



ARTICLE



<https://doi.org/10.1057/s41599-025-05846-0>

OPEN

# A supportive work environment matters: validating a concise scale and specifying its contributions to emotional experiences among second language teachers

Hanwei Wu<sup>1</sup> & Fenfang Liao<sup>1,2</sup>✉

The integration of positive psychology into second language (L2) education has generated increasing interest in L2 teachers' perceptions of a supportive work environment (SWE), given its close relationship with their mental health. However, a reliable and concise scale to measure this perception, with strong psychometric properties, has yet to be developed. This study aims to address this gap by developing a streamlined version of the Supportive Work Environment Scale (SWES) and specifying its contributions to emotional experiences, a crucial component of mental health. The study involved two samples, totaling 753 Chinese L2 teachers. In Sample 1 ( $n = 351$ ), exploratory factor analysis identified a three-factor structure for the SWES, consisting of 20 items across three factors: school support, supervisor support, and colleague support. Confirmatory factor analysis conducted on Sample 2 ( $n = 402$ ) supported the model's fit. The SWES also demonstrated good convergent validity, discriminant validity, and internal consistency. Additionally, it showed that enjoyment was most strongly linked to school support, pride to supervisor support, anxiety to colleague support, and anger to school support. These findings suggest that the SWES is an effective tool for assessing L2 teachers' perceptions of SWE and underscores its role in shaping their emotional experiences.

<sup>1</sup>Hunan Normal University, Changsha, China. <sup>2</sup>Guangxi Normal University, Guilin, China. ✉email: [eva.liao@mailbox.gxnu.edu.cn](mailto:eva.liao@mailbox.gxnu.edu.cn)

## Introduction

The integration of positive psychology (PP) into second language (L2) education has prompted a significant shift in research focus (Derakhshan, 2022). Previously, the majority of scholarly attention was on cognitive aspects, such as language learning strategies (Pawlak and Kiermasz, 2018). However, the emphasis has broadened to include the three pillars of PP: positive institutions, positive characteristics, and positive emotions (Seligman, 2011). These pillars are interconnected: positive institutions (e.g., work environment) provide the structural foundation that nurtures positive characteristics (e.g., resilience, self-efficacy) in individuals, which in turn foster positive emotions (e.g., enjoyment, pride) (Seligman, 2011). Conversely, inadequate institutional support may hinder the development of positive characteristics and trigger negative emotions (e.g., anxiety, anger), highlighting the need to systematically measure institutional support to understand its cascading effects on emotions. Initially, the focus was on the positive characteristics and emotional experience of both L2 teachers and L2 learners (Derakhshan et al., 2023; Wang et al., 2022; Zhao et al., 2024; Zhao and Wang, 2024). As PP continues to be incorporated into L2 education, research has expanded to explore positive institutions in recent years (Greenier et al., 2023; Wu and Zeng, 2024; Zeng et al., 2024), which, in the context of L2 teaching, relates to the idea of supportive work environment (SWE).

The concept of SWE initially emerged in organizational psychology (Bosma et al., 2020) and refers to an environment where employees feel valued, respected, and supported in their roles (Ángeles López-Cabarcos et al., 2022). In educational settings, SWE specifically encompasses structural and interpersonal resources that enable teachers to perform their roles effectively (Wu and Zeng, 2024). Subsequently, similar concepts such as school climate (Oder and Eisenschmidt, 2018) and school working conditions (Toropova et al., 2021) were introduced into the field of teacher education. Consequently, researchers in the field of L2 education typically use two methods to measure SWE. The first method involves using scales that assess employees' perceived SWE (e.g., Wu and Zeng, 2024). The second method employs scales designed specifically for teachers in a general sense (Greenier et al., 2023). Despite the use of various scales, it is certain that SWE is a multidimensional concept as noted by Wang and Degol (2016).

L2 teachers face unique workplace challenges that set their SWE needs apart from those in other fields. The inherent complexity of L2 teaching makes them more susceptible to job-related stressors. For non-native teachers, these challenges are amplified by L2 anxiety and low self-confidence. Ershadi et al. (2024) found that non-native teachers often feel marginalized, view policy-makers as sources of inequality, and struggle with pedagogical inefficacy. The nature of L2 teaching, along with the delayed outcomes of L2 learning (Sudina and Plonsky, 2021), increases teachers' risk of frustration, burnout, and turnover (King et al., 2024). Occupational stress is a well-documented threat to L2 teachers' psychological well-being and professional growth (Mercer, 2023). MacIntyre et al. (2019) highlight the vulnerability of L2 teachers to stress, particularly from unstable work conditions, job insecurity, and identity crises. Hence, Hiver and Dörnyei (2017) describe L2 teaching as a profession in crisis, overwhelmed by various pressures. Despite the uniqueness, existing scales, which are validated for teachers in a general context, may therefore inadequately capture these nuances, underscoring the need for a tailored measurement tool.

Besides, through a detailed examination of scales used in general education (e.g., Burden and Fraser, 1994; Dang et al., 2024; Johnson et al., 2007) and those applied in L2 research (e.g., Greenier et al., 2023; Wu and Zeng, 2024; Zeng et al., 2024), we

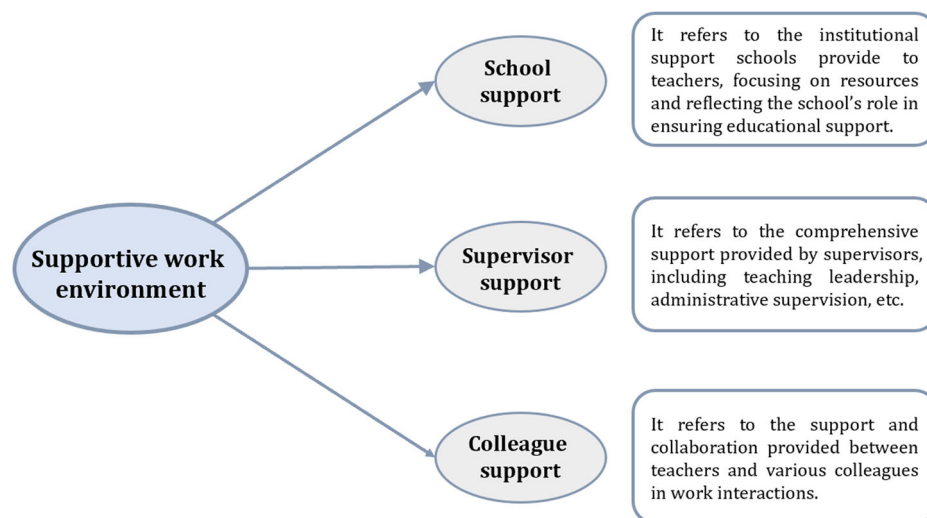
identified several limitations. First, the psychometric properties of these scales, such as convergent and divergent validity, have not been thoroughly evaluated. Second, many of these scales have an excessive number of items or factors, resulting in lengthy questionnaires that could negatively impact completion rates (Schoeni et al., 2013). To address these issues and meet the growing demands of L2 research, this study first aims to develop a streamlined SWE scale that maintains robust psychometric properties, offering a more effective tool for future L2 research. Furthermore, given the significance of SWE in influencing teachers' mental health, we also examined the links between specific SWE dimensions and L2 teachers' emotional experiences—defined as teachers' subjective affective states during work, including positive emotions (e.g., enjoyment, pride) and negative emotions (e.g., anxiety, anger) that arise from job-related interactions and tasks (Frenzel, 2014).

