RESEARCH ARTICLE

Psychometric Validation of the Mandarin Foreign Language Anxiety Scale in Malaysian Public Universities

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ABSTRACT - Mandarin Foreign Language Anxiety Scale (MFLAS) is an adapted scale designed to measure anxiety among Mandarin foreign language learners. The scale has been validated in two public universities in the United States; however, the validity and reliability of the scale in an Asian context has remained uncertain. Therefore, this study aims to fill this gap by testing the psychometric properties of the adapted scale within the Malaysian context. A quantitative research approach was adopted to assess the validity and reliability of MFLAS. A total of 614 undergraduates learning Mandarin as a foreign language in Malaysian public universities participated in this study. Cronbach's alpha analysis was conducted to evaluate the internal consistency of the scale. Furthermore, Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were conducted to evaluate and confirm the construct validity of the scale. The MFLAS showed acceptable internal consistency (α = .84). CFA confirmed the three-factor structure of the scale, with most items having standardized factor loadings above 0.5 for three factors: Speaking, Listening, and Classroom Anxiety. The study contributed to the literature on the foreign language anxiety in Asia. The revised MFLAS, as a valid and reliable tool offered a valuable resource for educators and researchers to evaluate and address foreign language anxiety among Mandarin foreign language learners. The findings of this study also provide insights that could inform the Ministry of Education and contribute to improving Mandarin language instruction in Malaysia.

1.0   INTRODUCTION

Learning a new language is a highly challenging process for foreign language learners. Many factors contribute to the success of foreign language learning, and one of the factors affecting this is anxiety. Foreign language learning anxiety has been studied and documented in research, with numerous studies highlighting its negative impact on tests, speaking, listening and classroom participation (Alla et al., 2020; Akbar et al., 2018; Naudhani et al., 2018; Ran et al., 2022). To assess the level of foreign language learning anxiety, Horwitz and Cope (1986) developed the first instrument, the Foreign Language Classroom Anxiety Scale (FLCAS) to evaluate foreign language speaking anxiety (Amengual-Pizarro, 2018; Ismail et al., 2022; Zheng & Cheng, 2018). Educators and language instructors worldwide have applied FLCAS as a tool to evaluate foreign language learners' oral communication.

Foreign language anxiety (FLA) has been widely studied, with scales such as the FLCAS being used to measure learners' anxiety. However, FLCAS primarily focuses on learners' speaking anxiety, and it does not adequately address other linguistic features, especially the unique challenge posted by tonal languages such as Mandarin Chinese (Luo, 2014). Given the distinctive linguistic features of Mandarin Chinese, including its tonal nature and character-based writing system, more specific anxiety measurement tool is required to measure language anxiety among Mandarin Chinese learners accurately.

The Mandarin Foreign Language Anxiety Scale (MFLAS) was developed to address this issue. While MFLAS has been validated in the United States (Ferrer & Li, 2021), its applicability in other educational and cultural contexts remains uncertain. The educational policies, cultural background and language learning environment are different from those in the United States. These are potential factors that could affect the anxiety of Mandarin Chinese foreign language learners (Chua & Azlan, 2019). Without proper validation, applying MFLAS in Malaysia may lead to inaccurate assessments and ineffective pedagogical interventions.

Despite the increased demand for Mandarin proficiency in Malaysian public universities, no studies have validated MFLAS in this context. The absence of a validated instrument will limit educators' ability to address and assess language learning anxiety effectively. Therefore, this study aims to fill this gap by evaluating the psychometric properties of the modified MFLAS among Mandarin learners in Malaysian public universities. The findings will provide an appropriate tool to measure and support Mandarin foreign language instruction in Malaysia.

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1.1 Foreign Language Anxiety

Elaine Horwitz first introduced FLA as a psychological concept in the late 1970s. It refers to the feeling of unease, stress and worry that learners experience while learning a second or foreign language. The concept has been studied in second language, applied linguistics and various educational contexts.

In the second language and linguistics contexts, educators have started to pay attention to the variables that affect foreign language anxiety in specific language skills. Researchers found that anxiety affects various aspects of language skills such as speaking (Damayanti & Listyani, 2020; Daud et al., 2019; Djahimo, 2018), listening (Li & Yuan, 2021), reading (Chow et al., 2017) and overall language performance (Liu & Xiangming, 2019; Sabti et al. 2019; Zheng & Cheng, 2018).

