Validating and Shortening the Achievement Emotions Questionnaire (AEQ) for Measuring Positive Emotions in Foreign Language Learning and Classroom Settings¹

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Abstract

Motivated by the 'emotional turn' in applied linguistics and the recent introduction of positive psychology in L2 studies, the present study aimed to validate and shorten the Achievement Emotions Questionnaire (AEQ) for measuring positive emotions in foreign language learning and classroom settings. To this end, data were collected from 442 Iranian English as a Foreign Language (EFL) students from several major state universities using the adapted sub-scales of positive classroom- and learning-related emotions of the AEQ. To prepare the short version, five items with the highest factor loadings in each of the six sub-scales were retained, which resulted in a total of 30 items. A six-factor model of this short version called Foreign Language Positive Emotions Questionnaire (FL-PEQ) was corroborated, which indicated that this measure could adequately differentiate between enjoyment, hope, and pride in foreign language 'learning' and 'classroom'. Additionally, internal validity, convergent validity, and discriminant validity of the FL-PEQ were confirmed.

Resumen

Motivado por el "giro emocional" en la lingüística aplicada y la reciente introducción de la psicología positiva en los estudios de L2, el presente estudio tuvo como objetivo validar y acortar el Cuestionario de Emociones de Logro (AEQ) para medir las emociones positivas en el aprendizaje de lenguas extranjeras y en el aula. Con este fin, se recopilaron datos de 442 estudiantes iraníes de inglés como lengua extranjera (EFL) de varias universidades estatales importantes utilizando las subescalas adaptadas de emociones positivas relacionadas con el aula y el aprendizaje del AEQ. Para preparar la versión corta, se retuvieron cinco ítems con las cargas factoriales más altas en cada una de las seis subescalas, lo que resultó en un total de 30 ítems. Se corroboró un modelo de seis factores de esta versión corta llamado Cuestionario de Emociones Positivas en Lenguas Extranjeras (FL-PEQ), que indicó que esta medida podía diferenciar adecuadamente entre disfrute, esperanza y orgullo por el "aprendizaje" y el "aula" de lenguas extranjeras. Además, se confirmó la validez interna, la validez convergente y la validez discriminante del FL-PEQ.

Introduction

Students generally experience a wide range of emotions during learning activities in classroom (Pekrun et al., 2002), which can, in turn, significantly affect their learning processes (Dörnyei, 2014). The crucial importance of emotions has been generally emphasized in learning (Pekrun, 2006; Weiner, 2010) to the extent that the teaching activity and the classroom environment have been considered as an 'emotional practice' (Hargreaves, 2001) and an 'emotional place' (Pekrun & Linnenbrink-Garcia, 2014), respectively.

Similar to learning other subjects (e.g., mathematics and science), the language learning process and language classes are replete with a wide variety of emotions including anxiety, shame, enjoyment, and pride, etc. (Bown & White, 2010; Shao et al., 2020; Swain, 2013). Foreign/Second language (L2) learning is best considered as not only a cognitive/rational process but also a social and 'emotionally-charged' one (Richards, 2022). As key dynamic processes in L2 learning, emotions are "affective experiences that are tied directly to language learning activities and resulting learning outcomes" (Shao et al., 2019, p. 2) and can affect learners' attention and cognitive processes, interest, and engagement in foreign language learning (Shao et al., 2019). Therefore, it is highly crucial to take into account their role in L2 learning.

Research on emotions in foreign language learning

Research on factors affecting how students learn has captured the importance of both cognitive and emotional factors. However, most studies have generally focused on cognitive aspects while failing to pay due attention to the essential role of emotions in L2 learning (Dewaele, 2015; Richards, 2022; Shao et al., 2019; White, 2018). Motivated by the extensive research addressing emotions in educational psychology, a growing body of studies has recently addressed emotions in L2 learning over the past decade (Gkonou et al., 2020; Pekrun et al., 2019). However, the extant research on L2 emotions has mainly addressed negative

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emotions such as anxiety (see Cheng, 2017; Teimouri et al., 2019; Zhang, 2019) as well as shame and guilt (Teimouri, 2018) rather than positive emotions.