## Literature review

**Supportive work environment in education: concept and dimensions.** The construct of SWE emerged from organizational psychology in the early 20th century, with its significance gaining recognition as industrialization advanced. During this period, scholars increasingly noted that the work setting exerts a profound influence on employees' physical and mental well-being, as well as their work efficiency (Zhong and House, 2012). This understanding was further solidified by the Hawthorne studies (Hassard, 2012), which highlighted the pivotal role of the work environment in shaping employees' behaviors and attitudes. Conceptually, SWE refers to a collection of organizational cultures and management practices designed to foster a positive, healthy, and safe working environment, ultimately promoting employees' well-being and productivity (Ángeles López-Cabarcos et al., 2022). Among early conceptualizations, Broad and Newstrom (1992) identified four core components of SWE: perceived organizational support, perceived climate, supervisory relationship, and peer group interaction, each capturing distinct aspects of how support operates within organizational structures.

The introduction of SWE into educational contexts holds significant importance, as it directly enriches teachers' professional experiences, fosters their growth, and elevates overall educational quality (Wu and Zeng, 2024). However, the academic community remains divided regarding both the terminology used to describe this construct and its constituent components. In terms of terminology, some scholars adopt labels rooted in organizational psychology, such as "SWE" (Zeng et al., 2024), while others use terms like "school climate" (Ryberg et al., 2020) or "working conditions" (Toropova et al., 2021). We opted for "SWE" because "school climate" typically encompasses perceptions from both teachers and students, diluting focus on the workplace experience specific to educators, and "working conditions" fails to emphasize the positive, supportive attributes central to our inquiry.

Regarding the components of SWE, scholarly perspectives vary widely. Zeng et al. (2024) strictly adhere to the four-dimensional framework proposed by Broad and Newstrom (1992), while Masoom (2021) categorizes it to three components: organizational encouragement, supervisory encouragement, and work-group support. Toropova et al. (2021) expand the construct further, identifying five distinct aspects: student discipline, leadership support, school resources, teacher cooperation, and teacher workload. From another angle, Yada and Savolainen (2023) measure SWE across five dimensions: affiliation, innovation, participatory decision-making, resource adequacy, and student support. Given our goal of developing a streamlined



**Fig. 1** Three core components of SWE.

SWE scale with fewer factors and items, Masoom's (2021) three-dimensional model was selected for its balance of comprehensiveness and conciseness, making it the most suitable foundation for our study.

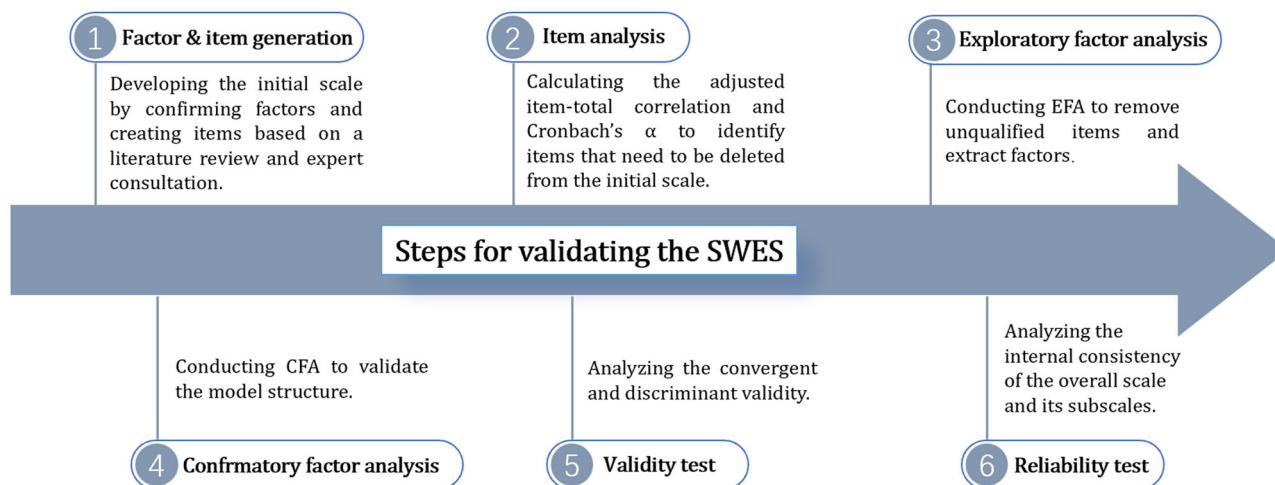
To make this framework more applicable to school contexts—where organizational psychology terms, often derived from corporate settings, may not fully capture the unique dynamics of educational environments—we adjusted the dimension labels while maintaining the essence of Masoom's (2021) model (see Fig. 1). Specifically, “organizational encouragement” was redefined as “school support” to better reflect the educational setting, aligning with terms like “school resources” (Toropova et al., 2021) and “resource adequacy” (Yada and Savolainen, 2023), which emphasize institutional support in schools. “Supervisory encouragement” was renamed “supervisor support” to broaden its scope, acknowledging that school supervisors (e.g., principals, department heads) play roles beyond mere “encouragement”, including instructional leadership, administrative oversight, and fostering professional growth (Harris and Jones, 2023). Lastly, “workgroup support” was changed to “colleague support” to clarify that it encompasses both teaching and non-teaching staff (e.g., administrative personnel) who collaborate with teachers in their daily activities, reflecting the inclusive nature of the “workgroup” concept in Masoom's (2021) model and echoing Toropova et al.'s (2021) emphasis on “teacher cooperation” as a key aspect of SWE in schools.