In second language learning, anxiety is particularly pervasive. A study by Song et al. (2023) revealed that second language learners showed anxiety across all four language skills, with writing causing the most anxiety, followed by speaking, listening and reading. The primary contributors to writing anxiety include avoidance behaviour, cognitive anxiety, physical anxiety, and negative feedback from teachers writing anxiety (Li, 2022; Tsao et al., 2017). The factors not only hinder learners' writing performance but may also exacerbate their fear and reluctance toward writing tasks. Social, linguistic and personal factors, on the other hand, contribute to speaking anxiety (Daud et al., 2019; Oflaz, 2019).

In Malaysia, studies by Sim et al. (2019) and Ling and Ooi (2023) have demonstrated that linguistic, social and instructional aspects contribute to foreign language anxiety. Malay learners of Mandarin foreign language particularly face many challenges with pronunciations, Chinese character recognition and cultural adaption, which contribute to an increased anxiety level (Chua & Azlan, 2019). Ling and Ooi (2023) argued that due to the character-based writing system and tonal pronunciation, Malay learners of Mandarin face a higher cognitive load compared to English language learners. This further exacerbates their anxiety. However, there is no specific scale in the literature to evaluate these anxieties among Malaysian students.

Many studies (Ahmetović et al., 2020; Ju et al., 2022; Sabti et al., 2019; Shao et al., 2020) have shown that foreign language anxiety is negatively correlated with language achievement. Learners with high levels of anxiety tend to perform poorly in foreign languages, avoid language activities in the classroom, and have unfavourable foreign language learning experiences. Educators must create a supportive psychological environment in language classrooms and understand how anxiety can negatively influence learners' language performance. Understanding these phenomena enables educators to design specific teaching strategies, which can help foreign learners reduce their anxiety, and at the same time help foreign language learners to engage more confidently and actively in their language learning.

1.2 Anxiety Scale for Foreign Language Learners

It is important to accurately evaluate foreign language anxiety (FLA) to identify and understand the psychological factors that hinder learners' language learning process. To do so, researchers developed various psychometric instruments specifically to assess the anxiety experienced by foreign language learners. Among these scales is the Foreign Language Classroom Anxiety scale (FLCAS) and the Chinese Language Anxiety Scale (CLAS). FLCAS, developed by Horwitz, Horwitz, and Cope (1986), is one of the most widely used instruments to measure anxiety in various educational settings. The scale includes 33 items covering three dimensions: communication apprehension, test anxiety and fear of negative evaluation. FLCAS is widely validated across various languages and learners' populations, it provides a comprehensive assessment to general foreign language anxiety and classroom anxiety among foreign language learners. However, FLCAS focuses only on speaking anxiety, paying less attention to listening, reading and writing skills. FLCAS does not account for specific target language features such as Mandarin Chinese (e.g. tonal language and script writing system). In addition, FLCAS was developed in Western educational settings, and cultural differences may affect its application in Asian learning contexts (Zheng & Cheng, 2018).

Recognising the limitations of FLCAS for Mandarin Chinese language learners, Luo (2014) developed the Chinese Language Anxiety Scale (CLAS) to measure anxiety specific to learning Mandarin Chinese as a foreign language. Unlike FLCAS, CLAS is a skill-specific scale that includes specific challenges faced by Mandarin Chinese language learners in four language skills: Second Language Speaking Anxiety Scale (SLSAS), Foreign Language Listening Anxiety Scale (FLLAS), Foreign Language Reading Anxiety Scale (FLRAS) and Foreign Language Writing Anxiety Scale (FLWAS). CLAS was developed specifically for Mandarin learners, addressing specific challenges such as tonal pronunciation and characters-based writing system, it is more linguistically relevant compared to FLCAS, and provides insight into distinct aspects of Mandarin learning anxiety. However, the validation of CLAS has been limited to a small group of learners from only two universities in the US (Ferrer & Li, 2021). CLAS, validated for heritage and second-language learners, does not fully address the needs of foreign language learners in multilingual learning environments.

While FLCAS and CLAS provide valuable insights into foreign language anxiety, none of these scales have been fully validated in the Malaysia context, where Mandarin Chinese is learned as a foreign language in Malaysian public universities by non-native speakers. Existing scales have their own gaps. To address these gaps, the study aims to validate the Mandarin Foreign Language Anxiety Scale (MFLAS) in Malaysia, ensuring it accurately reflects the anxiety experienced by Malaysian Mandarin foreign language learners.

