Development and validation of a scale to measure students' feelings about school: An exploratory and confirmatory factor analysis approach

American Journal of Education and Learning
Vol. 10, No. 2, 190-206, 2025
e-ISSN:2518-6647

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ABSTRACT

Over the past fifty years, schools have undergone significant changes in terms of technology and digitalization, as well as pedagogical, organizational, social, and cultural shifts, which have led to transformations in relationships between students and teachers, peers, and within the broader school environment. Dynamic contexts impose new challenges to teaching and learning, and emotions, feelings, and moods play a central role in this process. Understanding students' relationships with the school can provide valuable insights into their engagement, well-being, and academic success. However, this problem remains under-evaluated in school practice due to the lack of simple tools that can capture students' emotional experiences in a regular and contextualized manner. This study aims to address this gap by developing a scale to evaluate middle and high school students' interactions with peers and teachers, perceptions of school climate, teaching and learning, and assessment. The study used a 31-item questionnaire, and a survey was conducted with students aged 10 to 19 years old. An exploratory factor analysis (N = 200) and a confirmatory factor analysis (N = 300) were performed to identify and validate a hypothetical construct that explains the observed variables. Then, using an exploratory design to examine the preliminary structure and psychometric properties of the Exploratory Students' School Experience Scale (ESSES), the study reached two models. While one model exhibited good fit, the other model reflected a balance between statistical adequacy and conceptual parsimony, aiming to retain a structure that is both interpretable and psychometrically sound.

Keywords: *Confirmatory factor analysis, Emotional discomfort, Emotional safety, Exploratory factor analysis, School climate, Students' feelings.*

DOI: 10.55284/ajel.v10i2.1548
Citation | Serra, L., Alves, J. M., & Pinheiro, G. (2025). Development and validation of a scale to measure students' feelings about school: An exploratory and confirmatory factor analysis approach. *American Journal of Education and Learning, 10*(2), 190–206.

Funding: This study received no specific financial support.
Institutional Review Board Statement: The Ethical Committee of the Catholic University, Portugal has granted approval for this study on 1 December 2015 (Ref. No. NR/R/1419/2015).
Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.
History: Received: 26 July 2025/ Revised: 22 August 2025/ Accepted: 29 August 2025/ Published: 2 September 2025
Publisher: Online Science Publishing

Highlights of this paper

- This study used an exploratory approach to develop the Exploratory Students' School Experience Scale (ESSES), which addresses students' feelings.
- Exploratory Factor Analysis, followed by a Confirmatory Factor Analysis, reached two models: a five-factor scale with good fit, and a balanced six-factor scale that retains a structure that is both interpretable and psychometrically sound.
- The scale assesses students' feelings regarding the learning experience, assessment experience, teachers' support, relationships with peers, school climate, and emotional discomfort.

1. INTRODUCTION

The United Nations (2023) identified a triple crisis in education: a crisis of inclusion, quality, and relevance. The crisis of quality indicates that millions of children in school are not learning the basics. This crisis highlights a problem with students in schools who are not learning or interacting proficiently with the educational environment. Gyawali and Mehndroo (2023) alert to the changing needs of students in the dynamic landscape of contemporary education and to the imperative of aligning teaching, learning, and assessment strategies with the ever-changing and diverse requirements of learners. To achieve the education thesaurus and generate individual and socially relevant learning, it is essential to understand the feelings and emotions of children and young people (Alves & Cabral, 2021). As Damasio (2020) argues, one cannot honestly know without feeling. However, the education thesaurus is under threat, as the Organisation for Economic Co-operation and Development (2025) attests, given that absenteeism and indiscipline are on the rise. Furthermore, the frequency of negative feelings among students is considered a growing international problem (Moeller, Seehuus, & Peisch, 2020). The reality suggests that balancing the school's actions is challenging, given the existence of negative feelings of exclusion, anxiety, demotivation, conflicts, and unsafety (Fan & Bellmore, 2023; Guedes et al., 2023; Moeller et al., 2020) alongside the need to nurture positive feelings that directly impact well-being and overall student development (Zheng, 2022). Students who exhibit higher feelings of belonging are more motivated to learn and feel compelled by tasks (Liu, 2024) become more creative, and engage in more positive interactions with their peers (Zhang, Yang, Ge, Liang, & An, 2023). Conversely, students who exhibit lower feelings of belonging tend to be less engaged (Liu, 2024). Then, understanding what students feel, their dispositions, and both positive and negative emotions is a crucial exercise in restoring a pedagogical relationship that brings meaning to life (Alves & Cabral, 2021), starting with building homeostasis within the school.

Adolescence is a critical stage of emotional development. In this sense, the way young people feel about school has a long-term impact on their individual and social development. Although there is a growing tendency to value socioemotional dimensions in education, a scarcity of simple, integrated, and validated tools remains, hindering understanding of how students emotionally experience school. Students' feelings about the school climate, classroom environment, assessment, and relationships within the school community directly impact their well-being (LoCasale-Crouch, Jamil, Pianta, Rudasill, & DeCoster, 2018; Sun, 2021), behavior, and achievement.(Hargreaves, Elhawary, & Mahgoub, 2018; Hochschild Ovalle, Nussbaum, Claro, Espinosa, & Alvares, 2024; Klapp, Klapp, & Gustafsson, 2024). However, many of these dimensions remain under-evaluated in schools due to the lack of practical and informative tools that are easy to apply in real-world contexts (Organisation for Economic Co-operation and Development, 2019). Hence, this study aims to develop a scale that is simple enough to support exploratory approaches to assessing students' feelings in school contexts. The intention is to support schools' processes of evaluating students' well-being promptly, which informs pedagogical decisions, raises awareness among educators regarding socioemotional dimensions, and generates empirical data that sustains educational policies. The central purpose is to address this knowledge gap by developing and validating a scale that captures the essence of students' emotional experiences in school, specifically their feelings about relationships with teachers and peers, assessments, and the overall school and

classroom environment. Hence, the article primarily defines a conceptual framework that supports the development of a scale to assess students' feelings, specifically the Exploratory Students' School Experience Scale (ESSES). Assuming an exploratory design methodological approach, the scale was developed through an exploratory factor analysis (EFA) followed by a confirmatory factor analysis (CFA). The results yielded two psychometrically sound solutions for a simple and robust tool to understand students' feelings about the school, laying the foundation for future research and educational initiatives.