**Benefits of supportive work environment to L2 teachers.** Previous research in general education has extensively documented the benefits of SWE for teachers, including enhanced job satisfaction (Toropova et al., 2021), increased self-efficacy (Jang et al., 2023), improved well-being (Dreer, 2024), higher retention rates (Li and Yao, 2022), and ultimately, better academic outcomes for students (Wartenberg et al., 2023). Studies specifically focusing on L2 teachers have emerged more recently (Zeng et al., 2024), driven by the growing influence of PP in L2 research (Wang et al., 2021). Traditionally, L2 research emphasized the inhibitory effects of negative factors (e.g., negative emotions) on students' language learning (Zhao and Danping, 2024), but MacIntyre and Mercer (2014) highlighted that L2 learning requires sustained effort, motivation, resilience, and external support—concepts aligned with PP's focus on positive emotions, characteristics, and institutions. As PP further integrates into L2 research, attention to L2 teachers has grown, with researchers emphasizing that SWE

directly impacts their capacity for continuous learning and adaptation to evolving L2 teaching methodologies (Greenier et al., 2023; Ma and Wang, 2024; Wu and Zeng, 2024). Specifically, SWE provides necessary resources for professional development and facilitates cultural exchange through shared diverse perspectives, thereby strengthening teachers' instructional readiness.

This instructional readiness is particularly vital for cultivating creativity, as L2 classrooms uniquely foster student creativity by exposing learners to diverse cultural perspectives, sparking curiosity, imagination, and openness—key components of creativity (Wu and Zeng, 2025). Given teachers' centrality in this process, their mental health, especially emotional experiences, critically affects their creativity cultivation capacity (Su et al., 2024). Research confirms SWE significantly shapes these emotions: Adequate SWE fosters positive emotions like enthusiasm (Greenier et al., 2023), hope, and pride (Wu and Zeng, 2024), enhancing L2 teachers' ability to cultivate students' creativity. Conversely, insufficient SWE triggers negative emotions such as anxiety and anger, hindering these outcomes. Wu and Zeng (2024) explain this SWE-emotion link using Pekrun and Perry's (2014) Control-Value Theory (CVT), which posits emotions stem from appraisals of control over and the subjective value of meaningful tasks. While control-value appraisals are central, CVT recognizes distal antecedents like environmental antecedents like SWE, which influence emotions through these appraisals. However, treating SWE as a single construct by Wu and Zeng (2024) leaves unexplored the specific links between different SWE dimensions and various teacher emotions, limiting targeted interventions from an SWE perspective.

**Limitations in measuring supportive work environment in education.** Despite the vital role of the SWE in promoting positive teacher outcomes, assessing this construct remains challenging. The existing literature identifies two primary methods for evaluating SWE. The first involves aggregating items from various studies to define its components. For instance, Zeng et al. (2024) drew from Tripathi and Kalia (2022) to cover areas like perceived organizational support, perceived climate, etc. Similarly, Wu and Zeng (2024) integrated these elements to assess SWE. However, this approach raises psychometric concerns: Zeng et al. (2024) did not provide model fit statistics for their aggregated scale, while Wu and Zeng (2024) presented only overall model fit indices, lacking essential details such as subscale reliability and evidence of convergent and discriminant validity. The



**Fig. 2** Steps for the development and validation of the SWES.

absence of these validation steps reduces the scale's effectiveness in capturing the specific nuances of SWE, potentially distorting its relationship with teacher outcomes.

The second method relies on the School-Level Environment Questionnaire (SLEQ) (Burden and Fraser, 1994) and its revised versions (Dang et al., 2024; Johnson et al., 2007). However, the psychometric suitability of both the original and modified versions of SLEQ has been questioned. While the original SLEQ, consisting of 56 items across eight factors, has been widely used, its developers did not conduct psychometric testing such as exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) (Burden and Fraser, 1994). Johnson and Stevens (2001), after analyzing a sample of U.S. elementary school teachers, removed three factors due to low item loadings. However, the psychometric properties of their revised 35-item, five-factor model remain uncertain, as the CFA model only met fit criteria after around 30 times for residual adjustments, indicating possible overfitting.

In a subsequent revision, Johnson et al. (2007) removed 14 items, resulting in a five-factor model that showed good internal consistency among U.S. elementary and secondary school teachers. However, questions remain regarding the model fit, as important fit indices, such as chi-square to degrees of freedom ratio, Tucker-Lewis Index (TLI), and Standardized Root Mean Square Residual (SRMR), were not reported; only Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA) were provided. More recently, Dang et al. (2024) revalidated the original SLEQ with high school teachers in Vietnam, adding a "principal leadership" factor (similar to "supervisor support"), suggesting that the internal structure of SLEQ may differ across cultural contexts. Their study confirmed that the revised nine-factor model demonstrated strong reliability and validity. However, this model includes 38 items, which may be too lengthy for studies focusing on multiple constructs. Overall, the evolution of SLEQ demonstrates its structural instability and cultural sensitivity, limiting its generalizability across different educational and national contexts. Moreover, none of these versions have been validated in China or among university teachers, raising doubts about the relevance of existing SLEQ versions for L2 teaching in China.

These limitations—particularly the contextual reliance of SLEQ and the lack of thorough validation for ad-hoc scales—diminish the rigor and reliability of SWE research in L2 education. Consequently, this study aims to create the Supportive Work Environment Scale (SWES) assess its psychometric properties

specifically among L2 teachers (see Fig. 2). Additionally, to inform emotion-focused interventions for improving L2 teachers' mental health, this research also explores the relationship between SWE dimensions and their emotional experiences (i.e., enjoyment, hope, anxiety, and anger). The following research questions guide this study:

**RQ1:** What are the psychometric properties of the SWES?

**RQ2:** How do specific SWE factors relate to L2 teachers' emotional experiences?

## Methodology

**Participants.** The study recruited 753 L2 teachers from educational institutions across 11 provinces in China (Zhejiang, Hunan, Guangdong, Jiangxi, Jilin, Liaoning, Shandong, Sichuan, Guizhou, Henan, and Anhui), covering primary to tertiary education. To avoid overfitting and ensure the generalizability of the model (Thompson, 2004), participants were divided into two independent samples collected at different stages.

