et al., 2012; Kronenke et al., 2007; Luo et al., 2019; Mccrory et al., 2022; Seo & Park, 2015; Vrublevska et al., 2022). Although a unidimensional model is supported, the correlated errors indicate a need for further research using structural equation models to explore deeper relationships and validate the two-item version.

Regarding reliability, the test demonstrated good internal consistency ($\omega > .80$). However, one of the models (M1) showed better performance than M2. Nevertheless, these differences are slightly imperceptible. This could indicate that participants' scores in both models are consistent.

Table 3. Analysis of factor invariance according to the sex and age range of the GAD-7

Model	$\chi^2(df)$	$\Delta\chi^2$	Δdf	p	CFI	RMSEA	ΔCFI	$\Delta RMSEA$
Sex								
Configural	22.71 (26)	-	-	-	.995	.049	-	-
Threshold	23.89 (33)	4.06	7	.773	.995	.043	.000	-.006
Metric	26.76 (39)	3.43	6	.753	.997	.032	.002	-.011
Scalar	40.62 (45)	12.07	6	.060	.995	.038	-.002	.006
Strict	51.78 (52)	11.87	7	.105	.994	.039	-.001	.001
Age range								
Configural	21.09 (26)	-	-	-	.996	.045	-	-
Threshold	24.04 (33)	10.03	7	.187	.995	.044	-.001	-.001
Metric	27.67 (39)	4.18	6	.653	.997	.034	.001	-.010
Scalar	54.38 (45)	22.69	6	.001	.991	.053	-.006	.019
Strict	70.31 (52)	16.90	7	.018	.988	.055	-.002	.002
Age range ^a								
Configural	21.09 (26)	-	-	-	.996	.045	-	-
Threshold	23.76 (31)	8.80	5	.117	.995	.045	-.001	.000
Metric	26.90 (37)	3.29	6	.772	.997	.032	.002	-.014
Scalar	41.55 (41)	11.36	4	.023	.995	.042	-.003	.011
Strict	54.75 (46)	13.77	5	.017	.992	.048	-.002	.006

Note. a: Symbolizes a model where the parameters GAD3 and GAD7 had to be released in relation to their thresholds to achieve invariance. It is therefore a partial invariance model. The age was converted into a range, resulting in two groups: "8 to 10" (n = 296) and "11 to 12" (n = 288).

To comprehensively evaluate the results, researchers employed an innovative method using R codes, applying a random sampling with replacement technique to generate 1000 samples, each mirroring the original data size ($n=584$). This analysis confirmed the GAD-7's remarkable reliability, consistently exceeding an omega coefficient of .80, and in one instance, surpassing .90. Stability in the comparative fit indices (CFI and TLI) was also noted, with minimal variability ($SD = 0.01$). However, the resampling indicated that the maximum RMSEA value reached .12 in four instances, exceeding the acceptable threshold of .08. In contrast, the SRMR and CRMR values remained within acceptable limits. This detailed resampling underscores the model's robustness and stability, providing a solid basis for interpreting the model parameters with greater accuracy (Awang et al., 2015).

As for evidence based on the relationship with another variable, the criterion-test method was preferred. Therefore, scores were contrasted using factor scores based on a previous question asked to the children about their fear when their parents leave home. The results showed that there are moderate differences between children who indicated experiencing fear and those who did not. These findings are consistent with studies that suggest that when a child is separated from their home or close attachment figure, they experience significant distress (Basyouni, 2018; Feriante et al., 2023). The importance of this procedure lies in the fact that the illustrated GAD-7 could discriminate scores, which is necessary for classifying individuals (American Educational Research Association et al., 2014).

Regarding the invariance of the GAD-7 in terms of sex and age, the results indicated stability among the groups, with no significant differences in thresholds, factor loadings, intercepts, and residuals ($\Delta RMSEA < 0.015$; $\Delta CFI \leq 0.010$). This confirms that the GAD-7 measures anxiety similarly in both men and women and across different age groups. This is important because previous studies have highlighted differences in anxiety according to sex and age (Canals et al., 2019; Jamieson et al., 2023; Katanec et al., 2018; Santos et al., 2019; Varela et al., 2020), and the GAD-7 having this property benefits mean comparisons. It is worth noting that the invariance according to age was partial, requiring the release of thresholds for two items. This suggests that mean comparisons should be latent rather than observed, encouraging the use of structural equation models to control for the non-equivalence of some items. This procedure would ensure fair and accurate comparisons between subgroups (Finch & French, 2018; Hirschfeld & Von Brachel, 2014) and affirm that the observed differences in anxiety levels reflect true variations in the latent trait, rather than measurement bias due to the instrument (Dekhlyar et al., 2018; Howard et al., 2021).

The study has significant implications. Theoretically, the research expands the conceptual framework of childhood anxiety in the Peruvian context, as despite its importance, its study is still insufficient. From a practical perspective, the validation of the illustrated GAD-7 will enhance comprehension for children and reduce language barriers. There is indeed evidence suggesting that illustrated formats for children help improve assessment in this population, contributing to children's interest and participation (Dubí & Schneider, 2009; Ernst et al., 1994; Valla et al., 2000). They also have the potential to increase reliability by reducing misinterpretations because the images represent everyday situations in a child's life, thereby increasing accuracy. Socially, the study has the potential to impact policymakers and educational authorities, encouraging them to recognize childhood anxiety as an emerging issue in school settings, at least in the post-pandemic context.

Despite the relevant findings, the study acknowledges some limitations. First, the sampling was non-probabilistic because imple-

menting random sampling would incur significant economic costs, and accessing educational institutions after the pandemic has become quite challenging. Second, although a criterion-test relationship has been established, it is recommended for future research to examine the relationship between the illustrated GAD-7 and other theoretically coherent measures, such as depression, self-esteem, among others.

In conclusion, this study highlights the need to address anxiety in children, as it can persist into adulthood. Although the GAD-7 is widely used for assessing anxiety, it is not adapted for children, and there is even less research that has illustrated it for this population. The research demonstrated a consistent structure for the GAD-7 but identified correlated errors in two items. These findings were supported by a bootstrap technique used to examine the stability of the results, which could be employed in future studies. Additionally, the illustrated GAD-7 was linked to children's fear of being separated from their parents. In summary, this work enriches the understanding of childhood anxiety in Peru and provides an illustrated version of the GAD-7, aiming to reduce language barriers in children and emphasizing the importance of addressing anxiety in schools, especially in the post-pandemic context. Despite its contributions, the study has limitations in its sampling and suggests further research on this topic.

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Conflict of interests

The authors declare no potential conflicts of interest.

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Appendix

GAD-7

Instrucciones: Marca con una aspa (x) la alternativa que mejor describa como te has sentido en las últimas 2 semanas.

GAD-7

Instrucciones: Marca con una aspa (x) la alternativa que mejor describa como te has sentido en las últimas 2 semana:

Ejemplo de cómo responder:

0. Durante las últimas 2 semanas, he tenido dificultades para hacer mis tareas.



1. En las últimas 2 semanas, me he sentido nervioso, ansioso o con los nervios de punta.



2. En las últimas dos semanas, no pude dejar de preocuparme o controlar mis preocupaciones.



3. En las últimas dos semanas, me he preocupado demasiado por diferentes cosas.



4. En las últimas dos semanas, he tenido dificultad para relajarme.



5. En las últimas dos semanas, he estado tan inquieto que me fue difícil permanecer sentado tranquilamente.



6. En las últimas dos semanas, me he molestado o me he irritado fácilmente.



7. En las últimas dos semanas, he sentido como si algo terrible pudiera pasar.