Over the past few years, following the 'emotional turn' in applied linguistics (Benesch, 2013) as well as the application of positive psychology in L2 research (see Budzińska & Majchrzak, 2021; Derakhshan, 2022; Dewaele et al., 2018; Kushkiev, 2019; Oladrostam & Rezaee, 2019; Rezaee & Oladrostam, 2018), an unprecedented number of studies have focused on the significant and facilitative role of positive emotions in L2 learning (e.g., Reilly, 2021; Shao et al., 2020; Zhang & Tsung, 2021). For example, several studies have documented the important effect of positive emotions on learners' motivation (Dörnyei, 2014), engagement (Arnold, 2009; Sadoughi & Hejazi, 2021), grit (Hejazi & Sadoughi, 2023), willingness to communicate (Sadoughi & Hejazi, 2023a), interest and thinking (Fredrickson & Losada, 2005), creativity, performance, and social cohesion (Shao et al., 2019). In fact, a growing body of research has addressed the undeniable role of positive emotions in L2 learning.

Positive emotions in foreign language learning

Positive emotions are considered as one of the three main elements of positive psychology (Seligman & Csikszentmihalyi, 2000). Based on broaden-and-build theory (Fredrickson, 2001), positive emotions have an enormous potential to help EFL learners broaden their perspectives to specifically devote their cognitive resources to foreign language learning processes (Shao et al., 2019). Additionally, recent research has showed that positive emotions have a positive relationship with working memory (Figueira et al., 2018), motivation (Pekrun, 2014), and self-regulated learning (Alexander et al., 2018). Furthermore, fostering positive emotions in L2 classes can help build "an affectively positive environment [which can] put the brain in the optimal state for learning" (Arnold, 2009, p. 146). In fact, positive emotions enhance students' interest and thinking and enable them to concentrate their attention on learning activities by promoting their awareness of the foreign language input and engagement in learning tasks (Dewaele et al., 2016; White, 2018). Additionally, they can increase learners' willingness to communicate and risk-taking (Dewaele et al., 2018). Furthermore, they help learners maintain their interest and sustain their effort in the lengthy process of learning a foreign language (Hejazi & Sadoughi, 2023). Hence, effective measures should be taken to not only decrease the debilitating effects of learners' negative emotions but also enhance their positive emotions (Gregersen, 2013), which can in turn maximize their involvement and engagement in foreign language classes (Richards, 2022).

Measures of L2 positive emotions

A growing body of studies has recently focused on measuring positive emotions relating to foreign language learning. However, most of these studies have mainly addressed 'enjoyment' by developing and/or validating measurement scales (see Botes et al., 2021, 2022; Dewaele & MacIntyre, 2016; Jiang & Dewaele, 2019; Jin & Zhang, 2018; Li et al., 2018). The review of literature indicates that while foreign language enjoyment has received growing attention (Elahi Shirvan et al., 2021; Dewaele, 2022), there has been a lesser research focus on other positive emotions such as 'hope' and 'pride'.

One comprehensive, domain-general, and theory-grounded scale to assess positive and negative achievement emotions is Achievement Emotions Questionnaire (AEQ) which was originally developed by Pekrun et al. (2011). AEQ is one of the most widely used measures in education and educational psychology to investigate learners' achievement emotions. Deeply rooted in control-value theory (Pekrun, 2006) and informed by the social-cognitive perspective, AEQ classifies different emotions (enjoyment, hope, pride, relief, anger, anxiety, hopelessness, shame, and boredom) based on three main dimensions, namely, valence (positive or negative), activation level (activating or deactivating), and object focus (activity or outcome) in learning, classroom, and test situations, and at different time intervals corresponding to each situation (i.e., before, during, and after) (Pekrun et al., 2011). It should be noted that several studies have showed that there are meaningful relationships between emotions measured by AEQ and external variables such as achievement and attributions of success and failure (Frenzel et al., 2007) as well as psychobiological personality dimensions (Moreira et al., 2019).