Sample 1, consisting of 351 participants, was initially recruited, and a total of 378 responses were collected. However, 27 responses were excluded due to either uniform selection of the same option (e.g., all choosing "Neutral") or incomplete submissions, resulting in a response rate of 92.9% (351/378). This sample completed the original 26-item SWES for EFA. Following the EFA, the scale was refined to 20 items.

Sample 2, consisting of 402 participants, was recruited afterward, with 418 responses collected initially. Out of these, 16 responses were excluded based on the same criteria (uniform responses or incompleteness), yielding a response rate of 96.2% (402/418). This group completed both the refined 20-item SWES and measures of L2 teachers' emotional experiences, which were used for CFA and other psychometric evaluations.

The two-phase data collection approach was implemented to minimize participant burden, as collecting all data in one batch would require completing a large number of items (including both the original SWES and emotional experience items). Splitting the collection into two stages helped reduce the response burden.

Adequate sample size is essential for the validity of factor analysis, and de Vet et al. (2011) recommend a participant-to-item ratio of at least 10:1. Given that the initial SWES comprised 26 items, Sample 1 with 351 participants met the required ratio. For the refined SWES with 20 items, Sample 2 consisting of 402 participants also satisfied the recommended ratio. Data were collected via the Wenjuanxing online platform, with all



**Table 1** Demographic characteristics of two samples.

Characteristic	Category	Sample 1 (n = 351)	Sample 2 (n = 402)
Gender	Male	57 (16.2%)	59 (14.7%)
	Female	294 (83.8%)	343 (85.3%)
Age	Range	21–70 years	20–68 years
	Mean ± SD	39.94 ± 9.38	36.50 ± 9.63
Teaching level	Primary school	87 (24.8%)	48 (11.9%)
	Middle school	102 (29.1%)	108 (26.9%)
	High school	93 (26.5%)	120 (29.9%)
	University	69 (19.6%)	126 (31.3%)
Educational qualification	Bachelor	238 (67.8%)	207 (51.5%)
	Master	78 (22.2%)	111 (27.6%)
	Doctor	35 (10.0%)	84 (20.9%)
Teaching experience	1–5 years	89 (25.4%)	121 (30.0%)
	5–10 years	53 (15.1%)	63 (15.6%)
	10–15 years	54 (15.4%)	70 (17.4%)
	15–20 years	61 (17.4%)	58 (14.4%)
	20–25 years	43 (12.3%)	44 (10.9%)
	25–30 years	42 (12.0%)	26 (6.5%)
	> 30 years	9 (2.6%)	20 (5.0%)

questionnaires administered in Chinese. The detailed demographic characteristics are presented in Table 1.

Ethical guidelines were strictly followed: participants were informed of the research purpose, assured of data confidentiality, and granted the right to withdraw at any time. The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Hunan Normal University.

### Instruments

**The supportive work environment scale.** In developing the SWES, strict adherence to the scale development principles outlined by DeVellis (2016) was maintained. The initial phase involved an extensive review of existing literature focusing on the three core components of SWE: school support, supervisor support, and colleague support. This review specifically targeted scales measuring related constructs from key sources:

1. Wu and Zeng (2024): Items related to our dimensions were identified within their scales for perceived organizational support (8 items), supervisory relationship (7 items), and peer group interaction (8 items).
2. Johnson et al. (2007): Items were primarily drawn from their dimensions of “collaboration” (6 items) and “school resources” (4 items).
3. Dang et al. (2024): As the full item set was unavailable, we referenced the single example items provided in their paper for each of the dimensions: affiliation, resource adequacy, and principal leadership (1 item per dimension).
4. Masoom (2021): Items were selected from the dimensions of organizational encouragement (5 items), supervisory encouragement (4 items), and workgroup support (6 items).

Given the conceptual overlap in the dimensions across sources, items were synthesized and modified. Specifically, the subject of items was consistently adapted to refer to “the school”, “the supervisor”, or “the colleague” to align with our target dimensions. This process generated an initial item pool of 31 items.

Following the foundational methodological guidance of Lawshe (1975) and McKenzie et al. (1999), which emphasizes the importance of involving at least five experts to ensure content

validity, a rigorous evaluation of the scale’s clarity was conducted. This assessment was carried out by a distinguished panel of six experts from diverse backgrounds, including a professor specializing in psycholinguistics, another in teacher education, a psychometrics specialist, and three experienced L2 teachers from primary, middle, and high schools.

The expert feedback was systematically collected and analyzed, resulting in a comprehensive review of the scale items. Based on the consensus of the expert panel, five items were deemed unsuitable for inclusion and were subsequently excluded, while other items were refined according to the experts’ recommendations. Consequently, a revised draft of the scale was developed, comprising 26 items. Participants were asked to respond in Chinese. These items are presented on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The Chinese version can be seen in our uploaded supplementary material.

**The achievement emotions questionnaire–teachers.** The Achievement Emotions Questionnaire–Teachers (AEQ-T) by Hong et al. (2016) was used to assess participants’ emotional experiences. It includes four subscales: enjoyment (4 items), pride (4 items), anxiety (4 items), and anger (3 items), totaling 15 items. Each subscale operates independently and uses a 4-point Likert scale (1 = “strongly disagree”, 4 = “strongly agree”). Since only the English version was available, a translation and back-translation procedure was employed. The AEQ-T was translated from English to Chinese and then back to English by three bilingual researchers and two experts. Participants responded in Chinese. The Chinese AEQ-T in this study demonstrated strong reliability and validity, with Cronbach’s  $\alpha$  of 0.747 for enjoyment, 0.852 for pride, 0.851 for anxiety, and 0.724 for anger (Viladrich et al., 2017). The construct validity indices were: Chi-square per degree of freedom ( $\chi^2/df$ ) = 2.578, CFI = 0.983, TLI = 0.970, RMSEA = 0.063, and SRMR = 0.035 (Hu and Bentler, 1999). The detailed item content in both English and Chinese is provided in the supplementary material we uploaded.

