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Validation of a Spanish version of the Foreign Language Classroom Anxiety Scale in Peruvian secondary education students

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Background: Anxiety in learning foreign languages is a global phenomenon that impacts students' academic performance, with English being a critical language in secondary education. The Foreign Language Classroom Anxiety Scale (FLCAS) has been widely used to assess this anxiety. However, the need to validate and adapt the scale for specific cultural contexts remains a priority in educational research.

Objective: To assess the validity and reliability of a Spanish version of the FLCAS among a sample of Peruvian secondary education students, in order to better understand the structure of language learning anxiety in this context.

Methods: A total of 818 students from four public educational institutions in southern Peru participated. An instrumental design was used, which included descriptive analysis, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and assessments of convergent, divergent validity, and measurement invariance by gender.

Results: The EFA recommended a four-factor model that explained 32% of the total variance. Subsequent CFA adjusted this model to 24 items with optimal fit indices (CFI = 0.969; RMSEA = 0.045). The reliability of the factors was acceptable ($\alpha > 0.70$ for all factors). Convergent and divergent validity was confirmed through significant correlations with related constructs (Fear of Negative Evaluation and Enjoyment of Foreign Language). Gender invariance analysis indicated that the scale is equally applicable to men and women.

Conclusion: The Spanish version of the FLCAS is a valid and reliable tool for assessing foreign language classroom anxiety among Peruvian secondary education students. This study contributes to the field of language teaching by providing evidence of the cultural applicability of the FLCAS in the Peruvian context, thus facilitating more effective pedagogical interventions to address language learning anxiety.

1 Introduction

The acquisition of English as a foreign language has become an essential component of secondary education globally, promoting not only cultural enrichment but also opening doors to academic and professional opportunities. However, this learning process is not without challenges, among which language anxiety emerges as a significant obstacle affecting a considerable number of students (Mendoza-Torres et al., 2023). This form of anxiety, specifically associated with the context of learning a second language, manifests through tension, nervousness, and worry in situations perceived as stressful, such as oral interaction, listening comprehension, reading, and writing in the foreign language classroom (Huang, 2014). The factors behind this anxiety are multiple, encompassing both intrinsic aspects of the student and extrinsic aspects related to the learning environment (León-Gutiérrez et al., 2023). Among these, the fear of making mistakes and distress during communication with teachers and peers are predominant, reflecting how the perception of social judgment and fear of negative evaluation play crucial roles in exacerbating anxiety (Yashima et al., 2009; García et al., 2016). In specific contexts, like in Peru, test anxiety has been identified as the most significant component of this issue, suggesting a direct relationship between communicative difficulties and increased anxiety in assessment situations. It's important to note that anxiety levels not only vary among individuals but also influence different aspects of language learning in diverse ways. It has been observed that lower levels of anxiety favor more effective learning, especially in critical areas such as vocabulary, grammar, pronunciation, and intonation (Adrianzén, 2021; Santander Rodriguez et al., 2022; Enriquez-Gavilan et al., 2023; Contreras-Saavedra et al., 2024).

In the field of foreign language teaching, understanding and measuring student anxiety is crucial to facilitate effective learning. Tools like the Foreign Language Classroom Anxiety Scale (FLCAS), developed by Horwitz et al. (1986), are used for this purpose. Since its introduction, the FLCAS has gained significant recognition in academic research, becoming a widely used resource for assessing anxiety in language classrooms (Botes et al., 2022). This questionnaire has undergone extensive psychometric research, including adaptations and abbreviated versions, to ensure its relevance and applicability across different linguistic and cultural contexts (Liu and Huang, 2011; Dewaele and MacIntyre, 2014). The adaptation process of the FLCAS has involved its translation and adjustment into various languages, including Hungarian, Persian, Arabic, Thai, and Spanish, reflecting its global applicability in countries as diverse as Spain, Chile, Japan, Korea, France, and Serbia (Pérez-Paredes and Martínez-Sánchez, 2000; Tóth, 2008; Alidoost et al., 2013; Tanielian, 2014; Dewaele and Al-Saraj, 2015; Riquelme-Mella et al., 2015). These adaptations have employed varied methodologies, including both exploratory factor analysis (EFA) and principal component analysis (PCA) and confirmatory factor analysis (CFA), to examine and validate the scale's factorial structure in different cultural settings.

The diversity in the results of these psychometric adaptations underscores the complexity of measuring anxiety in language learning and the need to consider the cultural and linguistic specificities of each context. For example, while a 4-factor model was revealed in Japan (Aida, 1994), models of up to 8 factors were identified in Spain and Hungary (Pérez-Paredes and Martínez-Sánchez, 2000; Tóth, 2008). In Korea, a 2-factor model was identified (Park and French, 2013), and

in Chile, a 4-factor model was confirmed (Riquelme-Mella et al., 2015). This range in the factorial structure of the FLCAS, from 2 to 8 factors, highlights the variability in the anxiety experience among different student populations and reinforces the importance of carefully adapting and validating measurement tools to accurately reflect the realities of students in different educational contexts.