1.3 Mandarin Language Learning in Malaysia

Mandarin education for non-native speakers in Malaysian public universities began in the 1960s at Universiti Malaya (UM) and has since grown in popularity in Malaysia due to factors such as economic growth and good diplomatic ties with China, and the global significance of Mandarin. In Malaysia, mastering Mandarin is part of the National Higher Educational Action Plan and the Malaysia

Education Blueprint 2015-2025, making it a required subject alongside the national language Malay, and the second language, English (Chua & Azlan, 2019). The demand for Mandarin language courses in Malaysian public institutions has increased, reflecting its recognition of Mandarin proficiency as a valuable asset in employment and international communication. All 20 public universities in Malaysia offer Mandarin either as a third language or a foreign language, in addition to Malay as the first language and English as the second language.

Malay learners of Mandarin as a foreign language (MFL) encounter distinct challenges shaped by Malaysia's multicultural and multilingual context. Existing research highlights three key difficulties: (1) mastering Chinese characters (logographic writing system), (2) navigating sociolinguistic norms in Mandarin communication (Sim et al., 2019), and (3) overcoming phonological differences, particularly in tone production (Ling & Ooi, 2023). These linguistic and cultural barriers underscore the need for context-sensitive pedagogy. By deepening their understanding of these Malaysia-specific learning challenges, Mandarin educators and researchers can develop more effective, learner-centred instructional approaches.

2.0   METHODOLOGY

2.1   Participants

This study adopted a quantitative design with cluster sampling to capture diverse Mandarin learning in the Malaysia context. Participants were recruited from 5 public universities offering Mandarin courses for non-native learners. A total of 624 undergraduates, a sample size exceeding the 300-participant threshold recommended for psychometric validation (Boateng et al., 2018; White, 2022). The season to select entire classes across institutions rather than individual students to ensure both institutional representation and demographic diversity, to generalise findings of tertiary education in Malaysia context.

To maintain homogeneity, this study exclusively enrolled beginning-level Mandarin learners with Malay as their first language (L1) and English as the second language (L2). Participants were drawn from diverse academic disciplines but shared a common Mandarin learning trajectory - all were completing the 120-hour compulsory course offered by their universities. Initial recruitment yielded 624 eligible candidates, though 10 respondents submitted incomplete questionnaires during data collection. After applying these exclusion criteria, the final dataset contained 614 complete responses, enhancing the internal validity of subsequent analyses.

2.2   Measures

To better assess anxiety among Asian Mandarin learners, this study modified Luo's (2014) Chinese Language Anxiety Scale (CLAS). The research team carefully reviewed the original scale and adjusted certain items to better reflect the common teaching practices in Malaysia. The revised version, renamed as Mandarin Foreign Language Anxiety Scale (MFLAS), consisted of 16 items. The original scale established a strong internal consistency coefficient of 0.83 in two United States universities. To validate the content of MFLAS, three experts in foreign language education and psychometrics were consulted. The experts' input was very helpful in refining the scale, to make the scale clearer, relevant and well-aligned with the Malaysian learning context. This step is essential to minimize the potential bias that could arise during the adaptation process.

In addition, a pilot test was conducted with 50 undergraduates, who were not included in the final data. The pilot test aimed to evaluate the reliability and clarity of the revised MFLAS. The pilot test results indicated a good internal consistency coefficient of 0.82. This step ensured that each item was included in the final scale as expected before being administered to the full sample. The pilot test was valuable in validating the modified scale and making its effectiveness fit for the intended application.

The final version of the scale was subsequently distributed to participants. They were instructed to rate the statements using a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree), to reflect their level of agreement or disagreement with each statement. Researchers provided the MFLAS in both participants' L1 (Malay language) and their L2 (English), to ensure participants responded clearly and accurately. This bilingual approach aimed to minimize potential misunderstandings and to enhance the reliability of the participants' responses.

To evaluate the internal consistency of the MFLAS, Cronbach's alpha was used. The analysis yielded a coefficient of 0.841, indicating a good internal consistency. This value exceeds the threshold of .70, which is widely recommended by researchers (Boyer et al. 2022; Jansen et al. 2021). As a result, this finding supports the reliability of the MFLAS as a tool for assessing anxiety among Mandarin foreign language learners at Malaysian public universities.

2.2   Statistical Analysis

To ensure the comprehensiveness and accuracy of the findings, statistical analyses were conducted. The chi-square value, degrees of freedom, and respective p-values were calculated. An Exploratory Factor Analysis (EFA) was carried out to evaluate the construct validity of the MFLAS, and a Confirmatory factor analysis (CFA) was performed using AMOS 24 to further validate the scale. Two-tailed tests were utilized with a significance level of 0.05 to assess the statistical significance of the results. Three-factor models were analysed using SPSS to determine the goodness-of-fit of the factor structure. Several model fit indices were employed in this study, such as the goodness-of-fit index (GFI) of .958, Tucker-Lewis's index (TLI) of .932, normed fit index (NFI) of .939, comparative fit index (CFI) of .953, and root-mean-square error of approximation (RMSEA) of .071.