**Data analysis.** Data from Sample 1 underwent analysis using SPSS 26.0. Initial Pearson correlation analysis was conducted to determine correlations between each item and the total score of the SWES. Items with adjusted correlation coefficients below 0.3 were excluded from further analysis. The reliability was assessed through Cronbach’s  $\alpha$ , with items removed if their exclusion notably increased  $\alpha$ . EFA prerequisites included a KMO measure exceeding 0.60 and Bartlett’s test of sphericity significant at  $p < 0.05$  (Carpenter, 2018). Promax oblique rotation was employed for factor extraction, retaining components with eigenvalues greater than 1 (Worthington and Whittaker, 2006), and varimax rotation facilitated factor interpretation (Morrison, 2009). Criteria for item deletion during EFA involved factor loadings below 0.50, presence of cross-loadings, communalities below 0.20, and factors comprising fewer than three items (Carpenter, 2018).

Data from Sample 2 were analyzed using AMOS 24.0. CFA assessed construct validity based on criteria including  $\chi^2/df$ , CFI and TLI, RMSEA, and SRMR (Hu and Bentler, 1999). Internal consistency of the SWES was assessed using Cronbach’s  $\alpha$ , with above 0.70 indicating high reliability (Viladrich et al., 2017). Convergent and discriminant validity were assessed using the guidelines of Fornell and Larcker (1981). An AVE score of  $\geq 0.5$  was considered indicative of satisfactory convergence, while sufficient discriminant validity was confirmed when the square root of the AVE for each subscale exceeded its intercorrelations. Besides, Pearson correlation analysis using SPSS 26.0 was

conducted to examine the associations between SWE and emotional experiences.

Results

**Item analysis.** Item analysis conducted on the data from Sample 1 indicated that item 1, along with all items proposed for Professional Development (28, 29, 30, and 31), had adjusted correlation coefficients with the total score below 0.3, resulting in their exclusion. The remaining items demonstrated stronger associations with the total score, with correlation coefficients varying between 0.453 and 0.762. Moreover, the initial SWES exhibited a high Cronbach’s  $\alpha$  of 0.942, and the removal of any item would result in a decrease in this internal consistency. Consequently, no item was omitted. As a result of the item analysis process, a total of 26 items were retained for further evaluation.

**Exploratory factor analysis.** EFA was performed on data from Sample 1. The suitability of the data for EFA was confirmed by a high KMO measure of sampling adequacy (0.957) and a significant Bartlett’s Test of Sphericity ( $\chi^2 = 7054.897$ ,  $df = 325$ ,  $p < 0.001$ ). Based on the EFA results, six items were excluded due to problematic cross-loadings, categorized as follows:

Items cross-loading on two pre-specified factors: Item 8 (“The school supervisors do not exploit me”), Item 10 (“The school supervisors make me feel like an important member of the team”),

Item 11 (“The school supervisors respect L2 teachers”), and Item 22 (“L2 teachers are allowed to impact several key school issues”)—all loading on both “school support” and “supervisor support”;

Item 23 (“Colleagues collaborate closely and complete tasks on time”), which cross-loaded on two other pre-specified factors: “supervisor support” and “colleague support”;

Item 25 (“Colleagues often engage in conversations unrelated to work”), which cross-loaded on “colleague support” and an unspecified (non-predefined) factor.

After removing these items, the remaining items formed three distinct factors, collectively accounting for 69.766% of the total variance. The scree plot supporting this factor solution is presented in Fig. 3.

Factor 1 (school support) comprised 8 items, factor 2 (supervisor support) included 7 items, and factor 3 (colleague support) retained 5 items. Besides, the communality of all remaining items exceeded 0.2. Detailed results are presented in Table 2.

**Confirmatory factor analysis.** Using the pattern obtained from EFA, a 20-item scale was administered to the data from Sample 2, and CFA was conducted. First, we examined the item loadings in the unstandardized estimation, with items exhibiting non-significant loadings excluded (Kline, 2016). None of the 20 items showed non-significant unstandardized estimates, and all standardized estimates exceeded 0.45, so all items were retained in the model.

Next, we evaluated the model fit of the initial CFA model, which yielded the following results:  $\chi^2/df = 4.515$ , CFI = 0.906, TLI = 0.893, RMSEA = 0.094, and SRMR = 0.052. These indices indicated that the initial model did not meet the established fit criteria (Hu and Bentler, 1999), which specify that a well-fitting model should have  $\chi^2/df < 3$ , CFI > 0.90, TLI > 0.90, RMSEA < 0.08, and SRMR < 0.08.

To improve model fit, we then examined modification indices with a threshold of 10, focusing on those consistent with existing literature—specifically, correlations between error terms of items from the same component, justified by content overlap (Kline, 2016). Following Harrington (2008), we adjusted only the highest modification index at a time, repeating this process until the model fit improved adequately.

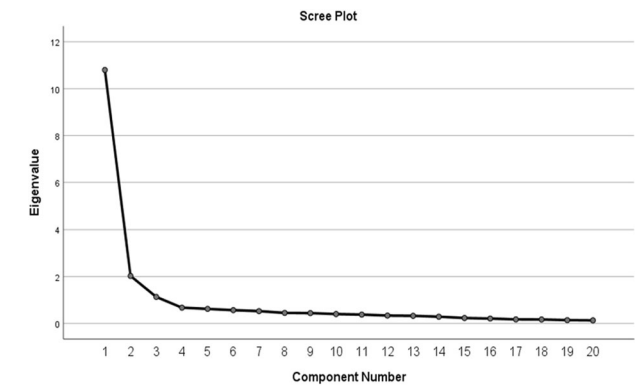
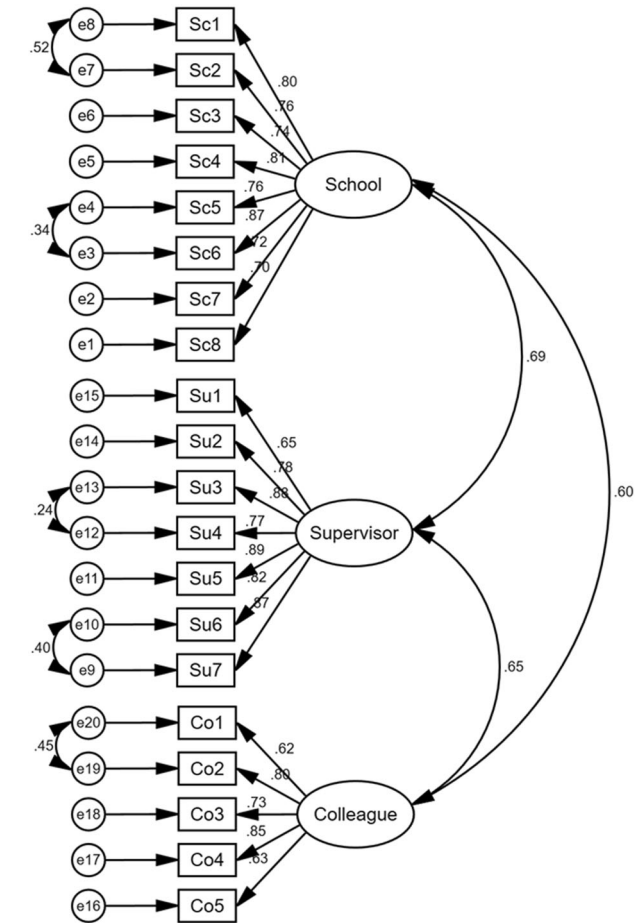