2. BACKGROUND

Building more humanistic and inclusive schools implies investing in understanding students' feelings. In this article, the definition of feelings adopted considers them as the affective state that students report, seeing them strictly under the umbrella of experiences related to academic emotions (Moeller et al., 2020). To know and understand students' feelings is to empower a school community that can utilize this information to adjust pedagogical practices, enhance student-teacher relationships, foster students' sense of belonging, and cultivate a school culture that is more welcoming, equitable, and emotionally safe. To capture the essence and dimension of the students' feelings demands considering their positive and negative valence. Both positive and negative feelings can be shaped by a variety of individual and contextual factors, which can significantly impact students' welfare, motivation, and school path.

2.1. Positive Feelings

Emotional safety contributes to positive feelings and pertains to the conditions or environment that allow those feelings to emerge. Positive emotions promote engagement and higher academic motivation, which may lead to an increased potential for deeper learning. Emotions in students emerge from conscious and/or unconscious judgments relating to perceived success (Hopwood et al., 2025). Hence, students' whole-school experiences matter. According to constructionist theories of emotions, affective experiences or emotions (Ekman, 2016) are shaped by the social, cultural, and individual idiosyncrasies of individuals (Barrett, 2012). Then, school has a role in shaping emotions. Positive feelings of belonging, emotional safety, and positive school relationships all contribute to overall well-being (Fan & Bellmore, 2023; Guedes et al., 2023; Williams, Schneider, Wornell, & Langhinrichsen-Rohling, 2018). Recent studies have shown that students' emotional states significantly influence their concentration, memory, reasoning, and information retrieval (Hopwood et al., 2025). Therefore, interventions and organized school actions aimed at fostering well-being and promoting the development of emotional skills (Martins, 2024) can create a positive emotional environment in schools, which can, in turn, enhance academic resilience.

Nurturing a sense of belonging among students in school can buffer the inevitable effects of academic pressure. School-belonging is defined as "the extent to which students feel personally accepted, respected, included, and supported by others in the school social environment" (Goodenow & Grady, 1993). Feeling part of a community is an "idea of belonging that requires greater attention to acknowledge the affective dimension of students developing interpersonal competencies" (Dobson, 2025). Fan and Bellmore (2023) hypothesized that adolescents in the ideal friendship profile reported the highest feelings of school belonging. Those researchers noted that "adolescents with ideal and realistic friendships are more likely to receive the necessary social and academic support from their best friends than adolescents with somewhat problematic friendships" (p. 2503). They are also positively associated with a greater ability to cope with stress, and ultimately have significant implications for learning, social interaction, and participation (Corominas, González-Carrasco, & Casas, 2022). Hence, interactions with peers appear to be an important predictor of positive feelings in schools. Positive effects on the general well-being of students are also associated with the learning process and teacher-student interactions. On the one hand, teacher-student relationships

based on trust, respect, affection, openness, empathetic listening, and cooperation promote students' performance, sense of belonging, and identity (Ibrahim & El Zaatari, 2020). These relationships enhance student motivation, foster engagement and involvement (Sun, 2021), trigger a sense of safety that can reinforce constructive ways of reducing more destructive behaviors (Zheng, 2022), and create a more collaborative and inclusive environment (Martín de Hijas-Larrea, de Anda-Martín, & Díaz-Iso, 2025). On the other hand, according to Efklides and Volet (2005), the learning process is influenced by personal and task characteristics, as well as the context in which it occurs, and by the individual's ongoing evaluation of the learning process and its outcomes. The same authors add that it starts with "the stage that precedes learning and determines engagement with the learning task, the stage of actual learning that requires regulation of the learning activity, and the stage that follows the completion of the learning task and involves evaluation of the learning outcome" (p. 378). Hence, learning is promoted by students' well-being, which is influenced by teachers' support and assessment for learning, and as learning. Liu (2024) found that feedback is closely related to engagement from behavioral, cognitive, and emotional aspects (p. 101), and Oberle (2018) affirms that the more supportive the school environment, the greater the level of well-being reached.

In sum, students' feelings of belonging in school are demarcated, in a multidimensional way, by the nature of interactions established either with peers or teachers. In context, interactions between students and teachers consider the dynamics of the teaching, learning, and assessment process. The teaching and learning dimension highlights the impact of teachers' methods and practices on students' learning process (Hargreaves et al., 2018) and their motivation (Dobson, 2025).

2.2. Negative Feelings

Emotional discomfort is not a single emotion but rather a general condition that triggers negative emotional states. Emotions such as anxiety, frustration, fear, and boredom can diminish academic performance due to avoidance behaviors and disengagement, which impact concentration and memory (D'agostino, Schirripa Spagnolo, & Salvati, 2022; Nakano et al., 2022). Then, motivational delink causes functional problems regarding the teaching and learning process. Lower feelings of belonging among students diminish efforts in the face of difficulties and challenges, leading to a give-up attitude towards tasks (Abdollahi & Noltemeyer, 2018). Negative feelings, such as anxiety, fear of failure, and negative self-perception, are linked to assessment-related stress and pressure. This is because high-performing students are more susceptible to emotional reactions to tests and schoolwork anxiety than low-performing students (D'agostino et al., 2022; Klapp et al., 2024). Kandemir (2013) explains that anxiety plays a crucial role in test scores, regardless of the specific area of study, and it negatively impacts individual performance. The same author affirmed that test anxiety is augmented with the increase in perfectionist characteristics and performance goals. Test anxiety has been differentiated by varying levels of severity, both in the distinction between nonclinical versus clinical test anxiety and between low and high levels within nonclinical test anxiety (Tan, Cassady, Wong, Khng, & Leong, 2025). Additionally, students with high test anxiety perform poorly on tests compared to students with low test anxiety (Tan et al., 2025). On the other hand, poor academic performance can also result in low engagement, negative emotions (such as sadness, anxiety, and anger), and a lower-quality teacher-student relationship (Patrick, Stockbridge, Roosa, & Edelson, 2019).