3.0   RESULTS AND DISCUSSION

3.1   Demographic Data

A total of 624 Mandarin foreign language learners were surveyed, and after the data screening, 614 data responses were included in the analysis. The participants' demographic data included gender, age, native language, Mandarin proficiency and duration of Mandarin study. The analysis indicated that the majority of participants were female, constituting 80% (n = 481), while males accounted for 20% (n = 123) of the sample. Regarding respondents' age, a significant proportion, 65% (n = 399), fell within the 21 to 22-year age group, while 20.7% (n = 127) were in the 23 to 24-year age group. Additionally, 11.1% (n = 68) of the respondents were between 18 and 20 years old. In contrast, a smaller fraction, 3.3% (n = 20), were aged 25 years old. Analysis of the participants' Mandarin proficiency levels showed at the time of data collection, 45.5% (n = 281) were at Mandarin level 1, 23.6% (n = 145) were at level 2, and 30.5% (n = 187) were at level 3.

Furthermore, the majority of the participants (97.1%, n =596) stated that their first Language was Malay (the Malaysian national language), while 0.7% (n =4) spoke Tamil and another 0.7% (n = 4) spoke English. In comparison, 1.6% (n = 10) spoke other indigenous Malaysian languages from Sabah and Sarawak, such as   Bahasa Iban, Rungus, Kadazan, and Kenya. Regarding the duration of Mandarin learning, the analysis indicated that 45% of the participants (n = 276) had studied Mandarin for one semester, while 23.9% had studied Mandarin for at least two semesters. Furthermore, 29.6% (n =182) of the participants had studied Mandarin for three semesters, whereas only one participant (0.2%) had studied Mandarin for four semesters. Additionally, 0.5% (n = 3) had studied Mandarin for five semesters, while 0.7% (n = 4) had attended Malaysian Chinese primary schools.

3.2   Exploratory Factor Analysis of MFLAS

To evaluate the construct validity of the modified MFLAS, EFA was conducted. Previous studies suggested that for meaningful factor analysis, all scale items should demonstrate correlations of at least 0.30. (Maskey et al., 2018; Pallant, 2020). In this study, the correlation matrix (Table 1) revealed coefficients ranging from 0.326 to 0.759, confirming strong inter-item relationships. Therefore, the result supports the suitability of data for factor analysis and further statistical examinations.

Table 1

Correlation matrix of MFLAS

Variable	ANX8S	ANX 9S	ANX11S	ANX 13S	ANX 15S	ANX 5L	ANX 6L	ANX 12L	ANX1C	ANX 2C	ANX 3C
ANX8S											
ANX9S	.578										
ANX11S	.378	.326									
ANX13S	.503	—.535	.390								
ANX15S	.335	.574	.631	.484							
ANX5L	.578	.410	.546	.343	.560						
ANX6L	.362	.465	.577	.364	.631	.566					
ANX12L	.465	.553	.463	.417	.434	.421	.587				
ANX1C	.329	.440	.457	.330	.359	.470	.402	.490			
ANX2C	.322	.471	.337	.408	.638	.475	.496	.426	.410		
ANX3C	.377	.429	.433	.340	.358	.459	.442	.592	.587	.759	

To assess the sampling adequacy of the MFLAS construct, the Kaiser-Meyer-Olkin (KMO) Measure and Bartlett's Test of Sphericity were applied. The KMO value of 0.827 exceeded the recommended threshold of 0.60 (Shrestha, 2021; Thomas, 2019), indicating strong sample adequacy. Additionally, the Bartlett's Test of Sphericity yields statistically significant results ($\chi2$ (55) =2521.993, p < .05), further validating the dataset's suitability for factor analysis. As summarised in Table 2, these results confirm that data met all necessary assumptions for robust factor analysis.

Table 2

 MFLAS sampling adequacy

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.827
Bartlett's Test of Sphericity	Approx. Chi-Square	2521.993
	df	55
	Sig.	0.000

The anti-image correlations and communalities were also analysed to assess their suitability. The anti-image correlations fell within an accepted range (0.506-0.788), while communalities demonstrated even stronger values (0.689-0.901), further confirming the appropriateness of all items for factor analysis. After verifying KMO, Bartlett's test of sphericity, eigenvalues, anti-image matrices and

total variance, the rotated matrix was examined to determine the number of factors in the scale. The first factor identified was speaking anxiety, as five items loaded highly won it. According to the Kaiser criterion, only factors with eigenvalues greater than one (Pallant, 2020) should be considered. Based on this criterion, EFA identified three significant factors, with each factor consisting of at least three items. In comparison, three items loaded significantly on factor 2, labelled "Listening Anxiety". Finally, three items loaded highly on factor 3, labelled "Classroom anxiety". As presented in Table 3, these three factors accounted for 65.672% of the total variance in the scale, with the highest eigenvalue for factor 1 at 4.216, followed by factor 2 at 1.635 and factor 3 at 1.373.