Fig. 3 The scree plot from EFA.

Table 2 The items, factor loadings, and factors of the SWES (n = 351).			
Items	School	Supervisor	Colleague
1. The school places significant importance on my well-being.	0.789		
2. The school honors my goals and values.	0.768		
3. The school shows much concern for me.	0.609		
4. The school appreciates my opinion.	0.724		
5. If I need special assistance, the school will offer proactive support.	0.787		
6. When I encounter problems, the school can provide support.	0.807		
7. The school is tolerant of my unintentional mistakes.	0.731		
8. The school provides a good working environment.	0.620		
9. Feedback from the school supervisors enhances my work performance.		0.644	
10. The school supervisors openly share important information and work collaboratively with us.		0.707	
11. The school supervisors are reliable.		0.735	
12. The school supervisors acknowledge and praise our work accomplishments.		0.683	
13. The school supervisors try to understand our opinions during discussions.		0.733	
14. The school supervisors provide fairly objective assessments of our work performance.		0.801	
15. The school supervisors are well-informed about work-related matters.		0.758	
16. I am open to discussing work-related issues with my colleagues.			0.847
17. My colleagues are willing to discussing work-related issues with me.			0.874
18. I can depend on my colleagues for support in performing well at work.			0.660
19. I am pleased with the level of friendliness from my colleagues.			0.750
20. I enjoy spending time with my colleagues outside of work.			0.646

The final modified CFA model (as depicted in Fig. 4) showed acceptable fit to the data, with fit indices meeting the criteria:  $\chi^2/df = 2.947$ , CFI = 0.949, TLI = 0.941, RMSEA = 0.070, and SRMR = 0.042. These values indicate that the modified model fits the data well, aligning with the guidelines proposed by Hu and Bentler (1999).

**Convergent and discriminant validity.** We evaluated the convergent and discriminant validity of the SWES using data from Sample 2. As presented in Table 3, all AVE scores were above 0.5, demonstrating strong convergence within the overall scale. Additionally, the square root of each subscale’s AVE (bolded in Table 3) surpassed its correlations with other subscales, confirming the discriminant validity of the SWES. These findings collectively validate the structural integrity of the SWES, supporting both convergent and discriminant validity.



**Fig. 4 The final modified CFA model with standardized estimates (n = 402).** Note. School school support, Supervisor supervisor support, Colleague colleague support.

**Reliability analysis.** An internal consistency analysis was performed on the data from Sample 2 to evaluate the reliability of the SWES. The results demonstrated strong reliability, with an overall Cronbach’s  $\alpha$  of 0.953 for the scale. Specifically, Cronbach’s  $\alpha$  for individual factors were also high: 0.923 for school support, 0.931 for supervisor support, and 0.852 for colleague support.

**Correlations with emotional experiences.** Table 4 presents the results of Pearson correlation analysis using data from Sample 2. It is important to clarify that these correlations were based on basic sum-score correlations, not latent correlations. The analysis revealed significant relationships between SWE and emotional experiences, with positive associations to enjoyment and pride, and negative associations to anxiety and anger. Specifically, enjoyment was most strongly correlated with school support ( $r = 0.449$ ,  $p < 0.05$ ), pride with supervisor support ( $r = 0.384$ ,  $p < 0.05$ ), anxiety with colleague support ( $r = -0.357$ ,  $p < 0.05$ ), and anger with school support ( $r = -0.277$ ,  $p < 0.05$ ).

**Discussion**

In modern education, the significance of teachers’ work environments has drawn considerable global attention, generating substantial academic interest (Dang et al., 2024; Masoom, 2021; Toropova et al., 2021). Hence, it is crucial to create a scientifically grounded, reliable tool to evaluate how teachers perceive the supportiveness of their work environment. This could aid in designing effective educational policies. Additionally, as PP becomes increasingly incorporated into L2 education, many researchers have identified the work environments of L2 teachers as a central element of this framework (Wu and Zeng, 2024; Zeng et al., 2024; Zhang et al., 2023; Zhi and Derakhshan, 2024). However, despite the growing demand for such instruments, there remains an absence of rigorously validated scales in current L2 research. To fill this gap, this study introduces the SWES. Given that the SWES was developed and validated among L2 teachers, further cross-disciplinary studies are needed to explore its broader applicability to other educational settings.

EFA was conducted on the data from Sample 1, revealing three factors that account for a total of 20 items. These factors correspond to the concepts of school support, supervisor support, and colleague support. Together, these three factors explain 66.75% of the total variance, substantiating our decision to use a three-factor model to represent the perceived SWE among L2 teachers. This variance explained exceeds rates commonly reported in social science studies (nearly 55%) (Peterson, 2000). While this supports the model’s utility, we emphasize that measurement quality requires holistic evaluation beyond variance explained, considering model complexity and practical utility. Critically, the removal of cross-loading items (Items 8, 10, 11, 22, 23, 25) was not solely statistically driven but also theoretically grounded (Boateng et al., 2018). These items exhibited ambiguous conceptual alignment with our tripartite framework distinguishing support sources (school, supervisor, colleague). For instance, Items 8, 10, 11, and 22 referenced “school supervisors” while

Table 3 Convergent and discriminant validity of the SWES (n = 402).					
Factors	CR	AVE	Fornell - Larcker Criterion		
			School support	Supervisor support	Colleague support
School support	0.922	0.597	<b>0.772</b>		
Supervisor support	0.931	0.659	0.691***	<b>0.812</b>	
Colleague support	0.850	0.535	0.603***	0.655***	<b>0.732</b>
CR composite reliability, AVE average variance extracted; ***p < 0.001. The bold values represent the AVE's square root.					