Another dimension that imposes negative feelings within schools includes social exclusion, loneliness, fear, and bullying. Being exposed to bullying increases the chances of experiencing mental health problems (Källmén & Hallgren, 2021). Loneliness, peer rejection, and social anxiety are associated with poor friendship interactions (Williams et al., 2018). A research study made by Fan and Bellmore (2023) reveals that adolescents with problematic friendships rate significantly lower in school belonging and exhibit vulnerability regarding socialization and academic

difficulties. On the other hand, students who experience a greater sense of safety, security, and trust in their school setting tend to exhibit higher school attendance, academic success, and learning outcomes (Williams et al., 2018). Lack of a sense of emotional safety increases the risk of absenteeism, school dropout, and mental health issues such as depression and low self-esteem (Organisation for Economic Co-operation and Development, 2019) and even suicidal ideation (Nakano et al., 2022). All these dimensions regarding the school climate, another multidimensional construct that impacts students' feelings, which are directly related to the quality and consistency of interpersonal relationships established in the school, are strong predictors of the students' emotional well-being, sense of belonging, and engagement with learning.

Dynamic and complex contexts, such as schools, present challenges to the teaching and learning process, and emotions, feelings, and moods are part of it. Understanding the relationship between students and the school can provide valuable insights into their engagement, well-being, and academic success, ultimately supporting more responsive and inclusive educational practices. Negative feelings are often rooted in students' perceptions of exclusion, injustice, or emotional insecurity within the school environment, which can undermine learning and psychological well-being. By focusing on students' emotional experiences, both positive and negative, schools can foster environments that not only reduce harm but also actively support connection, motivation, and long-term academic outcomes.

In summary, at the core of interventions aimed at building strong emotional skills is a comprehensive assessment and intervention. "The need for proactive measures arises from the challenges many students face in developing social and emotional competencies, which, if unaddressed, can escalate into academic and social difficulties" (Organisation for Economic Co-operation and Development, 2025).

3. METHODS

The methodology adopted to define and examine the preliminary structure and psychometric properties of a scale to measure students' feelings followed an exploratory design. A three-step research organization was employed, comprising the development of a questionnaire, sampling, and the definition of the dimensional structure and psychometric adequacy of the scale.

3.1. Instrument

The process of scale development began with the identification of core domains to build a questionnaire focused on students' feelings about school, followed by item generation and content validity (Boateng, Neilands, Frongillo, Melgar-Quiñonez, & Young, 2018). Highlighted in the literature, four main domains were identified: relationship with teachers and peers (Fan & Bellmore, 2023; Oberle, 2018), school climate (Dobson, 2025), and academic emotions (Efklides & Volet, 2005; Liu, 2024; Tan et al., 2025). Then, a pool of items was generated and discussed by experts in the field of educational science. A set of 31 items was defined and organized into five groups of questions (Table 1): Feelings about classes (8 items), feelings concerning assessment (6 items), the relationship between students and teachers (5 items), relationships with peers (6 items), and school climate (6 items). A 5-point scale was used, where 1 represents the highest level of disagreement and 5 reflects the highest level of agreement.

Table 1. Questionnaire.

How do I feel in classes?	**Item 1: I'm well during classes**
	Item 2: I like to participate in tasks proposed by teachers
	Item 3: I can concentrate easily on different subjects
	Item 4: I feel that what I learn is helpful for my life
	Item 5: I feel anxiety or nervousness during classes
	Item 6: I feel motivated to learn new things in each subject
	Item 7: I feel valued when I share my ideas in classes
	Item 8: In some classes, I feel excluded or ignored
How do I feel about assessment?	Item 9: I understand the assessment criteria well
	Item 10: I believe that the tests and assignments effectively assess what I know.
	Item 11: The way all teachers assess me is fair
	Item 12: I receive feedback from most teachers that helps me improve
	Item 13: I feel anxious about tests and other assignments
	Item 14: I feel that assessment usually helps me to learn better
Pedagogical relationship with teachers	Item 15: I feel that teachers worry about me
	Item 16: Teachers listen to what I have to say
	Item 17: I can ask teachers for help when I have difficulties
	Item 18: Teachers treat all students with respect
	Item 19: I feel free to ask questions in classes
School climate	Item 20: I like to be at school
	Item 21: I feel safe at school
	Item 22: The school climate is calm and pleasant
	Item 23: School is a place where I feel respected
	Item 24: I feel well walking through corridors, yards, and common spaces
	Item 25: In school, adults treat students with justice
Relationship with colleagues (peers)	Item 26: In school, I have friends I can count on
	Item 27: I feel that my colleagues accept me
	Item 28: I feel excluded by my colleagues
	Item 29: My colleagues help me when I need
	Item 30: Bullying (threats, violence, and mistreatment) is a problem in my class
	Item 31: I can solve conflicts with colleagues peacefully

Table 2. Samples' descriptive statistics.