In this sense, despite the original scale having a defined structure, subsequent research has revealed the need for a detailed and contextualized analysis of language learning anxiety. This is particularly relevant in the case of measurement invariance (MI) and Differential Item Functioning (DIF) studies, areas that have received relatively little attention in the literature. These studies are crucial for reinforcing the scale's validity, ensuring that measurements are equitable and comparable across different demographic groups and educational contexts (Saghafi et al., 2022). Research on the invariance of the FLCAS has yielded mixed results, indicating gender invariance in some cases, though with certain limitations regarding the consistency of these findings across different levels of invariance (Riquelme-Mella et al., 2015; Botes et al., 2022). This suggests that, although the scale may be generally applicable to different groups, challenges remain in its ability to accurately reflect all students' experiences without bias.

Given this situation, there is a recognized need for additional validation studies that consider a wider variety of educational and demographic contexts. In particular, the validation of the Spanish version of the FLCAS in specific student populations, such as Peruvian secondary education students, represents a step forward in understanding and accurately measuring anxiety in foreign language learning. This approach allows not only to generalize results to a broader student population but also to identify and address potential differences and specific needs within such a population (Safranj et al., 2020).

Therefore, the main objective of the present research is to evaluate the validation of the FLCAS scale for Peruvian secondary education students.

2 Methods

2.1 Participants

This study, which was instrumental in nature (Carretero-Dios and Pérez, 2007; Ato et al., 2013), employed a convenience sampling method (Soper, 2024), used a non-probabilistic convenience sampling method. The necessary sample size was calculated considering various factors such as the number of variables, both observed and latent, the expected effect ($\lambda = 0.3$), statistical precision ($\alpha = 0.05$), and statistical power ($1 - \beta = 0.80$), recommending a minimum of 137 participants. However, the study was expanded to a total of 818 students (403 males and 415 females), from the second to fifth grade of secondary education in four public educational institutions in the southern region of Peru. The age of the participants ranged from 13 to 17 years, with an average age of 15 years and a standard deviation of 1.41. The sample was divided into two distinct groups: one for the exploratory factor analysis (EFA) with 408 students, and another for the confirmatory factor analysis (CFA), the assessment of reliability, and the internal convergent validity, with 410 students. The entire sample was used for additional analyses, including divergent convergent

TABLE 1 Sociodemographic characteristics of the participants (*N* = 818).

Variable	TOTAL (*n* = 818)		G1 (*n* = 408)		G2 (*n* = 410)	
	n	%	*n*	%	*n*	%
Gender						
Male	403	49.3	201	49.3	202	49.3
Female	415	50.7	207	50.7	208	50.7
Age						
13	46	5.6	28	6.9	18	4.4
14	201	24.6	104	25.5	97	23.7
15	230	28.1	122	29.9	108	26.3
16	244	29.8	114	27.9	130	31.7
17	97	11.9	40	9.8	57	13.9
Educational Institution (EI)						
IE-1	193	23.6	98	24	95	23.2
IE-2	205	25.1	102	25	103	25.1
IE-3	213	26.0	106	26	107	26.1
IE-4	207	25.3	102	25	105	25.6
School Grade						
2	164	20.0	82	20.1	82	20
3	190	23.2	96	23.5	94	22.9
4	250	30.6	124	30.4	126	30.7
5	214	26.2	106	26	108	26.3

G1 is the sample for exploratory factor analysis, G2 is the sample for confirmatory factor analysis; n represents the number of participants.

validity and measurement invariance, allowing a more comprehensive and rigorous evaluation of the constructs studied (Table 1).

2.2 Procedure

Before data collection, ethical approval was obtained from the graduate school of the Peruvian university for conducting the study (UPeU00868). Authorization was requested from the administrators of the selected educational institutions for the application of the instrument. Parents of the participants and the students themselves were informed about the study's objectives, the voluntary nature of their participation, the benefits, and the confidentiality of the information collected. Only those who provided their informed consent for minors were considered as participants. Data collection was conducted in person using printed questionnaires and took place from April to July 2023. Each student group received the same instructions from the researcher, who was present during the data collection process to clarify any doubts regarding the instrument. The estimated time for completing the questionnaire was 30 min.