Table 4 Correlations between SWES and emotional experiences (n = 402).							
Variables	1	2	3	4	5	6	7
1. School support	-						
2. Supervisor support	0.626**	-					
3. Colleague support	0.536**	0.591**	-				
4. Enjoyment	0.449**	0.363**	0.334**	-			
5. Pride	0.384**	0.415**	0.329**	0.542**	-		
6. Anxiety	-0.297**	-0.273**	-0.357**	-0.409**	-0.423**	-	
7. Anger	-0.277**	-0.229**	-0.263**	-0.271**	-0.229**	0.543**	-

\*\*p < 0.01.

loading on both school support (an institutional-level construct) and supervisor support (an interpersonal-level construct), thereby blurring the theoretical boundaries between these dimensions. Similarly, Item 23 (colleague collaboration) cross-loaded on supervisor support, conflating distinct support agents. Item 25 (non-work conversations) loaded on an unspecified factor unrelated to our framework. Retaining these items would have compromised the theoretical integrity of the distinct support sources central to our model.

Breaking it down, Factor 1, “school support”, includes 8 items that assess L2 teachers’ perceptions of the support they receive from their institution, covering aspects like personal welfare, respect, assistance, and tolerance for mistakes. The factor scores reflect how supported teachers feel by the school. Items related to assistance, with high factor loadings, suggest that teachers highly value the school’s role in providing solutions to challenges (Bogler and Berkovich, 2022). Factor 2, “supervisor support”, consists of 7 items evaluating feedback, communication, collaboration, recognition, respect, and fairness from leadership. The scores reveal how teachers perceive support from their supervisors. High factor loadings for items related to respect and fairness reflect the multifaceted nature of teachers’ roles, which include teaching, research, and communication with families, thereby increasing their expectations for fair treatment. This is consistent with findings by Zhang et al. (2023) and Taamneh et al. (2024), which stress that responsible leadership, work recognition, and justice are crucial for teachers’ emotional well-being. Finally, Factor 3, “colleague support”, consists of 5 items focused on communication, collaboration, and relationships with colleagues. The scores show the extent to which teachers feel supported by their peers. Items concerning communication and friendliness, with relatively high factor loadings, underscore the importance of these aspects for effective collaboration and knowledge sharing, as supported by Akinyemi et al. (2020) and Kolleck et al. (2021).

The CFA outcomes subsequently validated the structural model of the SWES, thereby substantiating its theoretical underpinnings anchored in a tripartite factor configuration (Hu and Bentler, 1999). Furthermore, analyses of convergent and discriminant validity provided strong evidence for the psychometric robustness of the SWES. The satisfactory convergent validity indicates that the items within each factor (school support, supervisor support, colleague support) consistently measure their intended underlying construct. Crucially, the established discriminant validity demonstrates that these three factors, while interrelated components of the broader SWE construct, are statistically distinct and capture unique aspects of teachers’ perceptions of support from different sources within their work environment. This distinction is theoretically meaningful, as it confirms that support from the institution, supervisors, and colleagues represents empirically separable facets of the work environment experienced by L2 teachers. To evaluate the reliability of the SWES and its constituent factors, we employed

Cronbach’s  $\alpha$ . The results revealed that both the overall scale and its three subscales exhibited Cronbach’s  $\alpha$  exceeding 0.7, indicating acceptable reliability (Viladrich et al., 2017).

We also analyzed the correlation between SWE and the emotional experiences of L2 teachers. The results revealed significant positive correlations with emotions such as enjoyment and pride, while negative correlations with anxiety and anger. To explain these patterns, we apply Pekrun and Perry’s (2014) CVT, which attributes achievement emotions to two core appraisal processes: individuals’ evaluations of their control over teaching activities and outcomes, and the subjective value assigned to these activities —categorized as intrinsic (inherent meaning) or extrinsic (instrumental consequences). CVT suggests that these appraisals are influenced by distal factors, such as the environment. SWE, as conceptualized here, likely enhances teachers’ sense of control over professional tasks while reinforcing intrinsic value (e.g., personal fulfillment from teaching) or extrinsic value (e.g., career advancement), fostering positive emotions and reducing negative ones. For the focal emotions, CVT specifies distinct antecedent patterns: Enjoyment arises from high perceived control and high intrinsic value (positive engagement in the activity itself); Pride comes when success is attributed to one’s capabilities and effort (control appraisal) and holds significant achievement value (intrinsic self-worth or extrinsic recognition); Anxiety results from low perceived control over high-value outcomes or failure scenarios with high costs; Anger occurs when high-value goals are obstructed by external, unreasonable barriers despite high perceived capability. This framework helps clarify our findings.

Specifically, enjoyment was most strongly linked to school support, suggesting that institutional resources and care can enhance teachers’ sense of control over their work environment while reinforcing the intrinsic value of their instructional role, which contributes to greater happiness and satisfaction (Ashley et al., 2011). In contrast, pride was most closely associated with supervisor support, indicating that recognition and constructive feedback play a key role in boosting teachers’ sense of accomplishment (extrinsic value of outcomes) and competence (control), which fosters pride (Yang et al., 2022). Anxiety, on the other hand, was most strongly correlated with colleague support, revealing that lack of peer collaboration can reduce teachers’ control over classroom challenges and amplify the external pressures to avoid failure, contributing to feelings of anxiety. Lastly, anger was most associated with school support, suggesting that unsupportive environments are perceived as obstacles to goal achievement (lowering control) and reducing the extrinsic value of efforts, which leads to anger (Miron-Spektor and Rafaeli, 2009). Overall, these findings imply that environmental factors (SWE) serve as indirect influences on L2 teachers’ emotions, shaping them through their impact on context-specific control-value appraisals.

It is noteworthy that while the SWES’s dimensions (i.e., school, supervisor, and colleague support) and specific items (e.g., “The



school places significant importance on my well-being”) may hold relevance beyond L2 education, its unique value lies in its validation among L2 teachers and its integration with PP frameworks in L2 research to interpret relationships with emotional experiences—contexts that underscore its targeted relevance for L2 education research and practice. In other words, while the SWES has wider potential, the conceptual and functional dynamics of these support dimensions (such as their connection with emotions) are deeply rooted in the unique context of L2 education. Therefore, applying it across disciplines requires empirical validation to ensure its relevance. Ultimately, the SWES is a specialized tool for exploring core support structures and their outcomes in the distinct professional landscape of L2 teaching.