Several attempts have been made to validate the AEQ in different domains and contexts (e.g., Bhansali & Sharma, 2020; Fierro-Suero et al., 2020; Govaerts & Grégoire, 2008; Lichtenfeld et al., 2012; Moreira et al., 2019; Peixoto et al., 2015). These studies have generally confirmed the psychometric proprieties of AEQ in different populations. In a recent study, Bieleke et al. (2021) introduced the short form of AEQ and reported its high validity and reliability. The short version includes 96 items measuring eight different

emotions relating to classroom, learning, and test with four items per scale. Similar to the original questionnaire, the short version is correlated with external measures, i.e., antecedents (e.g., perceived academic control, self-efficacy, and task value) and consequences of academic emotions (e.g., motivation, learning strategies, and self-regulation).

Although several L2 studies have used AEQ to measure emotions (e.g., Reilly & Rosas, 2019; Tan, 2017; Yükselir & Harputlu, 2014), only a few studies have attempted to examine the factor structure of this questionnaire to measure emotions relating to foreign language *learning* and *classroom* in general and *positive emotions* in particular. In a recent study, Davari et al. (2020) examined the factor structure of *only* the *classroom* emotions sub-scales among Iranian foreign language learners through Confirmatory Factor Analysis (CFA). Their findings indicated that the classroom sub-scale for positive and negative emotions had a good model fit, and its factor structure was invariant across gender (i.e., male and female) and learning context (language institutes and university). This validation study did not consider other sub-scales of AEQ, i.e., those relating to learning and test situations. To the best of our knowledge, no systematic study has specifically focused on *all* positive emotions of EFL learners in *learning* and *classroom* settings based on AEQ.

It is argued that the validity of psychometric measures should be examined for further use in different contexts (Li et al., 2018) and domains (Butz et al., 2016; Goetz et al., 2007; Götz et al. 2010; Shao et al., 2019). Accordingly, in response to Shao et al.'s (2019) call for further extensive research on achievement emotions in L2 and considering the utmost importance and the excellent potential of positive emotions in L2 learning (MacIntyre et al., 2019; Shao et al., 2020), the present study aims to fill in this research gap by focusing on positive emotions in foreign language learning and classroom. More specifically, this study is an attempt to prepare a psychometrically valid and reliable measure called Foreign Language Positive Emotions Questionnaire (FL-PEQ) based on AEQ. It should be noted that AEQ is a rather long measure with a large number of items, which could make it difficult and time-consuming to administer in empirical studies. Therefore, following Dörnyei and Taguchi's (2010) suggestions to ensure an appropriate length of questionnaires for efficient administration and avoid respondents' fatigue, the present study aims to prepare a short version for assessing positive emotions in foreign language classroom and learning.

Method

Participants and procedure

A total of 442 Iranian EFL university students in Tehran (the capital city of Iran) were randomly chosen via multi-stage cluster sampling from six leading state universities in winter 2019. At the time of data collection, the students (50.5% males & 49.5% females; mean age=21.1 years) were taking a compulsory general English course offered by English language departments in their universities. They were all native speakers of Persian, had learned English in secondary school, and were at an intermediate proficiency level. A total of 450 questionnaires adapted from the AEQ were distributed among the participants, and the return rate was 99%. In the questionnaires, the participants first provided their demographic features (age & gender) and then completed the adapted version of the AEQ sub-scales measuring positive emotions (enjoyment, hope, pride) relating to foreign language learning and classroom. They had adequate time to respond to the questionnaire items.

To recruit the sample, the offices of vice deans of educational affairs in the selected universities were first contacted to obtain their permission. To this end, we explained the aims of the study for them and received their permission for data collection. To ensure the students' maximum understanding, the questionnaire was administered in Persian, the students' native language. The participants were assured about the anonymity and confidentiality of the collected data. Additionally, they were informed that participation in this study was entirely voluntary, and they could withdraw at any stage. Furthermore, their informed consent was obtained. The exclusion criteria were refusal to give informed consent, unwillingness to continue the study, and incomplete questionnaires.