		Minimum	**Maximum**	**Mean**	**Standard deviation**
EFA (N=200)	Age	10	19	14.73	1.972
	Frequencies				
	Gender	Male: 98 (49.0%)	Female: 91 (45.5%)	Not identified: 11 (5.5%)	
	Grade	5th – 5 (2.5%)	7th – 41 (20.5%)	9th – 37 (18.5%)	11th – 31 (15.5%)
		6th – 0 (0.0%)	8th – 42 (21.0%)	10th – 21 (10.5%)	12th – 23 (11.5%)
		Minimum	**Maximum**	**Mean**	**Standard deviation**
CFA (N=300)	Age	10	19	14.77	1.909
	Frequencies				
	Gender	Male: 102 (51.0%)	Female: 91 (45.5%)	Not identified: 7 (3.5%)	
	Grade	5th – 5 (1.7%)	7th – 56 (18.7%)	9th – 68 (22.7%)	11th – 33 (11.0%)
		6th – 8 (2.7%)	8th – 44 (14.7%)	10th – 49 (16.3%)	12th – 37 (12.3%)

3.2. Sample

A sample of 500 students from six Portuguese school clusters, whose principals have agreed to participate in the study, was obtained. These public schools, four of which are located in the North of the country (from the municipalities of Arouca, Gondomar, Maia, and Santa Maria da Feira), one in the Center, and the other in the South (from the municipalities of Cascais and Vila Real de Santo António). An online questionnaire, using Google Forms, was administered to students from middle and high schools. The students, voluntarily and anonymously, provided their informed consent to participate in the study. The sample was randomly divided into two groups, with 200 designated for Exploratory Factor Analysis (EFA) and 300 for Confirmatory Factor Analysis (CFA). Table 2

characterizes both samples, which include respondents aged 10 to 19 years, with a mean age of 14.7 years. The students range from 5th grade to 12th grade, and half of the respondents in both samples are males.

3.3. Data Analysis

The study employed an exploratory methodology to assess the factorial validity and internal consistency of a newly developed scale for assessing students' feelings. IBM SPSS Statistics 30.0 and IBM SPSS Amos 30.0 were used to conduct, respectively, EFA and CFA to define the structure of the ESSES scale. The study started with EFA by identifying the factorial structure and defining the essence of the construct that best explained the data regarding the 31 items from the questionnaire. Then, with a different sample, CFA was conducted to confirm the factor structure of the scale and ensure external validity. Items 1, 8, 13, 28, and 30 were reverted before conducting factor analysis.

EFA was performed to understand the relationship between the observed variables in the scale and to reduce it to a smaller set of composite factors. The data were assessed for missing values, outliers, linearity using the Pearson coefficient, and data normality (Watkins, 2018). Normal distribution was assessed through skewness and kurtosis. Therefore, EFA was conducted by determining data assumptions, extracting and calculating model fit, rotating factors, and interpreting the results (Costello & Osborne, 2005; Watkins, 2018). Principal components analysis was used as the extraction method, and oblimin with Kaiser normalization as the rotation method. EFA established eigenvalues greater than 1 and factor loadings greater than 0.30 to define the factors. Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were used to assess the suitability of data for factor analysis (Zygmont & Smith, 2014). The factor's reliability was assessed using Cronbach's alpha, and Cronbach's alpha if the item is excluded was determined to evaluate the impact of each item on the overall internal consistency of the scale. The criteria for determining factor adequacy included internal consistency, cross-loading items, and rejection of items with loadings inferior to 0.50.

CFA applied the maximum likelihood estimation method, and the model was specified based on the results that emerged from prior EFA. The goodness of fit was evaluated using multiple fit indices, namely, the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Standardized Root Mean Square Residual (SRMR), Root Mean Square Error of Approximation (RMSEA), and its PCLOSE. Criteria for an acceptable model fit considered: CFI and TLI ≥ 0.90 (preferably ≥ 0.95), RMSEA ≤ 0.06, and SRMR ≤ 0.08 (Hu & Bentler, 1999). Following the initial analysis, a process of respecification of the CFA model was assumed, supported by theoretical considerations, aiming to improve fit and achieve a more parsimonious structure. Then, the factor loadings were examined and considered adequate if they were greater than 0.50. When necessary, parcelling of unidimensional factors was equated, and modification indices were analyzed to explore points of model misfit and ensure that any adjustments were theoretically justified.

4. RESULTS AND DISCUSSION

4.1. EFA

In this study, to define the underlying factors beneath the ESSES scale for measuring students' feelings about school, an EFA was developed. EFA is a multivariate statistical method that attempts to identify the smallest number of hypothetical constructs that can parsimoniously explain the covariation among a set of measured variables (Watkins, 2018). Then, the first step involved determining the appropriateness of items and data for the analysis. No missing values and no outliers were present. The sample size was sufficient for EFA (Zygmont & Smith, 2014). All observed variables were normally distributed, as indicated by skewness and kurtosis values within the cut-off limits of -2 and +2 (George & Mallery, 2003).

The second step, which involved extracting the common factors using principal component analysis and assessing the model fit, yielded the data presented in Tables 3 and 4. The result of Bartlett's test of sphericity was significant (X^2=5071.196, p<0.001), indicating a strong correlation among variables. The KMO measure of sampling adequacy was 0.936, which, being closer to 1, suggests a strong partial correlation between the factors and suitability for EFA. The results suggest that the variables share enough common variance to justify the use of factor analysis.

Table 3. Kaiser-Meyer-Olkin's test and Bartlett's test results.

KMO test	Bartlett's test		
	X^2	df	Sig.
0.936	5071.196	465	<0.001

The third step consisted of rotating the factor-loading matrix to achieve a more interpretable and theoretically meaningful solution by optimizing the distribution of item loadings across factors and enhancing the clarity of the factor structure. Then, the factors were named based on the underlying meanings provided by EFA. EFA provided a 6-factor solution (Table 4). All items exhibited commonalities above 0.50, suggesting that the variance of each variable provides acceptable levels of explanation. The total variance explained by the data is 73.4%. The inter-item correlations within each factor also suggest high internal consistency.

Items 1, 7, 8, and 13 were loaded into two factors, and the first two with factor loadings inferior to 0.5, meeting the criteria for exclusion. Item 1 cross-load may be explained by its broad formulation, which allows for multiple interpretations that activate different latent dimensions. The cross-load observed in item 7 may result from the content simultaneously touching on the dimensions of feelings about the class and the school climate. The same applies to item 8, which addresses emotional discomfort and peer exclusion, and to item 13, concerning the factors of emotional discomfort and feelings about the class. The exclusion of items 8 and 13, and therefore the factor of emotional discomfort, needs to be evaluated using CFA, given that, theoretically, both items are relevant to studying students' feelings (Fan & Bellmore, 2023; Kandemir, 2013; Klapp et al., 2024). Factor V, a three-item construct, exhibits a .687 questionable Cronbach's alpha (Cronbach, 1951), two cross-loaded items, and items 8 and 13, exhibit an inter-item correlation inferior to .30, suggesting that they may not be conceptually aligned with the construct. Then, the outcomes indicate that factor V detracts from the overall model fit and construct validity (Table 4). However, due to the exploratory nature of the research, slightly lower thresholds for internal consistency were considered acceptable. Then, rather than excluding the factor at this stage, it was retained for further evaluation through CFA, which allows for a more comprehensive assessment of the scale's factorial validity.