Table 3

Rotated matrix for MFLAS

		Factor			
		Speaking	Listening	Classroom	Communalities
ANX9S	I often feel like I am not speaking in my Mandarin class.	0.875			0.62
ANX11S	I feel more tense and nervous speaking in Mandarin than in my other classes.	0.832			0.71
ANX13S	I am afraid that the other students will laugh at me when I speak Mandarin.	0.721			0.68
ANX15S	It embarrasses me to volunteer answers in my Mandarin class.	0.720			0.56
ANX8S	I do not feel confident when I speak in the Mandarin class.	0.670			0.64
ANX6L	I worry about the consequences of not understanding my Mandarin class.		0.910		0.72
ANX5L	It frightens me when I do not understand what the teacher is saying in Mandarin.		0.827		0.73
ANX12L	I get nervous when I do not understand every word the teacher says in Mandarin class.		0.545		0.68
ANX2C	I am usually at ease during my Mandarin class.			0.839	0.72
ANX3C	If I am well-prepared for Mandarin class, I don't feel anxious.			0.787	0.65
ANX1C	I do not worry about making mistakes in Mandarin class.			0.715	0.52
	Eigenvalue	4.216	1.635	1.373	
	Cronbach's alpha	.836	.760	.667	
	Omega reliability	.844	.771	.686	

Four items were ultimately excluded from the final analysis because they contribute insignificantly to factor formulation, including having low factor loadings, cross-loadings and loading on hypothesized factors. A clear factor pattern emerged; the loadings were interpretable for the remaining 11 items. As previously highlighted, factor 1 consisted of five items labelled "Speaking Anxiety," with loadings ranging from 0.67 to 0.88. Factor 2 consisted of three items labelled "Listening Anxiety," with loadings ranging from 0.55 to 0.91. Factor 3, representing "Classroom Anxiety", included three items with loadings ranging from 0. 72 to 0.84.

Table 4

Final factor inter-correlation matrix (MFLA)

Factor	1	2	3
1	1.000	0.400	0.312
2	0.400	1.000	0.167
3	0.312	0.167	1.000

The correlation matrix was replicated to verify that the factor solution was correct. The items associated with the three extracted factors were labelled "Listening Anxiety", "Speaking Anxiety", and "Classroom Anxiety". Initially, the three factors accounted for 62.2% of the total variance. However, after removing the four aforementioned items (4,7,10,14) from the analysis, the explained variance increased to 65.67%. This suggests that the scale successfully captures key dimensions of language anxiety in Mandarin learners, aligning with Zheng and Cheng's (2018) finding in their validation of foreign language anxiety constructs. The correlations among the

extracted factors ranged from 0.167 to 0.400, as shown in Table 4. In conclusion, the exploratory factor analysis of the MFLAS items resulted in an interpretable three-factor structure.
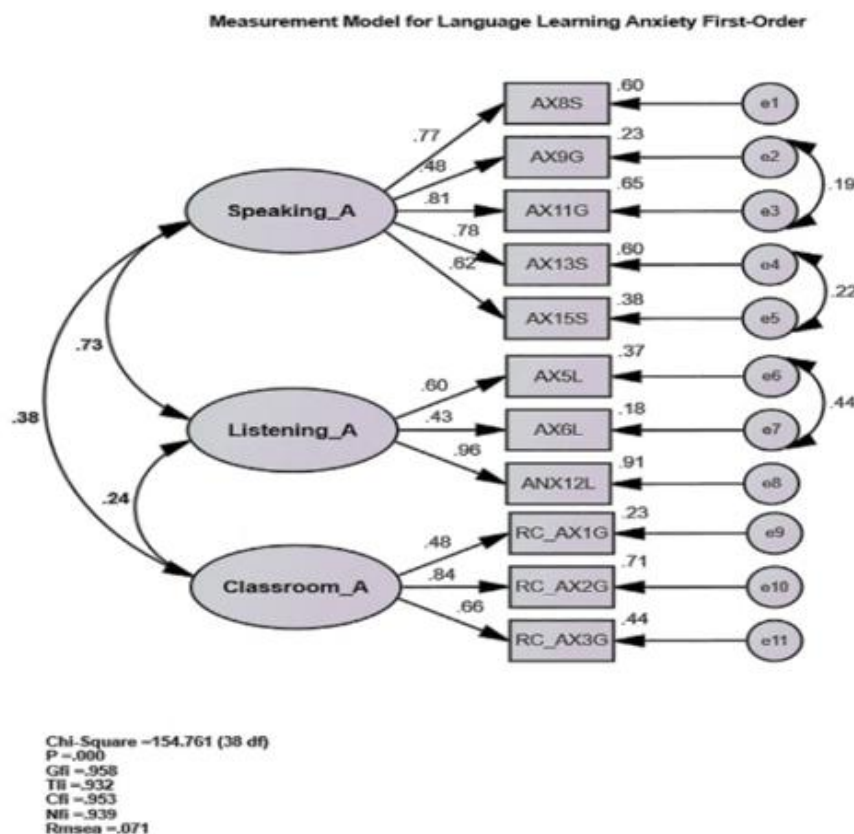
3.3 Confirmatory Factor Analysis of MFLAS