Instrument

AEQ (Pekrun et al., 2011) sub-scales for positive emotions relating to learning (enjoyment: 10 items; hope: 8 items; pride: 9 items) and classroom (enjoyment: 10 items; hope: 6 items; pride: 6 items) were adapted by inserting the word 'English' in the items and applying some necessary modifications. The items were first translated from English to Persian by two experts and then back-translated to English by two other

translators. The inconsistencies and ambiguities were resolved by a panel of experts in translation, educational psychology, and English language teaching. Furthermore, six students were asked to check the clarity of the items. Accordingly, some minor modifications were applied based on their feedback. The questionnaire had six sub-scales measuring different positive emotions (i.e., enjoyment, hope, and pride) relating to foreign language *learning* and *classroom*. The items were presented on a 5-point Likert scale ranging from 'strongly disagree' (1) to 'strongly agree' (5).

Data analysis

Preliminary analysis

Prior to the main analysis, the data were checked for missing data as well as univariate and multivariate normality. First, six questionnaires with missing values on more than five items were excluded. Next, the percentage of missing data per each variable was computed as 0-1.1%. The results of Little's test showed that the data were missing completely at random (MCAR) (χ 2 (1116)=915.30, p=1.00). Therefore, Multiple Imputation using the EM algorithm was used to replace the isolated missing values in the data set. Then, the univariate normality was assessed through standardized scores, and multivariate normality was evaluated by Mahalanobis Distance. Consequently, three multivariate outliers were removed. The values of skewness (-.004 to .47) and kurtosis (-.15 to -.98) were within the recommended ranges for CFA with maximum likelihood estimation (West et al., 1995), which suggested that all variables met the normality assumption.

Constructing the short version

To construct a short version of the questionnaire for measuring positive emotions in foreign language learning and classroom, five items with the highest factor loadings in each of the six sub-scales were retained, which resulted in 30 items. Confirmatory factor analyses (CFAs) and maximum likelihood estimation were performed to assess the factor structure of the scales. Comparative Fit Index (CFI), Akaike Information Criterion (AIC), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Squared Residual (SRMR) were used to analyze the model fit.

Statistical procedure

After the preliminary analysis, two CFAs were first run to check the construct validity of 'the adapted subscales of the AEQ measuring positive emotions relating to learning and classroom' as well as 'the shortened version prepared in this study (FL-PEQ)'. Next, the construct validity of the one-, two-, and six-factor models of the FL-PEQ were examined to evaluate their internal validity. In addition, the convergent validity of the FL-PEQ was assessed by Average Variance Extracted (AVE) and composite reliability. Additionally, Fornell and Larker criterion and heterotrait-monotrait (HTMT) ratio were checked to evaluate the discriminant validity. Furthermore, the reliability of the FL-PEQ was investigated by part-whole corrected item-total correlations.

Results

CFA was run in Amos software (Arbuckle, 2019) to evaluate the factor structure of the adapted sub-scales measuring positive emotions relating to learning and classroom, which indicated a good model fit (Table 1). After retaining five items with the highest factor loadings in each sub-scale, another CFA was run to examine the model fit of the short version. As Table 1 shows, the short version has a better model fit in comparison to the original version.

Model	X ²	df	X ²∕df	TLI	CFI	SRMR	RMSEA	90% CI for RMSEA
Original version (49 items)	2091.73	1112	1.88	.918	.923	.051	.045	(.042, .048)
Short version (30 items)	703.13	390	1.80	.957	.962	.042	.043	(.038, .048)

Note: χ2: Chi square; df: degrees of freedom; TLI: tucker-lewis index; CFI: comparative fit index; SRMR: standardized root mean squared residual; RMSEA: root mean square error of approximation

Table 1: CFA results comparing the original and short versions of FL-PEQ

Table 2 shows the retained 30 items with the highest factor loadings as well as their mean, standard deviation, skewness, and kurtosis. In what follows, the validity and reliability of the FL-PEQ are investigated.