2.3 Instruments

Foreign Language Classroom Anxiety: the Spanish version of the Foreign Language Classroom Anxiety Scale (FLCAS) by Pérez-Paredes and Martínez-Sánchez (2000), derived from the original by Horwitz et al. (1986), was used. The scale consists of 33 items and four dimensions

(see Instrument in Appendix 1). Factor one, Communicative Apprehension, contains 13 items (3, 20, 9, 31, 33, 24, 27, 13, 19, 4, 12, 2, and 28). Factor two, Anxiety toward Foreign Language Learning Processes and Situations, contains nine items (29, 25, 15, 30, 26, 21, 8, 16, and 10). Factor three, Comfort with Using the Foreign Language Inside and Outside the Classroom, contains seven items (23, 7, 1, 18, 14, 32, and 22). Factor four, Negative Attitudes and Self-Perceptions, contains four items (6, 17, 5, and 11). Literature reports that factor one refers to the fear or anxiety of communicating in a foreign language due to misunderstanding, factor two considers the context and circumstances of foreign language learning, factor three refers to the student's ease of using the foreign language in or outside the classroom with native speakers, and factor four is related to distressful experiences of learning the foreign language (Park, 2014; Jarie et al., 2019). The FLCAS scoring levels are based on a five-point Likert scale from (1) Strongly Agree to (5) Strongly Disagree, however, scoring was taken as reported by Park and French (2013) from (1) Strongly Disagree to (5) Strongly Agree. In all studies conducted, the FLCAS has shown good reliability with Cronbach's alpha values from 0.89 to 0.94 (Horwitz et al., 1986; Aida, 1994; Tóth, 2008). It is important to consider that the FLCAS includes 9 reverse-scored items (2, 5, 8, 11, 14, 18, 22, 28, and 32), and their scores were inverted before statistical analysis, as reported by various studies (Park, 2014; Riquelme-Mella et al., 2015; Jarie et al., 2019).

Fear of Negative Evaluation: The Brief Fear of Negative Evaluation Scale (BFNES) was used, which was taken from the Spanish version reported by Gallego et al. (2007), consisting of 12 items, considering only the 8 direct items as applied and recommended by other studies (Rodebaugh et al., 2004; Gallego et al., 2007; Botes et al., 2022). The

instrument is rated on a 5-point Likert scale from (1) not at all characteristics of me to (5) extremely characteristic of me. The scale has a reliability $\alpha = 0.96$.

Enjoyment of the Foreign Language: The Short Scale of Foreign Language Enjoyment (S-FLES) was taken from Barrios and Acosta-Manzano (2022), which is a short Spanish scale of 10 items, derived from the original 21-item scale by Dewaele and MacIntyre (2014). It is rated on a 5-point Likert scale from (1) strongly disagree to (5) strongly agree. It has a reliability $\alpha = 0.85$.

2.4 Data analysis

Descriptive Statistics: Means, standard deviations, skewness (g1 < ±2), and kurtosis (g2 < ±7) were calculated (Kline, 2016; Bandalos and Finney, 2019).

Exploratory Factor Analysis (EFA) was conducted to identify the underlying structure of the scale and data reduction (Reise et al., 2000; Lloret-Segura et al., 2014). The Kaiser–Meyer–Olkin (KMO) value was calculated to determine factorability, indicating that values close to 1 are factorable, with a recommended KMO value >0.5 and a Bartlett's test of sphericity value of $p < 0.05$ (Kaiser, 1974; Tabachnick and Fidell, 2019). The estimator used was unweighted least squares or minimum residual, with direct Oblimin rotation, and the cutoff point for factor loadings was set at 0.3 as reported by various authors (Kline, 2016; Ventura-León et al., 2018; Ruiz et al., 2022). The EFA was determined with a sample of 408 participants.

Confirmatory Factor Analysis (CFA) was subsequently performed using the robust maximum likelihood estimator (WLMSV) as it is considered the best alternative for ordinal variables (Brown, 2006). Therefore, model fit indices were determined: Chi-square (χ^2), the Chi-square to degrees of freedom ratio (χ^2/df), the Incremental Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR). These indices confirm the internal structure of the scale at the factor and item levels (Keith, 2019). Values considered to represent a good model fit are χ^2/df < 2, CFI > 0.90, and RMSEA and SRMR <0.05 (Browne and Cudeck, 1992; Keith, 2019; Tabachnick and Fidell, 2019). Reliability of the scale was also evaluated using internal consistency methods, including ordinal alpha coefficient (α) and McDonald's omega coefficient (ω), determining reliability at both factor and overall levels. Reliability values greater than 0.7 are acceptable (McDonald, 1999; Raykov and Hancock, 2005; Oliden and Zumbo, 2008).

Internal convergent validity was determined according to Fornell and Larcker (1981), where convergent validity is estimated by the average variance extracted (AVE), indicating that 50% of the variance is due to the items. For acceptable AVE values, factor loadings (λ) should be greater than 0.6. Convergent and divergent validity was determined by structural equation modeling according to the procedure reported by Fornell and Larcker (1981). The sample for these analyses was the second group of 410 participants.