Concerning how closely related items within a factor are, Factors II and III (Table 4) present a Cronbach's alpha higher than 0.9, indicating excellent reliability, and demonstrate that Factor IV exhibits very good internal consistency (Cronbach, 1951). The results showed moderate, but not excessively high, correlations, ranging between 0.30 and 0.80, except for the pairs of items 26-27 (r = 0.833), 16-17 (r = 0.825), and 15-17 (r = 0.803), which suggest redundancy. This possibility should be supported by confirmatory factor analysis (CFA), given that Cronbach's alpha if an item is excluded causes a loss in reliability, indicating the inclusion of these items. Considering that the exclusion of item 31 led to a higher reliability value (Cronbach's alpha = 0.913), its exclusion should also be evaluated in CFA.

Factor I has two cross-load items, suggesting that they should be excluded. However, the exclusion of items 1 and 7 leads to a decrease in Cronbach's alpha (0.911) from excellent to very good reliability, and inter-item correlations (ranging from 0.486 to 0.720) suggest that the items are appropriately related and contribute to a consistent measurement of the underlying construct. Then, we propose testing its inclusion through CFA to determine whether it contributes to or detracts from the overall model fit and construct validity.

Factor VI is a two-item construct, producing, according to Watkins (2018), a location of such factors in three-dimensional space that is imprecise. However, Worthington and Whittaker (2006) affirm that "it is possible to retain a factor with only two items if the items are highly correlated (i.e., r > 0.70) and relatively uncorrelated with other variables" (p. 821). In this sense, factor VI was excluded because the correlation between items 28 and 30 is 0.432.

Table 4. EFA's results.

Item	Mean	Standard deviation	Communalities	Factor loading	Eigenvalue	Cronbach's alpha if item is excluded	Cronbach's alpha
Factor I: Feelings about classes (r: 0.486-0.720)							
It.1	3.59	1.135	0.764	.483[a]	14.413	0.889	0.911
It.2	3.62	1.068	0.712	0.568		0.89	
It.3	3.32	1.11	0.734	0.688		0.89	
It.4	3.12	1.193	0.667	0.647		0.908	
It.6	3.2	1.098	0.829	0.801		0.895	
It.7	3.35	1.167	0.67	0.441[b]		0.898	
Factor II: Feelings about teachers' and students' interactions (r: 0.474 - 0.825)							
It.9	3.79	1.163	0.628	0.556	2.503	0.944	0.948
It.10	3.28	1.195	0.743	0.842		0.944	
It.11	3.59	1.165	0.788	0.879		0.94	
It.12	3.47	1.186	0.74	0.715		0.941	
It.14	3.28	1.241	0.681	708		0.944	
It.15	3.48	1.156	0.757	0.726		0.94	
It.16	3.56	1.141	0.774	0.741		0.94	
It.17	3.75	1.16	0.772	0.704		0.939	
It.18	3.65	1.194	0.671	0.636		0.944	
It.19	3.53	1.256	0.636	0.422		0.945	
Factor III: Feelings about school climate (r: 0.595 -0.794)							
It.20	3.2	1.319	0.672	0.593	1.808	0.925	0.93
It.21	3.2	1.279	0.805	0.796		0.914	
It.22	2.93	1.211	0.8	0.861		0.913	
It.23	3.14	1.203	0.833	0.837		0.911	
It.24	3.44	1.218	0.796	0.807		0.913	
It.25	3.26	1.253	0.662	0.655		0.926	
Factor IV: Feelings about students' relationships with peers (r: 0.548 -0.833)							
It.26	4.21	1.095	0.796	0.799	1.734	0.847	0.891
It.27	3.96	1.217	0.862	0.85		0.818	
It.29	3.82	1.117	0.751	0.814		0.856	
It.31	3.58	1.247	0.587	0.595		0.913	
Factor V: Feelings about emotional discomfort (r: 0.256 - 0.528)							
It.5	2.81	1.384	0.776	0.86	1.202	0.408	0.687
It.8	2.42	1.335	0.732	0.659[c]		0.652	
It.13	3.44	1.343	0.711	0.720[d]		0.691	
Factor VI: Feelings about peer exclusion (r=.432)							
It.28	2.1	1.299	0.763	-0.861	1.081	---	0.603
It.30	2.26	1.342	0.626	-0.771		---	

Note: Extraction method – principal component analysis; rotation method – oblimin with Kaiser normalization; converged rotation with 11 iterations.
[a] item that also loads Factor feelings about school climate (0.338).
[b] item that also loads Factor feelings about school climate (0.383).
[c] item that also loads Factor feelings about peer exclusion (-0.450).
[d] item that also loads Factor feelings about class (-0.328).

The matrix of correlations between factors (Table 5) suggests moderate relationships among factors I, II, III, and IV, with coefficients ranging from 0.349 to 0.579, indicating limited conceptual overlap among constructs. Hence, these latent variables should be correlated in the CFA model. Factors V and VI are almost independent of each other

and other factors. This suggests a conceptual distinctiveness from the other factors, supporting the decision to retain Factor V and further evaluate it in CFA.

In summary, six factors representing the 31 items were retained. However, data suggest that five factors, representing 26 items, demonstrated good psychometric properties and should be used to define the model for the CFA study: feelings about classes, feelings about teachers' and students' interactions, feelings about school climate, feelings about students' relationships with peers, and feelings about emotional discomfort.

Table 5. Matrix of correlations between factors.