	Items	Mean	SD	Skewness	Kurtosis
	1. I get excited about going to my English class.	3.11	.99	11	59
	2. I enjoy being in my English class.	3.17	.97	26	57
CE	3. I am glad that it paid off to go to my English class.	2.86	1.07	08	78
	4. I am motivated to go to English class because it's exciting.	2.95	1.02	10	66
	5. I enjoy participating in my English class so much that I get energized.	3.05	.88	06	48
	6. I am confident when I go to my English class.	3.02	1.02	02	60
	7. I am hopeful that I will make good contributions in my English class.	2.82	.99	.10	47
СН	8. I am confident because I understand the lesson.	2.88	.96	.004	50
en	9. My confidence motivates me to prepare for my English class.	3.08	1.07	.09	62
1	 My hopes that I will be successful in my English class motivate me to invest a lot of effort. 	3.04	1	.13	56
	11. I am proud of myself in my English class.	3.22	1.05	05	72
	12. I take pride in being able to keep up with the lesson in my English class.	3.20	1.09	11	67
СР	13. I am proud of the contributions I have made in my English class.	3.20	1.14	002	85
	14. I would like to tell my friends about how well I did in in my English class.	3.31	.98	26	32
	15. When I do well in my English class, my heart throbs with pride.	3.25	1.07	05	82
	16. I enjoy the challenge of learning English.	3.51	1.12	48	58
	17. Reflecting on my progress in learning English makes me happy.	3.53	1.09	50	45
ΙF	18. I study English more than required because I enjoy it so much.	3.53	1.04	47	46
LL	 I am so happy about my progress in learning English that I am motivated to study more. 	3.50	.97	30	51
	20. I get physically excited when I can learn English well.	3.56	.94	35	15
	21. I have an optimistic view towards learning English.	3.40	1.06	47	44
	22. I feel confident when studying English.	3.03	1.00	09	55
LH	23. I feel confident that I will be able to successfully learn English.	3.03	.96	23	30
	24. I feel optimistic that I will make good progress at studying English.	3.31	1.04	47	41
-	25. The thought of achieving objectives in learning English inspires me.	3.14	1.11	22	81
	26. I'm proud of myself for learning English.	3.32	1.08	45	49
	27. I'm proud of my capacity for learning English.	3.21	1.10	02	78
IP	28. I think I can be proud of my progress in studying English.	3.16	1.24	07	98
LP	 Because I want to be proud of my progress in learning English, I am very motivated. 	3.09	1.12	01	94
	30. When I excel at leaning English, I swell with pride.	3.03	1.05	11	89

Note: CE: classroom-related enjoyment; CH: classroom-related hope; CP: classroom-related pride; LE: learning-related enjoyment; LH: learning-related hope; LP: learning-related pride.

Table 2: Descriptive statistics relating to the items of the FL-PEQ

Internal validity

CFA was carried out to assess the internal validity of the FL-PEQ. The construct validity of three models, namely, one-factor, two-factor, and six-factor models, was investigated competitively. Model A (one-factor model) assumed that the whole scale was based on only one factor while Model B (two-factor model) distinguished between the latent factors, namely, classroom emotions and learning emotions. In addition, in Model C (six-factor model), six latent primary factors for each positive emotion (enjoyment, hope, and pride) and two secondary latent emotion factors (i.e., classroom emotions and learning emotions) were assumed. Based on Table 3, neither Model A nor Model B has a good fit to the data. However, the hypothesized hierarchical Model C has a good fit with the empirical data. To sum up, confirmatory factor analyses corroborated the six-factor structure by distinguishing between different positive emotions in classroom and learning situations.