Measurement invariance was determined as proposed by Fornell and Larcker (1981), in such a way that the good functioning and stability of the scale across different groups can be verified. Thus, this invariance was evaluated at four levels: (1) Configural invariance, which measures the factorial structure equivalence of the instrument across groups, (2) Metric invariance for measuring the equivalence of structure and factor loadings, (3) Scalar or strong invariance,

which measures structural equivalence, factor loadings, and intercepts, and (4) Strict invariance, which measures the equivalence of structure, factor loadings, intercepts, and error covariances (Meredith, 1993; Barrera-Barrera et al., 2015). According to Cheung and Rensvold (2002) an instrument shows invariance if each level reports ΔCFI <0.01.

3 Results

Descriptive Analysis of Items In the study of the FLCAS scale, mean values ranged from 2.42 to 3.56. All skewness (g1) values were less than ±1, and for kurtosis (g2), some values were greater than ±1. However, these are acceptable data according to the literature (g1 < ±2 and g2 < ±7) (Kline, 2016; Bandalos and Finney, 2019), indicating a normal distribution of data (Table 2).

3.1 Preliminary analysis

The analysis of the Foreign Language Classroom Anxiety Scale (FLCAS) has been approached from various theoretical perspectives through Confirmatory Factor Analysis (CFA), revealing significant differences in the suitability of the proposed models (see Table 3). Starting with the four-factor model by Horwitz et al. (1986), it was observed that re-specification improved the fit indices: the chi-square (χ^2) was reduced from 2293.6 to 1966.9, and the Comparative Fit Index (CFI) increased from 0.886 to 0.900. However, despite these improvements, the model still faces reliability issues in the fourth factor and an insufficient Average Variance Extracted (AVE), suggesting the need for an Exploratory Factor Analysis (EFA) to achieve a more representative model. The model by Jarie et al. (2019), also consisting of four factors, showed improvements in re-specification, decreasing the χ^2 from 1840.1 to 841.6 and raising the CFI from 0.877 to 0.939. Nonetheless, issues of low reliability in the fourth factor and unsatisfactory AVE for two factors persist, even after re-specification and with a reduced version of 21 items. This indicates that Jarie et al. (2019) model is also not suitable in this context, reinforcing the recommendation for conducting an EFA. On the other hand, the three-factor model by Arnaiz and Guillén (2012), applied to the Mathematics Anxiety Scale, showed a better fit in the re-specified version according to the CFI, RMSEA, and SRMR indices. Although the model fits with 27 items after re-specification, the ordinal alpha reliability is very low for the third factor, and the AVE is low for two factors, without the possibility of removing more items from the third factor. This analysis concludes that Arnaiz and Guillén (2012) model is not suitable and suggests, once again, a prior EFA. Finally, Park's (2014) model for the FLCAS, based on a two-factor structure, also revealed improvements after re-specification, with a decrease in the χ^2 from 1298.8 to 988.2 and an increase in the CFI from 0.903 to 0.920. However, both the RMSEA and SRMR remain above desirable values, indicating a moderate fit. Additionally, the reliability of the second factor and the AVE values for both factors are low, leading to the conclusion that Park's (2014) model is also inadequately fitted, recommending the conduct of an EFA as well.

TABLE 2 Descriptive analysis of items (*N* = 818).

Items	M	DE	g1	g2
Item01	3.23	1.08	−0.35	−0.63
Item02*	3.18	1.16	−0.19	−0.98
Item03	3.02	1.28	−0.13	−1.16
Item04	3.04	1.20	−0.14	−1.05
Item05*	2.42	1.26	0.63	−0.63
Item06	2.92	1.17	0.03	−0.93
Item07	3.41	1.19	−0.42	−0.68
Item08*	3.00	1.13	−0.01	−0.89
Item09	3.56	1.24	−0.69	−0.57
Item10	3.85	1.12	−0.93	0.11
Item11*	2.97	0.96	0.21	−0.04
Item12	3.27	1.27	−0.28	−1.13
Item13	3.30	1.24	−0.35	−0.96
Item14*	2.88	1.09	0.10	−0.57
Item15	2.93	1.16	−0.02	−0.87
Item16	3.37	1.20	−0.45	−0.87
Item17	2.42	1.19	0.50	−0.69
Item18*	3.12	1.08	−0.07	−0.79
Item19	3.06	1.25	−0.11	−1.11
Item20	3.22	1.27	−0.30	−0.98
Item21	2.45	1.21	0.53	−0.63
Item22*	3.01	1.11	0.08	−0.82
Item23	3.36	1.16	−0.39	−0.77
Item24	2.87	1.24	0.12	−1.05
Item25	3.13	1.17	−0.19	−0.94
Item26	2.80	1.25	0.16	−1.06
Item27	3.14	1.15	−0.21	−0.95
Item28*	2.87	1.12	0.05	−0.82
Item29	3.15	1.18	−0.23	−0.99
Item30	2.75	1.23	0.17	−1.01
Item31	3.18	1.30	−0.24	−1.11
Item32*	2.94	1.08	0.02	−0.53
Item33	3.50	1.12	−0.62	−0.40

*Reverse-scored items; M stands for mean; SD is standard deviation; g1 is skewness, and g2 is kurtosis.