Factor	I	II	III	IV	V	VI
I	-					
II	0.434	-				
III	0.423	0.579	-			
IV	0.349	0.444	0.444	-		
V	-0.119	-0.169	-0.028	-0.144	-	
VI	0.079	-0.085	-0.056	-0.100	-0.160	-

4.2. CFA

CFA is used during the scale development process to support the validity of the scale following an EFA and to verify how well the existing theoretical model aligns with the data (Worthington & Whittaker, 2006; Wymer, Maria, & Alves, 2012). The sample size (N = 300) is appropriate, exceeding the recommended 10:1 ratio of participants to parameters as best practice (Wymer et al., 2012). No missing values or far outliers were observed in the sample. Descriptive statistics were compared between the EFA and CFA samples to examine their similarity (Tables 4 and 6). The means and standard deviations regarding the 24 items showed comparable distributions, supporting the appropriateness of using both independent samples for model validation.

Table 6. Descriptive statistics (N=300).

Item	Mean	Standard Deviation	Item	Mean	Standard Deviation
Factor I: Feelings about classes					
It.2	3.45	1.041	It.4	3	1.432
It.3	3.20	1.046	It.6	3.02	1.083
Factor II: Feelings about teachers' and students' interactions					
It.9	3.77	1.077	It.15	3.26	1.094
It.10	3.12	1.222	It.16	3.39	1.062
It.11	3.30	1.116	It.17	3.67	1.082
It.12	3.30	1.070	It.18	3.53	1.152
It.14	3.03	1.162			
Factor III: Feelings about school climate					
It.20	2.85	1.325	It.23	2.88	1.179
It.21	3.14	1.231	It.24	3.31	1.149
It.22	2.65	1.136	It.25	3.06	1.196
Factor IV: Feelings about students' relationships with peers					
It.26	4.26	1.018	It.29	3.77	1.101
It.27	3.93	1.088	It.31	3.54	1.183
Factor IV: Feelings about emotional discomfort					
It.5	3.12	1.432	It.13	3.69	1.322
It.8	2.47	1.357			

CFA followed the EFA analysis of the factor structure of the scale, starting with the replication of the hypothesized factor structure using a new sample (Worthington & Whittaker, 2006). Wymer et al. (2012) note that

the measurement model often fails to demonstrate an initial good fit with the sample data, necessitating respecification to achieve an acceptable fit. Then, a CFA was conducted using an exploratory, theory-driven approach to refine the model. This was accomplished through the examination and review of the global fit indices, factor loadings, modification indices, and standardized residuals (Wymer et al., 2012). The respecification of the model included: (i) exclusion of items 1, 7, and 19 with factor loadings <0.50; (ii) adding a covariance parameter between high standardized errors of the same dimension; inclusion of items 9, 20, and 31 due to an increase of the reliability if excluded and a factor loading >0.50. Wymer et al. (2012) alerted researchers to consider the possibility of parceling latent variables. They informed that "parceling can provide a means of retaining a sufficient number of scale items to adequately measure a construct's conceptual domain while enabling the model to become parsimonious enough to produce good fit indices" (p. 149). The same authors note that parceling is acceptable for unidimensional measures and when the data are not normally distributed. The latent variable, *feelings about teachers' and students' interactions*, with 9 items, was split into two sets of items. The one-dimensionality attested by EFA, the large number of items, and the theoretical evidence supported parceling. EFA generated a solution with a single factor concerning students' and teachers' interactions, combining items related to students' assessments and teachers' supportive actions. Although it concerns the expected interactions between these school actors, they represent different dimensions of the teachers' work. Assessment (items 9 to 14) is also dependent on school structural decisions, while items 15 to 19 are more related to the humanistic, individual, and attitudinal professional characteristics of the teacher. That is why these two sets of items were designed separately in the questionnaire.

The model review, according to the three types of respecifications referred to above, provided an overall fit (Table 7), as tested by the chi-square statistic, that was acceptable [$\chi^2(278) = 596.278$; $p < 0.001$]. The outcomes of the CFA (Figure 1) suggest an acceptable fit, considering the indices CFI (0.925) and TLI (0.913) (Hu & Bentler, 1999) as well as RMSEA (0.062) (Browne & Cudeck, 1992). The SRMR obtained (0.092), an overall measure based on squared residuals, should be <0.05 for a good fit (Hu & Bentler, 1999), whereas values smaller than 0.10 may be interpreted as acceptable (Schermelleh-Engel, Moosbrugger, & Müller, 2003). Hence, the set of model fit indices indicates the adequacy of the model, reinforcing the validity of the factorial structure proposed in Figure 1. In this initial model, the approach was to retain all theoretically essential items, even though the model exhibits slightly lower fit. Subsequently, a second, more parsimonious approach was adopted to achieve a better fit.

The respecification of the model continued, focusing on exploring the dimensional structure and psychometric adequacy, and achieving a well-established model. Tabachnick and Fidell (2007) recommended stricter cut-offs of 0.55 (good), 0.63 (very good), or 0.71 (excellent) for factor loadings, particularly with strong sample sizes, which was the case in this study. The exclusion of items 19, 20, and 31 also improved this second model. Additionally, the covariance was added between peers of standardized errors of the same dimension: items 10 and 11, and items 10 and 14. These final specifications resulted in an overall fit (Table 7), as indicated by an acceptable value of the chi-square statistic [$\chi^2(176) = 525.006$; $p < 0.001$]. The CFA outcomes indicated a good model fit, suggested by the CFI (0.951) and TLI (0.942), both considered very good values (Hu & Bentler, 1999). The RMSEA obtained was 0.059, which indicates a proper fit, as it is < 0.06 (Browne & Cudeck, 1992). Although the PCLOSE value (0.053) is slightly below the recommended limit of 0.05, it remains acceptable, suggesting a reasonable probability that the RMSEA error is small enough not to compromise the model (Schermelleh-Engel et al., 2003). The SRMR obtained (0.072), an overall measure based on squared residuals, is smaller than 0.10 and considered acceptable (Schermelleh-Engel et al., 2003). Hence, the set of model fit indices points to the adequacy of the model, reinforcing the validity of the factorial structure proposed in Figure 2.