Model	X ²	df	X ²∕df	AIC	CFI	RMSEA	90% CI for RMSEA
Six factor Model	703.13	390	1.80	853.13	.962	.043	(.038, .048)
Two-factor model	3640.22	404	9.01	3762.22	.602	.135	(.131, .139)
One-factor model	4807.005	405	11.86	4927.005	.459	.157	(.153, .161)

Table 3: Summary of model fit statistics for the one-factor, two-factor, and six-factor models

In addition, as another criterion for assessing internal validity, inter-correlations between different positive emotions across the two situations (i.e., learning and classroom) indicated that all three emotions were correlated. For example, students experiencing more enjoyment in foreign language classroom reported higher levels of enjoyment in foreign language learning. To conclude, the inter-correlations among the three emotions in the two situations confirmed the internal validity of the FL-PEQ.

Convergent validity

The convergent validity of the FL-PEQ was examined to confirm the validity of each subscale. Based on Table 4, the model in each subscale has a good fit with the data, which indicates that the collected data were suitable for convergent validity analysis.

Componente	Itomo		Convergent Va	alidity	~	r	Model Fit Indices						
components	rtems	λ	AVE	CR	— u	l it	X ²∕df	Р	CFI	RMSEA	90% CI	SRMR	
	1	.78				.68							
Classroom-	2	.71				.64							
related	3	.75	.596	.880	.830	.68	2.674	.020	.989	.062	.022, .103	.025	
Enjoyment	4	.55				.51					·		
	5	.72				.62							
	6	.86				.82							
Classes	7	.93				.88							
Classroom-	8	.83	.785	.948	.932	.78	2.838	.014	.995	.065	.026, .105	.014	
related hope	9	.85				.82							
	10	.81				.77							
Classroom- related Pride	11	.75				.68							
	12	.75				.68							
	13	.81	.640	.898	.858	.73	2.995	.010	.989	.067	.030, .108	.019	
	14	.61				.56							
	15	.78				.71							
	16	.73				.66							
Learning-	17	.81	6.40		0.64	.73	0 574	005	0.01				
related	18	./4	.643	.900	.861	.67	2.5/1	.025	.991	.060	.020, .101	.019	
Enjoyment	19	./3				.64							
	20	./1				.66							
	21	.85				.//							
Learning-	22	./2	641	800	050	.65	2 000	012	000	066	020 106	010	
related Hope	23	.58	.041	.899	.000	.54	2.908	.013	.990	.066	.028, .106	.019	
	24	.60				./3							
	25	.75				.08							
	20	.01				.70							
Learning-	27	.01	700	052	0.26	./0	2 0 4 1	014	005	0.65	006 105	012	
related Pride	28	.83	./98	.952	.936	.81	2.841	.014	.995	.065	.026, .105	.013	
	29	.94				.89							
	30	.92				.87							

Table 4: Convergent validity, reliability, and model fit of the FL-PEQ

Discriminant validity

Discriminant validity was checked with two widely used methods, namely, Fornell and Larker criterion and heterotrait-monotrait (HTMT) ratio, which were performed in SmartPLS software (version 3.2.9) (Ringle et al., 2015). To examine the discriminant validity using Fornel and Larcker (1981), the square root of each AVE in the diagonal was compared with the correlation coefficients (off-diagonal) for each construct in the relevant rows and columns below the diagonal. AVE square roots for each construct which are greater than the correlation between the constructs indicate discriminant validity between the constructs. As shown in Table 5, the correlations between the constructs are less than the square root of the AVE of each construct.

Latent Constructs	CE	СН	СР	LE	LH	LP
CE	.772	.321(.207,.411)	.479(.375, .569)	.441(.329, .544)	.460(.354, .558)	.448(.360, .530)
СН	.293	.886	.36(.258, .458)	.288(.177, .387)	.282(.164, .390)	.362(.264, .446)
СР	.410	.324	.800	.457(.337, .557)	.404(.288, .509)	.386(.280, .494)
LE	.377	.259	.395	.802	.546(.443, .641)	.472(.384, .558)
LH	.394	.255	.353	.474	.801	.582(.499, .659)
LP	.394	.338	.347	.424	.522	.893

Note: The values (in bold) on the diagonal are the square root of AVE values. The values below the diagonal show the correlations between the constructs. The values above the diagonal indicate the HTMT ratios with 95% CI shown in parentheses.