TABLE 3 Confirmatory models of the FLCAS.

Model	Condition	x2	gL	CFI	RMSEA	SRMR
Horwitz et al. (1986) – 4 factors	Unrespecified	2293.6	489	0.886	0.067	0.059
	Respecified	1966.9	428	0.9	0.066	0.056
Jarie et al. (2019) – 4 factors	Unrespecified	1840.1	344	0.877	0.073	0.062
	Respecified	841.6	183	0.939	0.066	0.049
Arnaiz and Guillén (2012) – 3 factors	Unrespecified	2126.9	431	0.885	0.069	0.061
	Respecified	1708.3	321	0.9	0.073	0.056
Park (2014) – 2 factors	Unrespecified	1298.8	229	0.903	0.076	0.057
	Respecified	988.2	188	0.92	0.072	0.051

χ^2, Chi-square; df, degrees of freedom; CFI, comparative fit index; RMSEA, root mean square error of approximation; and SRMR, standardized root mean square residual.

3.2 Exploratory factor analysis

According to the results of the Kaiser–Meyer–Olkin measure (KMO = 0.93) and Bartlett's Test of Sphericity (χ^2 = 4140.89, df = 528, p < 0.001), the data collected from the FLCAS are suitable for factor analysis. Parallel analysis suggested 4 factors for the model, and factor loadings λ > 0.3 were visualized. (Items 4 and 11 were excluded for this reason). The 4 factors explain 32% of the total variance, with factor 1 "Communicative Apprehension or Fear of Speaking" showing the highest explanatory variance (17%) and the highest number of items (18 items), followed by factor 2 "Anxiety toward Evaluation" (6%) with 8 items. Factor

3 "Comfort with Using English" accounts for 4% with 7 items, and finally factor 4 "Negative Attitudes and Self-Perceptions" explains 5% of the variance with 5 items. It was also observed that seven items (1, 9, 18, 23, 26, 28, and 29) had loadings on different factors (Table 4).

3.3 Confirmatory factor analysis

According to the Confirmatory Factor Analysis (CFA), the initial model derived from the EFA, which contained 4 factors and 31 items, presented optimal fit indices (Table 5). However, subsequent reliability

TABLE 4 Factor loadings from the exploratory factor analysis of the FLCAS scale (n = 408).

Items	F1	F2	F3	F4	h2
Item01	0.313	–	–	0.316	0.391
Item02*	–	–	0.305	–	0.137
Item03	0.515	–	–	–	0.398
Item04	–	–	–	–	0.345
Item05*	–	0.352	–	–	0.146
Item06	–	0.355	–	–	0.229
Item07	–	–	–	0.608	0.534
Item08*	–	–	0.468	–	0.394
Item09	0.321	–	–	0.427	0.485
Item10	–	–	–	0.599	0.402
Item11*	–	–	–	–	0.068
Item12	0.545	–	–	–	0.495
Item13	0.685	–	–	–	0.484
Item14*	–	–	0.423	–	0.168
Item15	–	0.401	–	–	0.380
Item16	0.623	–	–	–	0.576
Item17	–	0.619	–	–	0.358
Item18*	0.330	–	0.406	–	0.333
Item19	0.528	–	–	–	0.326
Item20	0.809	–	–	–	0.598
Item21	–	0.472	–	–	0.414
Item22*	–	–	0.323	–	0.213
Item23	0.468	–	–	0.327	0.513
Item24	0.706	–	–	–	0.481
Item25	0.368	–	–	–	0.450
Item26	0.546	0.302	–	–	0.517
Item27	0.766	–	–	–	0.631
Item28*	0.337	–	0.394	–	0.289
Item29	0.394	0.328	–	–	0.461
Item30	–	0.674	–	–	0.438
Item31	0.592	–	–	–	0.488
Item32*	–	–	0.449	–	0.208
Item33	0.577	–	–	–	0.394
Variance (%)	17.4	5.8	3.9	5.1	

F1, communicative apprehension factor; F2, evaluation anxiety factor; F3, comfort with using English inside and outside the classroom factor; F4, negative attitudes and self-perceptions factor; h2, communality. *Reverse-scored items.

and internal convergent validity results did not align with this model, leading to a model adjustment with re-specifications where seven items (2, 5, 6, 10, 14, 17, and 32) were ultimately refined. The new model showed improved fit indices and subsequent validity analyses.

The adjusted FLCAS model after the CFA consisted of 4 factors and 24 items, with factor loadings ranging from 0.4 to 0.8 (see Table 6). The scale showed acceptable ordinal alpha reliability values for each factor according to the literature ($\alpha > 0.70$). A similar result was observed with the determination of the omega coefficient. The overall reliability for the entire construct was optimal ($\alpha = 0.95$; $\omega = 0.94$). Regarding internal convergent validity, it was observed that the average variance extracted

(AVE) for factors F1 and F4 met the criterion of AVE ≥ 0.5. For factors F2 and F3, the AVE reached 0.4 (Table 7).