CFA was also performed on the MFLAS construct. The construct included three distinct factors, identified through EFA: Speaking Anxiety, Listening Anxiety and Classroom Anxiety. Speaking anxiety consisted of five highly loaded items while Listening Anxiety and Classroom Anxieties each comprised three items. The 11 highly loaded items were analysed using the measurement model (first and second order) and were all retained as significant contributors to their latent variables. In addition to estimating the parameters, Maximum Likelihood Estimation (MLE) was employed to confirm the construct validity of the dimension's factors. Various fit indices were used to evaluate the overall model fit. The analysis yielded a chi-square of χ² (38) = 154.761, p = .001. This chi-square result suggests a poor model fit. However, the Chi-square test and its p-value are known to be highly sensitive to large sample sizes (Yoon & Lai, 2018; Kyriazos, 2018). Therefore, additional goodness-of-fit indices were used to assess the model's overall fit.

The results yielded fit indices that met the recommended critical value of 0.90. The Goodness-of-Fit Index (GFI) achieved 0.958, Tucker-Lewis Index (TLI) was 0.932, Normed Fit Index (NFI) was 0.939, Comparative Fit Index (CFI) was 0.953, and Root Mean Square Error of Approximation (RMSEA) was 0.071. The chi-square value divided by its degrees of freedom (CMIN/DF) was 4.07, indicating an adequate model fit, as this value falls well below the maximum recommended threshold of 5, as shown in Figure 1. There were no problematic estimates, such as negative variances or excessively high fit indices, supporting this conclusion. The factor loadings for each of the language learning anxiety dimensions were all significantly above 0.50. Furthermore, significant covariance r was found among the three dimensions of the construct. The analysis revealed covariances of 0.38 (speaking-classroom anxiety) 0.73(speaking–listening anxiety), and 0.24(listening-classroom anxiety).

Figure 1

MFLA Measurement Model 1st order

Measurement Model for Language Learning Anxiety First-Order

Chi-Square =154.761 (38 df)
P =.000
Gfi =.958
Tli =.932
Cfi =.953
Nfi =.939
Rmsea =.071

Additionally, the researcher evaluated and presented both unstandardised and standardised regression weights, standard error, critical ratio, and squared multiple correlation indicators for language learning anxiety to support goodness-of-fit indices, as shown in Table 5. Furthermore, item reliability was thoroughly assessed, and except for minor cases, squared multiple correlation indicators exceeded the recommended value of 0.50 (Hancock et al., 2018). The findings implied that nearly two-thirds of the variance was explained by the items associated with the construct. However, although three items failed to reach the recommended value of 0.50, they were retained because of their significant impact on the content and construct validity. These elements were also retained because estimates of other fit indices, including construct reliability, extracted variance, and factor loadings remained reasonable and appropriate. Furthermore, eliminating these items would reduce the number of items to fewer than three on some components, potentially leading to identification problems. The factor loadings, which measure the correlation coefficients between indicators and