Table 7. CFA: Model fit results.

Fit indices	CMIN	PCMIN/DF	CFI	TLI	RMSEA	PCLOSE	SRMR
Model 1	596.357	2.145	0.925	0.913	0.062	0.003	0.092
Model 2	356.738	2.027	0.951	0.942	0.059	0.053	0.072

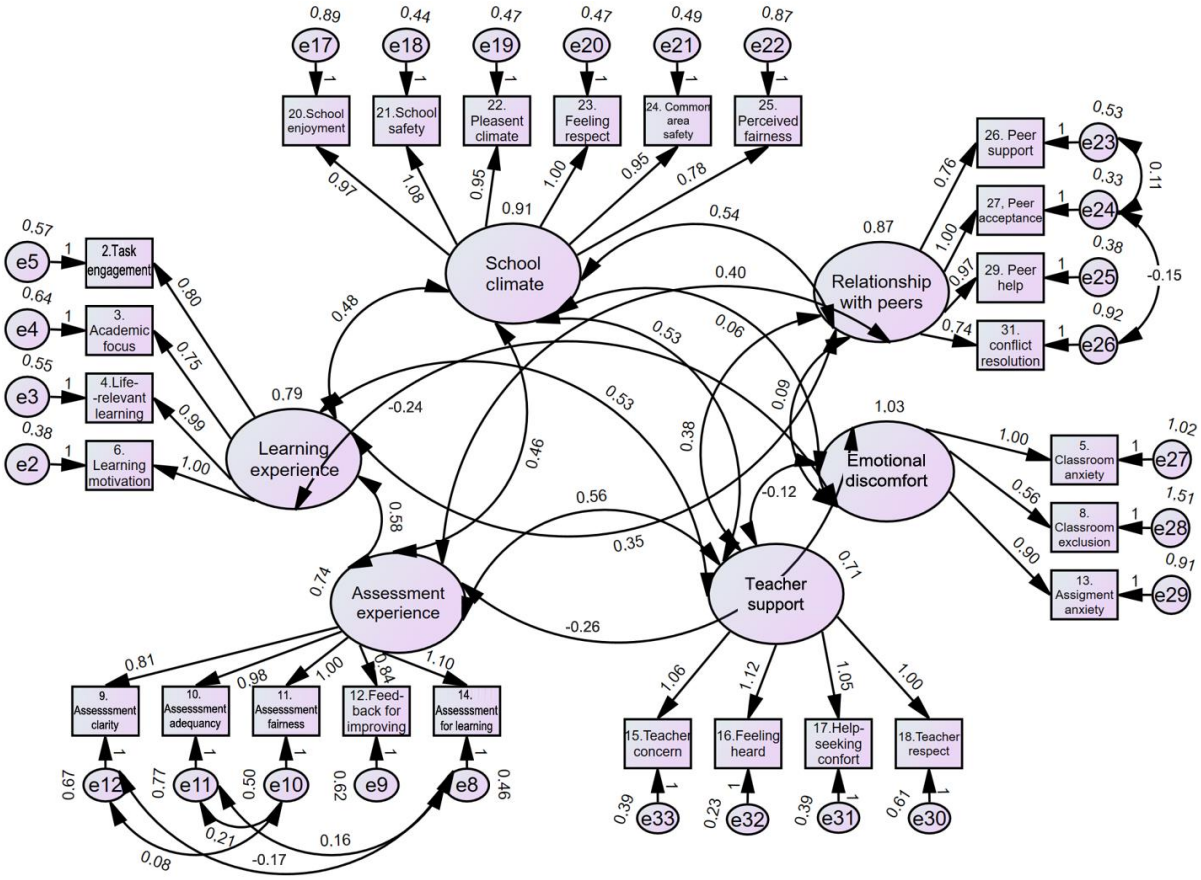

Figure 1. CFA results for model 1.