3.4 Convergent and divergent validity

This validation, based on the relationship with other variables, observed that the correlation model of 3 constructs: Foreign Language Classroom Anxiety (FLCA), Fear of Negative Evaluation (BFNE), and Enjoyment of Foreign Language (FLE), showed an optimal fit ($\chi^2 = 1839$; df = 815, $p < 0.001$; CFI = 0.903; RMSEA = 0.039;

TABLE 5 Confirmatory factor analysis of the FLCAS scale ($n = 410$).

Model	X^2	X^2 / gL	p	CFI	RMSEA [IC 90%]	SRMR
Initial	985.7	2.30	<0.001	0.923	0.056 [0.052–0.061]	0.060
Adjusted	497.6	2.02	<0.001	0.969	0.045 [0.038–0.051]	0.041

χ^2, Chi-square; df, degrees of freedom; p, p-value; CFI, comparative fit index; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual; CI, confidence interval.

TABLE 6 Confirmatory factor analysis of the FLCAS scale ($n = 410$).

Items	F1	F2	F3	F4
Item03	0.692			
Item12	0.668			
Item13	0.712			
Item16	0.722			
Item19	0.563			
Item20	0.747			
Item24	0.679			
Item25	0.554			
Item27	0.744			
Item31	0.725			
Item33	0.657			
Item15		0.515		
Item21		0.635		
Item26		0.781		
Item29		0.578		
Item30		0.509		
Item08*			0.574	
Item18*			0.805	
Item22*			0.480	
Item28*			0.594	
Item01				0.641
Item07				0.688
Item09				0.658
Item23				0.732
α	0.90	0.75	0.70	0.77
ω	0.90	0.74	0.71	0.77
AVE	0.46	0.37	0.39	0.46

F1, communicative apprehension factor; F2, evaluation anxiety factor; F3, comfort with English usage inside and outside the classroom factor; F4, negative attitudes and self-perceptions factor; α, ordinal alpha; ω, omega coefficient; AVE, average variance extracted. *Reverse-scored items.

SRMR = 0.057). As shown in Figure 1, FLCA presented a positive and highly significant correlation with BFNE (r = 0.64; p < 0.001) and a negative and significant correlation with FLE (r = −0.30; p < 0.001).

3.5 Measurement invariance

According to the analysis of internal structure, it was observed that the models for the gender variable for males and females presented optimal fit values (Table 7). From the evaluation of invariance, at the configurational level, it was indicated that there is invariance across the two gender groups. At the metric level, it was observed that factor loadings are invariant across both male and female groups. Regarding the scalar level, the intercepts were found to be invariant, and at the strict level, factor loadings, intercepts, and residuals were likewise invariant. Therefore, it is reported that the FLCAS scale is invariant regarding gender among secondary school students.

4 Discussion

The acquisition of English as a second language is crucial in global secondary education, offering cultural benefits and academic and professional opportunities. However, linguistic anxiety is a common challenge affecting learning, manifesting as tension and worry,

especially during oral interaction and assessment. Factors such as fear of social judgment and negative evaluation are critical, with studies in Peru identifying test anxiety as a significant factor. Anxiety varies among individuals and impacts different learning areas. To address this, the FLCAS, a recognized tool for measuring classroom anxiety, has been adapted and validated in various languages and cultural contexts through different factor analysis methods. These adaptations reveal variability in the anxiety experience among students from different cultures. Thus, the main goal of this research was to evaluate the validity of the FLCAS scale for this specific population.

From the exploratory factor analysis, the FLCAS scale in Peruvian secondary students presents 4 factors, with Communicative Apprehension accounting for the highest variance explained (17.4%). This confirms the literature on FLCAS validation studies in both university and secondary students, validating the 4 factors and also reporting that the most perceived factor in the FLCAS is the fear of speaking or anxiety to communicate, with explained variance values for this factor between 35 to 38% and lower values for the other factors (Aida, 1994; Tóth, 2008; Arnaiz and Guillén, 2012; Jarie et al., 2019). Qualitative studies on English learning reinforce this result, showing that anxiety is the most significant variable in foreign language learning (Torres and Turner, 2017; García Pastor and Miller, 2019). The low variance value could have been affected by the sample or cultural factors. Studies with scales containing reverse-scored items indicate that these cause low load values in students with lower education levels because they cause confusion and careless responses

TABLE 7 Internal structure and factorial invariance of the FLCAS.