Discriminant validity was also evaluated using HTMT based on Multitrait-Multimethod (MTMM) matrix. In this study, HTMT was applied as both a criterion and a statistical test. HTMT results lower than .85 indicate discriminant validity (Kline, 2011). In addition, bootstrap procedure was used with a confidence interval to check whether the confidence interval included one. Confidence intervals including the value one indicate the lack of discriminant validity while those not including the value one are indicative of the construct distinctiveness. Based on Table 5, the FL-PEQ has discriminant validity since all HTMT ratios are below .85 and the confidence intervals (shown in parentheses) do not contain the value one.

Reliability

The Cronbach alpha coefficients of different FL-PEQ sub-scales ranged from .83 to .93. Additionally, partwhole corrected item-total correlations for all items were higher than .5 (see Table 4), which is considered very good (Bortz & Döring, 2006). Hence, the FL-PEQ scales have sufficient reliability.

Measurement invariance of the FL-PEQ across gender

The measurement equivalence of the six-factor model was examined across gender to make sure that it could be used to measure positive emotions of both male and female students. Before analyzing measurement invariance, this model was checked to examine whether it showed a reasonably good fit to the empirical data in male and female groups separately (see Table 6). Model fit indices such as CFI, TLI, RMSEA, and SRMR were satisfactory for both gender groups. The configural invariance model, in which no equality constraints were imposed, had an adequate fit to the data. Next, the metric invariance was checked for the two groups, and all model fit indices were acceptable. The invariance of the models was checked following Cheung and Rensvold's (2002) recommendation based on which ΔCFIs less than .01 indicate the model invariance. The Δ CFI between the configural and metric models was below .01, which showed that the hypothesis of metric invariance could be retained. Then, scalar model invariance, in which the intercepts and factor loadings were constrained to be equal across groups, was also examined. The ΔCFI between the scalar and metric invariance models was less than .01, which indicated that scalar invariance could be confirmed. In addition, the differences in Macdonald non-centrality (ΔMC NCI) between the models were .0031 and .0008 for metric and scalar models, respectively, which are less than the recommended value of .02 by McDonald and Marsh (1990). Additionally, gamma hats were higher than .90. Furthermore, the differences in gamma hats were .00056 and .00016 for metric and scalar models, respectively, which are less than the recommended value of .001 (Cheung & Rensvold, 2002). Therefore, all indices support configural, metric, and scalar invariance of the six-factor model of the FL-PEQ across gender (see Table 6).

Model	X ²	df	CFI	TLI	RSMEA	RSMEA 90% CI	SRMR	MC NCI	Gamma hat
gender									
Males (n=223)	558.76**	390	.961	.956	.044	.036, .052	.046		
Females(n=219)	575.21**	390	.949	.943	.047	.038, .055	.056		
Multiple group									
Configural	1133.98**	780	956	.950	.032	.028, .036	.046	.66942	.94920
Metric (weak)	1162.07**	804	.955	.951	.032	.028 .036	.047	.66632	.94864
Scalar (strong)	1184.96**	828	.965	.953	.031	.027, .035	.047	.66716	.94880

Table 6: Goodness-of-fit indices of measurement invariance across gender for FL-PEQ six-factor model