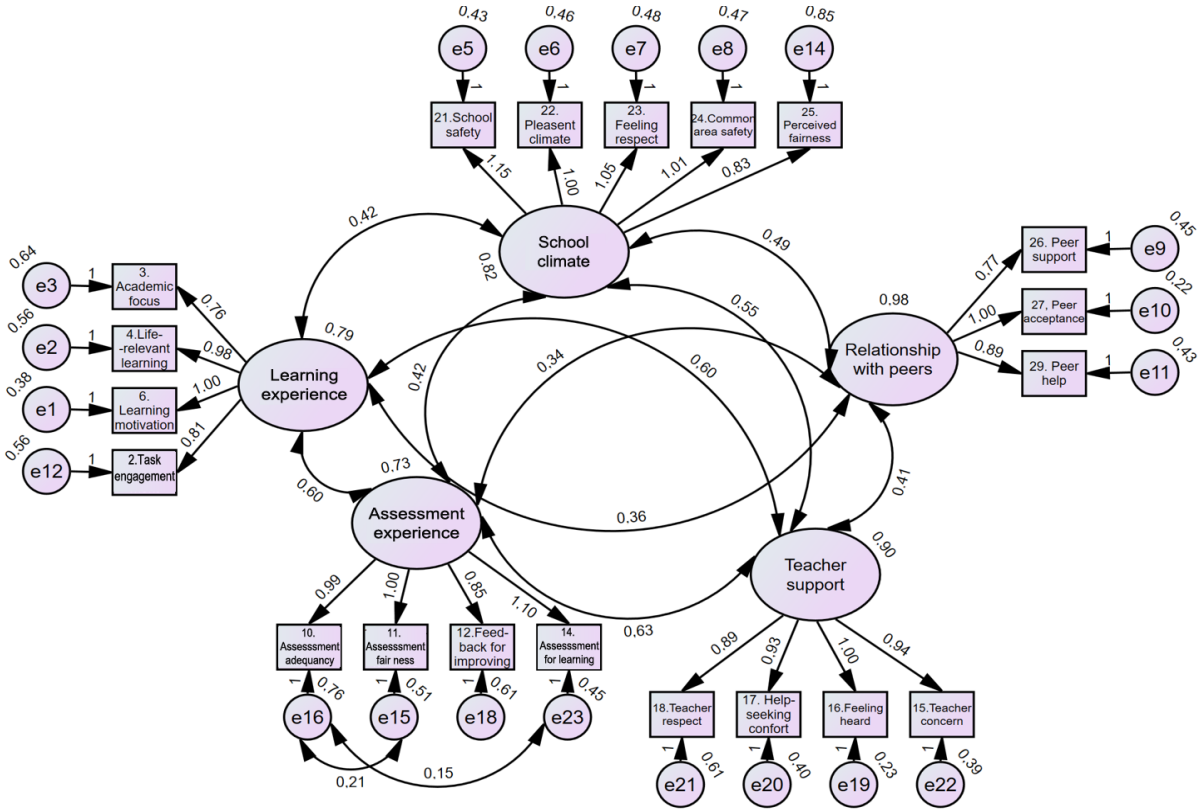

Figure 2. CFA results for model 2.

Table 8. ESSES scale reliability.

Factor	Item	Cronbach's alpha if the item is excluded		Cronbach's alpha	
		Model 1	Model 2	Model 1	Model 2
Factor I. *Feelings about the learning experience*	It2	0.783	0.783	0.817	0.817
	It3	0.799	0.799		
	It4	0.767	0.767		
	It6	0.727	0.727		
Factor II. *Feelings about the assessment experience*	It9	0.855	-	0.857	0.855
	It10	0.809	0.797		
	It11	0.802	0.802		
	It12	0.845	0.857		
	It14	0.819	0.802		
Factor III. *Feelings about the teacher's support*	It15	0.852	0.852	0.885	0.885
	It16	0.826	0.826		
	It17	0.851	0.851		
	It18	0.879	0.879		
Factor IV. *Feelings about the school climate*	It20	0.882	-	0.889	0.882
	It21	0.855	0.839		
	It22	0.862	0.848		
	It23	0.861	0.850		
	It24	0.865	0.853		
	It25	0.890	0.889		
Factor V. *Feelings about the relationship with peers*	It26	0.756	0.833	0.822	0.858
	It27	0.737	0.748		
	It29	0.742	0.816		
	It31	0.858	-		
Factor VI. *Feelings about emotional discomfort*	It5	0.401	-	0.627	-
	It8	0.659	-		
	It13	0.498	-		

The reliability of the ESSES scale was assessed for both models (Table 8). Model 1 factors presented Cronbach's alpha values between 0.80 and 0.90, indicating good reliability, except for Factor VI, emotional discomfort, which showed questionable reliability (0.627). This value, below the conventional threshold, is conditioned by the low number of items for the factor. However, given that CFA results demonstrated an acceptable model fit and the theoretical relevance of the factor, a scale with a six-factor structure may be admissible in further analysis. Regarding Model 2, results indicate that the five factors exhibit Cronbach's alpha values between 0.80 and 0.90, considered good, which suggests the internal consistency of the scale. In short, the goodness of fit of the five subdimensions of the SSEES scale is relatively robust, demonstrating good structural validity. While Model 2 showed a better statistical fit, Model 1 retained important theoretical content.

5. LIMITATIONS

Although the study provides valuable insights for improving research on students' feelings about school, due to objective constraints, some limitations must be acknowledged. First, the validation of the ESSES scale was conducted using a sample from six public Portuguese school clusters, which may not be representative of the entire population. Second, the study exhibits limited generalizability. Third, constructs related to negative feelings, specifically emotional discomfort and peer exclusion, exhibited limitations in capturing the multidimensional nature of students' experiences in this study. The exclusion of the latest factor may narrow the conceptual scope of the instrument. Fourth, given that the study was performed with students from middle and high school levels, and the sample being less representative of students aged 10 to 12 years old, this can introduce some bias. These limitations should be addressed in future research to enhance the psychometric properties of the ESSES scale.

6. CONCLUSIONS

This study aimed to develop and validate a scale to assess students' feelings about school (ESSES), specifically for middle and high school students. The development and validation of a scale were achieved through three main steps. First, the scale was designed by starting with a literature review to establish a framework that supports the definition of the items. This process led to the development of a 31-item questionnaire that explored students' feelings about school across the dimensions of relationships with teachers and peers, school climate, and academic emotions. The exploratory nature of the study, as it sought to create a conceptual structure for a scale rather than confirm a pre-established model, necessitated flexibility in refining items, factors, and the theoretical understanding of students' feelings about school. Consequently, exploratory factor analysis (EFA) revealed the number and nature of latent dimensions for the scale, representing the second stage of the study. The initial six-factor EFA solution evolved into a hypothetical five-factor structure for the ESSES scale, consisting of: a 4-item subscale to measure feelings about classes; a 9-item subscale to assess perceptions regarding interactions between teachers and students; a 6-item subscale to understand perceptions about the school climate; a 4-item subscale to measure feelings about students' relationships with peers; and a 3-item subscale to measure feelings concerning emotional discomfort.

EFA informed the CFA study, leading to the third stage. Working with the EFA hypothesis of the ESSES structure, CFA yielded two models: one, a parsimonious version with fewer items and good reliability and validity indices; the other, a more complex model that included theoretical items but had a slightly lower fit. Although Model 2 provides a better statistical fit, omitting theoretically relevant items may result in some conceptual nuances being lost. While Model 2 may be preferable in applied settings for practitioners or schools due to its focus and efficiency, Model 1 is more suitable for in-depth research and comprehensive coverage of constructs. Model 2 is a five-factor scale, namely, feelings about the learning experience, assessment experience, teacher support, school climate, and

relationships with peers. Model 1 included an extra factor, feelings concerning emotional discomfort. Hence, ESSES can be a reliable tool for investigating and assessing students' feelings about school. This study can enhance scholars' and overall school actors' understanding of students' emotional and cognitive experiences, supporting more informed research and decisions on pedagogical practices.

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