Model	X^2	X^2 / gL	RMSEA [IC 90%]	SRMR	CFI	ΔCFI
Men	369	1.50	0.035 [0.028–0.042]	0.041	0.951	
Women	379	1.54	0.036 [0.029–0.043]	0.043	0.949	
1. Configurational	749	1.52	0.036 [0.031–0.041]	0.040	0.950	
2. Metric	766	1.50	0.035 [0.030–0.040]	0.043	0.950	0.000
3. Scalar (Strong)	810	1.52	0.036 [0.031–0.040]	0.045	0.946	−0.004
4. Strict	843	1.52	0.036 [0.031–0.040]	0.046	0.944	−0.002

F1, communicative apprehension factor; F2, evaluation anxiety factor; F3, comfort with English usage inside and outside the classroom factor; F4, negative attitudes and self-perceptions factor; α, ordinal alpha; ω, omega coefficient; AVE, average variance extracted.
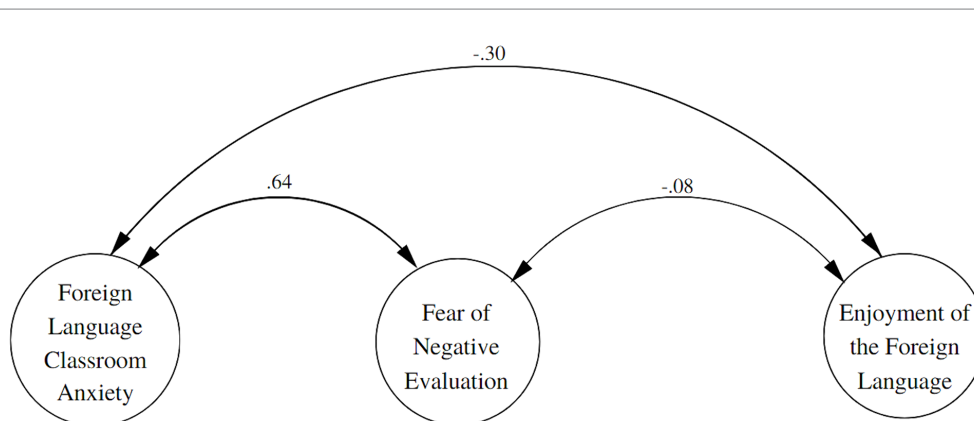

FIGURE 1
Convergent and divergent validity of the FLCAS.

(Weems et al., 2003; Rodebaugh et al., 2004; Chaves and Castaño, 2009), leading to low factor loadings and, consequently, low variances.

After the confirmatory factor analysis, the FLCAS scale for Peruvian students with 4 factors and 24 items is reaffirmed with good fit indices, as initially proposed by Horwitz et al. (1986), although certain items were excluded (a total of 7) to achieve the optimal model fit, a typical procedure in other psychometric studies of the FLCAS (Aida, 1994; Jarie et al., 2019). The factor loadings of the adapted FLCAS scale are greater than 0.5, with the exception of item 22 ($\lambda = 0.48$). It is important to highlight that many of the excluded items were reverse-scored, which mostly showed lower factor loadings. Literature reports that reverse-scored items tend to have lower loading values (Weems et al., 2003; Moral-De-Rubia and Martínez-Sulvarán, 2012), and are mostly excluded in various psychometric studies that processed the FLCAS with reverse-scored items, always eliminating some (Pérez-Paredes and Martínez-Sánchez, 2000; Tóth, 2008; Atef-Vahid and Kashani, 2011; Tanielian, 2014; Dewaele and Al-Saraj, 2015; Riquelme-Mella et al., 2015; García et al., 2016). Moreover, it is important to note that factor 3 "Comfort with English Usage Inside and Outside the Classroom" is composed only of reverse-scored items with factor loadings above 0.5, clearly because this factor is intended to address the items in an opposite manner.

Regarding the reliability of the FLCAS results for Peruvian students, ordinal alpha values are acceptable, greater than 0.7, and similar results are observed for the omega coefficient for each of the scale's factors. This is in accordance with reference values from the literature (McDonald, 1999; Raykov and Hancock, 2005; Oliden and Zumbo, 2008), and the overall scale reliability is even higher than 0.9. The internal convergent validity values of the FLCAS are only acceptable according to the literature if $AVE > 0.5$ (Fornell and Larcker, 1981), only factors 1 and 4 (Communicative Apprehension and Negative Attitudes and Self-Perceptions, respectively) meet this requirement. Factors 2 and 3 present an approximate AVE of 0.4 (Evaluation Anxiety and Comfort with English Usage Inside and Outside the Classroom, respectively). These low values may be due to the previously indicated factor: the low educational level of the participants.

The evaluation of convergent and divergent validity based on the relationship with other variables revealed significant correlations between Foreign Language Classroom Anxiety (FLCA) with Fear of Negative Evaluation (BFNE) and Enjoyment of Foreign Language (FLE). A moderate positive correlation ($r = 0.64$; $p < 0.001$) and negative ($r = -0.30$; $p < 0.001$) respectively, corroborating the convergent and divergent validity for the FLCAS scale. The same profile of correlations is observed in the literature (Tzoannopoulou, 2016; Šafranj and Zivlak, 2019; Botes et al., 2022), providing relevant information about factors affecting foreign language learning anxiety.