Gender differences of the FL-PEQ

Given the measurement invariance of the FL-PEQ across gender, differences between the means of the sub-scales could be examined. The MANOVA results revealed that female students had significantly higher scores on all the six sub-scales: classroom related enjoyment ($M_{\pm}SD_{males}=14.12\pm3.88$; $M_{\pm}SD_{females}=16.15\pm3.44$; F=33.70; p < .001; $\eta^2 = .071$), classroom-related hope ($M_{\pm}SD_{males}=14.12\pm3.88$; $M_{\pm}SD_{females}=15.51\pm4.29$; F=10; p=.002; $\eta 2=.022$), classroom-related pride ($M_{\pm}SD_{males}=15.85\pm4.20$; $M_{\pm}SD_{females}=16.73\pm3.85$; F=5.34; p=.021; $\eta^2=.012$), learning-related enjoyment ($M_{\pm}SD_{males}=16.98\pm4.26$; $M_{\pm}SD_{females}=18.27\pm3.62$; F=11.70; p=.001; $\eta^2=.026$), learning-related hope ($M_{\pm}SD_{males}=15.64\pm4.3$; $M_{\pm}SD_{females}=16.37\pm3.93$; F=5.35; p=.021; $\eta^2=.012$), and learning-related pride ($M_{\pm}SD_{males}=15.21\pm4.87$; $M_{\pm}SD_{females}=16.53\pm4.7$; F=8.31; p=.004; $\eta^2=.019$).

Discussion and Conclusion

The present study aimed to prepare a valid and reliable scale to measure positive emotions in foreign language *learning* and *classroom* situations. To this end, the items (n=49) relating to positive emotions were adopted from AEQ as a well-known, domain-general measure with good psychometric qualities. Then, they were adapted for the purpose of the current study and administered among Iranian EFL university students. The results of data analysis indicated that this measure is psychometrically valid and reliable.

In order to prepare a short measure for efficient administration and avoid respondents' fatigue, it was decided to shorten the measure by choosing five items with the highest factor loadings from each of the six sub-scales, which resulted in a total of 30 items. Consistent with Pekrun et al.'s (2011) landmark study on undergraduate students, a six-factor model of this short version was corroborated, which indicated that the FL-PEQ as a shortened measure could adequately differentiate between enjoyment, hope, and pride across two important foreign language settings, namely, *learning* and *classroom*. In addition, the convergent validity and internal validity of the FL-PEQ were confirmed.

Considering the importance of positive emotions in foreign language learning and classroom, the FL-PEQ could be used as a valid and reliable measure to assess positive emotions. More specifically, given the undeniably important effect of positive emotions on students' motivation, engagement, grit, creativity, performance, etc. and the essential role of teachers in this regard (Hejazi & Sadoughi, 2023; Sadoughi & Hejazi, 2021; Sadoughi & Hejazi, 2022, 2023b), it is vital that EFL teachers as well as materials developers use FL-PEQ to evaluate learners' positive emotions towards classroom and learning and take significant measures to promote them. Accordingly, this will help create a balance between attention to *emotional* as well as *cognitive* aspects of learning a foreign language.

Implications, limitations, and suggestions for further research

Positive emotions have an excellent potential in promoting key outcomes in education (e.g., engagement and grit) as well as broadening learners' perspectives and enhancing the development of necessary cognitive resources for foreign language learning. Therefore, given the importance of positive emotions in education in general (Pekrun, 2006; Weiner, 2010) and L2 learning in particular (Shao et al., 2019), the FL-PEQ could be used as a reliable and valid measure to assess EFL learners' positive emotions and take effective measures to promote them accordingly. Additionally, researchers can use this short scale as a research tool to measure EFL learners' positive emotions and investigate their effects on other variables as well as their possible associations.

The present study had some limitations. The data were collected using *only* self-report questionnaires, which could have some problems such as superficiality, social desirability, and halo effect (Dörnyei & Taguchi, 2010). Therefore, it is suggested that future research use qualitative data collection techniques such as stimulated recall and interview to explore EFL learners' positive emotions more deeply.

Care should be taken in using the FL-PEQ in other contexts since this measure was validated in Iran, as an expanding circle country with its own particular political, educational, socio-economic, and cultural characteristics, where English is used as a foreign language (Zare-ee & Hejazi, 2017, 2018). Therefore, future studies could validate this measure in English as a Second Language (ESL) as well as other EFL contexts. Last but not the least, it is suggested that further studies be conducted to examine the psychometric properties of the FL-PEQ across different language skills (i.e., speaking, writing, listening, and reading) and settings (e.g., private language institutes and schools).

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