common latent factors, also showed higher values for the dimensions of speaking anxiety, listening anxiety and classroom anxiety within the language learning anxiety construct, respectively.
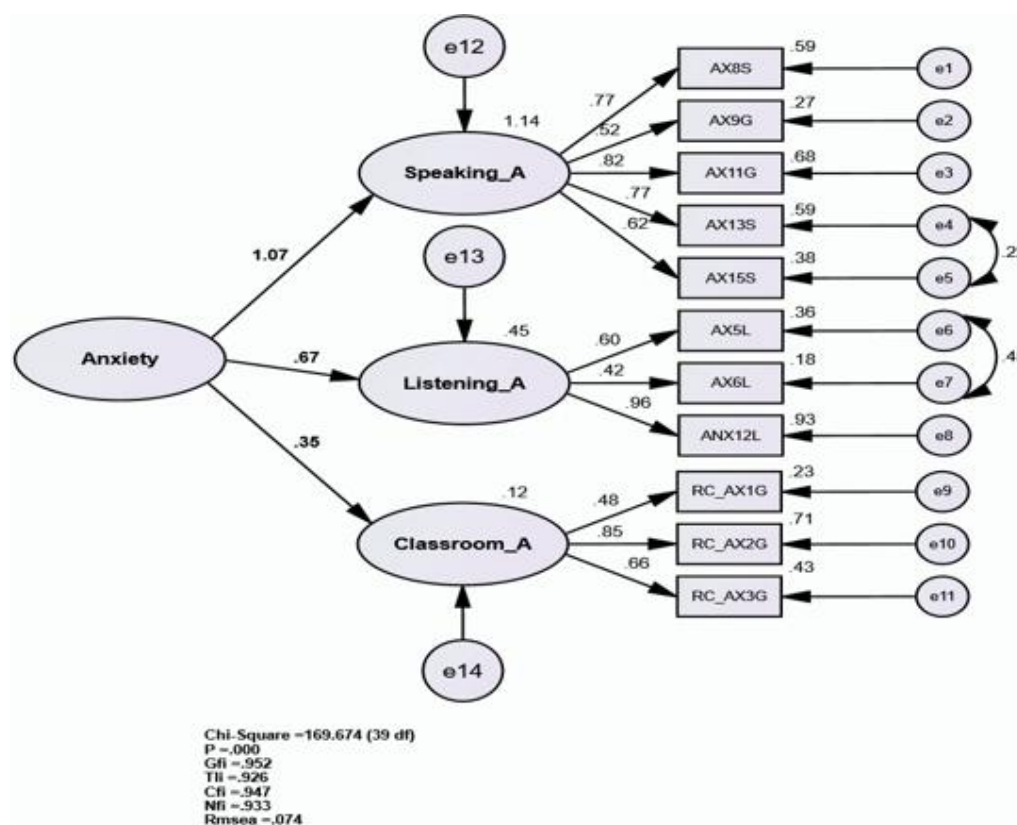
Table 5

Indicator loading for MFLAS first-order measurement model

Model	Item	Unstandardised	Standardised	Standard error	Critical ration	Squared multiple correlations
	AX8S	1.000	.771			.438
	AX9G	.527	.476	.048	10.892	.706
	AX11G	1.054	.805	.054	19.361	.230
	AX13S	1.136	.775	.061	18.600	.915
Measurement Model for Language Learning Anxiety (First order)	AX15S	.849	.617	.059	14.432	.183
	AX5L	1.000	.604			.365
	AX6L	.656	.428	.053	12.303	.381
	ANX12L	1.852	.957	.149	12.399	.601
	RC_AX1G	1.000	.479			.649
	RC_AX2G	1.449	.840	.158	9.187	.226
	RC_AX3G	1.017	.662	.104	9.768	.595

The second-order measurement model of Mandarin foreign language learning anxiety was tested after the examination of the first-order model. The hypothesised measurement model for language anxiety with standardised loadings is illustrated in Figure 2. The second-order measurement model consists of three dimensions: speaking anxiety, listening anxiety, and classroom anxiety, similar to the first-order model. Maximum Likelihood Estimation was also employed to estimate parameters in the measurement model and to examine whether the dimensions in question met the requirement of unidimensionality. Several indices were evaluated to determine the overall goodness-of-fit. The analysis produced a chi-square value of 169.674, df = 39, p = 0.001. The significant p-value in the measurement model and structural equation suggested a poor fit. Due to this sensitivity, particularly with a large sample size, supplemental indices were used to assess the model's goodness-of-fit. The resulting fit indices exceeded the recommended threshold of 0.90. The GFI reached 0.952, TLI = 0.926, NFI = 0.933, CFI = 0.947, and RMSEA = 0.074.

Figure 2

MFLA measurement model 2nd order

Additionally, the chi-square value divided by its degrees of freedom (CMIN/DF) indicated the model was appropriate. The index value, as shown in Table 6, suggested the uniqueness of this model and that its construct validity was met since the obtained value was below the maximum recommended threshold of 5. This result was consistent with numerous previous studies that have identified speaking, listening and classroom anxiety as distinct factors in foreign language anxiety (Luo, 2014; Jee, 2019). This conclusion was further supported by the absence of negative error variances in the results and the high levels of the goodness-of-fit indices. Remarkably, the values were substantial, all exceeding the recommended threshold of 0.50 for factor loading. The covariance among the factors was 1.07 for speaking anxiety, 0.67 for listening anxiety, and 0.35 for classroom anxiety.