From the results, the configurational, metric, strong, and strict invariance of the FLCAS remained equivalent in the comparison of male and female Peruvian secondary school student groups. Brown (2006) indicates that the existence of gender invariance means that the items measure a construct identically in males and females. It can therefore be stated that both male and female students conceptualize foreign language learning anxiety in the same way, allowing them to respond similarly. Van De Schoot et al. (2015) indicate that when an instrument has invariant properties, it implies that its metric properties such as factor loadings, intercepts, and residuals are similar. The results of this study reinforce the few studies of FLCAS invariance conducted by other authors in North American and

European contexts (Botes et al., 2022) and Latin American (Riquelme-Mella et al., 2015).

4.1 Implications

Validating this scale in a Peruvian context not only enhances our understanding of linguistic anxiety in this specific population but also opens new avenues for practical applications and educational policies aimed at improving the teaching and learning processes of English as a foreign language. From a practical perspective, the validation of the FLCAS suggests that educators and school administrators can use this tool to identify students with high levels of linguistic anxiety and develop interventions specifically targeted at these individuals. Such interventions could include pedagogical strategies that reduce pressure and fear of making mistakes, such as teaching techniques that promote more cooperative and less competitive interaction among students. Moreover, the findings of this study could inform educational policies by advocating for the integration of mental health and emotional well-being into language curriculum plans. This could translate into training programs for teachers that include modules on how to manage anxiety in the classroom and how to implement pedagogical practices that foster a more inclusive and less threatening learning environment. Theoretically, this study contributes to the existing literature by providing evidence on the factorial structure of the FLCAS in a new cultural context, which is crucial for understanding the universality and cultural specificity of anxiety in learning foreign languages. The results support the notion that anxiety is not a homogeneous phenomenon and that its manifestations.

4.2 Limitations

The current study has several limitations that must be acknowledged and addressed to improve the understanding of the evaluated constructs and to strengthen the generalization of the findings. First, the use of a cross-sectional analysis provides a snapshot rather than an evolution over time, which may not capture the variability of linguistic anxiety and its impact on language learning over time. Future studies could benefit from a longitudinal design that allows following the same students at several points in time to gain a more dynamic and evolving understanding of how linguistic anxiety affects and is affected by the learning process.

Another notable limitation is the measurement of constructs through the FLCAS. While efforts were made to validate the scale in the specific context of the sample, the reliability indices and internal convergent validity indicated variations in internal consistency and the robustness of the measured constructs. In particular, factor 4 presented reliability issues and a suboptimal AVE in several instances of model re-specification. This suggests that the factorial structure of the FLCAS and its applicability in different linguistic contexts may require more critical evaluation and possibly conceptual revision.

To address these limitations in future research, adopting a probabilistic sampling approach is recommended to enhance the generalizability of the results. It would also be beneficial to complement the cross-sectional design with longitudinal methodologies that can track patterns of linguistic anxiety over time. Additionally, expanding research to a wider range of educational contexts to examine the

measurement invariance and construct validity of the FLCAS in different cultures and educational systems is advisable.

5 Conclusion

From this study, it can be concluded that the FLCAS scale is reliable and valid, with optimal psychometric properties for measuring foreign language anxiety in the classroom among Peruvian secondary school students. These findings are crucial for educators and educational psychologists in Peru, enabling them to implement more effective and targeted strategies to address anxiety in the classroom, which could potentially improve students' academic performance and learning experiences. Additionally, the results indicate a need to further explore variations in anxiety responses that may be influenced by specific cultural factors not fully captured in the adapted version. Future research could benefit from incorporating mixed methodologies that combine quantitative and qualitative approaches to deeply explore the causes and manifestations of anxiety in different educational and cultural contexts. It would also be beneficial to extend the research to other regions of Peru to assess the consistency of these findings across various socioeconomic and cultural settings. Furthermore, longitudinal studies examining the effects of specific interventions aimed at reducing anxiety could provide valuable data on the long-term efficacy of evidence-based practices in the classroom.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Approval was obtained from the Ethics Committee of the Universidad Peruana Unión with code UPeU00868. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

RQ-S: Conceptualization, Data curation, Investigation, Methodology, Resources, Validation, Writing – original draft, Writing – review & editing. GA-S: Conceptualization, Formal analysis, Funding acquisition, Investigation, Resources, Writing – original draft, Writing – review & editing. DQ-S: Writing – review & editing, Writing – original draft, Validation, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. WM-G: Formal analysis, Investigation, Supervision, Validation, Writing – original draft, Writing – review & editing.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2024.1394157/full#supplementary-material

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