In addition, the researchers examined and presented the unstandardised and standardised regression weights, standard errors, critical ratios, and squared multiple correlations of anxiety in learning Mandarin as a foreign language in Table 6 to support the evaluation of goodness-of-fit indices. Furthermore, the reliability of the items was carefully assessed. The results indicated that most squared multiple correlation coefficients in this measurement model, with a few exceptions were greater than the recommended threshold value of 0.50.

This finding suggests that the majority of the underlying dimensions in this analysis accounted for more than half of the total variance in each indicator. Although some items did not meet the threshold of 0.50 cut-off point, they were kept in the analysis because they were particularly important indicators of the relevant dimension, and the content validity associated with these items was high. Another reason for retaining these items was that other estimates, such as composite reliability, extracted variance, and factor loadings, remained acceptable. More importantly, eliminating these indicators could result in an identification issue as some factors would be left with fewer than three indicators, which could potentially cause identification problems. The study also found that the factor loadings were relatively high for each of the three factors.

Table 6

Indicator loading for Mandarin foreign language learning anxiety second-order measurement model

Model	item	Unstandardised	Standardised	Standard error	Critical ration	Squared multiple correlations
Measurement Model for Language Learning Anxiety (Second order)	Speaking_A	4.545	1.067	.977	4.650	.124
	Listening_A	1.856	.668	.337	5.515	.446
	Classroom_A	1.000	.352			1.139
	AX8S	1.000	.767			.433
	AX9G	.577	.518	.047	12.276	.715
	AX11G	1.083	.823	.054	19.911	.228
	AX13S	1.132	.768	.061	18.543	.930
	AX15S	.857	.620	.059	14.618	.180
	AX5L	1.000	.599			.359
	AX6L	.655	.424	.053	12.278	.385
	ANX12L	1.882	.964	.156	12.049	.589
	RC_AX1G	1.000	.477			.677
	RC_AX2G	1.464	.845	.160	9.140	.268
	RC_AX3G	1.015	.658	.104	9.759	.589

In brief, the first-order measurement model of the MFLAS is more appropriate than the second-order model, as indicated by the superior goodness-of-fit indices for the first-order model, including chi-square along with its degree of freedom, GFI, CFI, TLI, and RMSEA. Consequently, the Mandarin Foreign Language Anxiety Scale (MFLAS) is categorised psychometrically into three dimensions: speaking anxiety, listening anxiety, and classroom anxiety.

4.0   CONCLUSION

This study validated the MFLAS for use among non-native Mandarin learners in Malaysian public universities. The findings revealed three key anxieties: speaking anxiety, listening anxiety, and classroom anxiety, which significantly impacted the experience of learning Mandarin as a foreign language. The adapted MFLAS demonstrated strong reliability (Cronbach's alpha = 0.84) and validity, confirming its suitability as a measurement tool. These findings contribute to a broader understanding of Mandarin Chinese anxiety, aligning with previous studies. The study highlights that speaking anxiety, listening anxiety, and classroom anxiety are factors affecting students

while learning Mandarin as a foreign language. The factors identified in this study as crucial in explaining the construct of Mandarin foreign language anxiety support the views of Chinese language anxiety proposed by previous researchers (Luo, 2014; Zheng & Cheng, 2018; Li, 2022).

Future research should address several limitations identified in this study. First, as the study sample comprised Malay Muslim learners from Malaysian public universities, future studies should include participants from diverse ethnic and cultural backgrounds to enhance the generalisation of the finding. Second, this study gathered information from non-native Mandarin learners who study Mandarin as a foreign language and primarily focus on Pinyin rather than Chinese characters. Consequently, future research should explore learning Mandarin as a foreign language using various techniques, including the study of Chinese characters, which could yield valuable insights. Lastly, the study relied on self-reported data, which may be subject to bias. Future research should incorporate a mixed-method approach, combining both qualitative interviews or classroom observation and quantitative surveys to provide a more comprehensive understanding of Mandarin Chinese learning anxiety.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

AUTHOR CONTRIBUTIONS

Suo Yan Ju (Resources, Data curation, Writing – original draft)

Mikail Ibrahim (Methodology, Formal analysis)

Suo Yan Mei (Writing – review & editing)

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