### Implications and limitations

This study makes several contributions to the field. First, the SWES provides a concise tool to assess L2 teachers’ perceived supportiveness of their work environment, with established psychometric properties. However, since the SWES was designed for L2 teachers, its potential application in other fields would require empirical verification of its psychometric properties in those specific contexts. Besides, the correlations observed between SWE dimensions and emotional experiences also suggest preliminary practical implications. Schools may consider implementing institutional support mechanisms to enhance teachers’ sense of control and value, which could contribute to enhanced enjoyment. Supervisory practices focused on recognition and constructive feedback may support teachers’ sense of accomplishment. Fostering collaborative relationships among colleagues could help mitigate anxiety triggers, while addressing systemic barriers might reduce anger. If implemented, these approaches could enhance teacher well-being in conjunction with other institutional interventions. However, these implications should be interpreted with caution due to the study’s methodological constraints.

Specially, the limitations of this study should be considered as follows. First, the exclusive reliance on self-reported data introduces the risk of common method bias and social desirability effects, which could inflate the observed correlations (Podsakoff et al., 2003). Future research could incorporate objective institutional records, such as official documents outlining school support policies and log data on resource allocation. By triangulating these sources with self-reported data, the robustness of the findings would be enhanced. Second, the cross-sectional design prevents drawing causal inferences about the relationships between SWE and emotional experiences. Longitudinal studies could help track changes in SWE and emotional experiences over time, offering more clarity on the directional relationships between these variables. Additionally, we did not conduct measurement invariance tests across subgroups (e.g., gender, educational levels) due to insufficient sample sizes. Consequently, conclusions regarding the scale’s equivalence across groups are limited. Future research with larger and more balanced samples is necessary to confirm the measurement invariance of the SWES. Finally, the omission of student support—an important SWE dimension (Toropova et al., 2021; Yada and Savolainen, 2023)—represents a significant conceptual gap that needs to be addressed in future studies.

### Conclusion

This study developed and validated the SWES among teachers, which includes three dimensions: school support, supervisor support, and colleague support. The results indicate that the SWES demonstrates acceptable reliability and validity within the L2 teacher population, providing an effective tool for assessing L2 teachers’ perceptions of their work environment. However, the

SWES may have overlooked the potentially key dimension of “student support,” which should be included and tested in future research.

The study also provides preliminary evidence suggesting that SWE may help improve L2 teachers’ positive emotions (i.e., enjoyment and pride) and alleviate negative emotions (i.e., anxiety and anger). However, due to the use of self-reported data and a cross-sectional design, the interpretation of these findings should be cautious. Future research, if it addresses these limitations, could provide stronger evidence to inform policies and practices aimed at improving teacher well-being and potentially optimizing teaching effectiveness.

Moreover, it should be clarified that while the wording of the SWES items is neutral and could potentially be applied to other teacher populations after further validation, it is crucial to emphasize that the development and validation of the scale were specifically focused on L2 teachers. As such, the main contribution of this study lies in providing the L2 research community with a validated tool to assess SWE as a critical factor in the L2 teaching context and its connection to emotional experiences, a key aspect of L2 teacher well-being.

### Data availability

The datasets generated for this study can be requested from the corresponding author.

Received: 10 February 2025; Accepted: 26 August 2025;

Published online: 02 September 2025

### References

- Akinyemi A, Rembe S, Nkonki V (2020) Trust and positive working relationships among teachers in communities of practice as an avenue for professional development. *Educ Sci* 10:136. <https://doi.org/10.3390/educsci10050136>
- Ángeles López-Cabarcos M, Vázquez-Rodríguez P, Quiñoá-Piñero LM (2022) An approach to employees’ job performance through work environmental variables and leadership behaviours. *J Bus Res* 140:361–369. <https://doi.org/10.1016/j.jbusres.2021.11.006>
- Ashley N, Yang L-Q, Spector PE, Zhang X (2011) Emotional labor in China: do perceived organizational support and gender moderate the process? *Stress Health* 27(4):289–305. <https://doi.org/10.1002/smi.1359>
- Boateng GO, Neilands TB, Frongillo EA, Melgar-Quiñonez HR, Young SL (2018) Best practices for developing and validating scales for health, social, and behavioral research: a primer. *Front Public Health* 6:149. <https://doi.org/10.3389/fpubh.2018.00149>
- Bogler R, Berkovich I (2022) A systematic review of empirical evidence on teachers’ organizational commitment 1994–2018. *Leadersh Policy Sch* 21(3):440–457. <https://doi.org/10.1080/15700763.2020.1774783>
- Bosma AR, Boot CRL, Schaafsma FG, Kok G, Anema JR (2020) Development of an intervention to create a supportive work environment for employees with chronic conditions: an intervention mapping approach. *J Occup Rehabil* 30(4):624–634. <https://doi.org/10.1007/s10926-020-09885-z>
- Broad ML, Newstrom JW (1992) Transfer of training: action-packed strategies to ensure high payoff from training investments. Addison-Wesley
- Burden R, Fraser B (1994) Examining teachers’ perceptions of their working environments. *Educ Psychol Pract* 10(2):67–73. <https://doi.org/10.1080/0266736940100201>
- Carpenter S (2018) Ten steps in scale development and reporting: a guide for researchers. *Commun Methods Meas* 12(1):25–44. <https://doi.org/10.1080/19312458.2017.1396583>
- Dang VH, Nguyen LT, Pham HT (2024) Validity of school-level environment questionnaire (SLEQ): a case of high school teachers in Vietnam. *Learn Environ Res* 27(1):37–52. <https://doi.org/10.1007/s10984-023-09468-8>
- Derakhshan A (2022) Revisiting research on positive psychology in second and foreign language education: trends and directions. *Lang Relat Res* 13:1–43. <https://doi.org/10.52547/LRR.13.5.2>
- Derakhshan A, Solhi M, Azari Noughabi M (2023) An investigation into the association between student-perceived affective teacher variables and students’ L2-grit. *J Multiling Multicult Dev* 1–17. <https://doi.org/10.1080/01434632.2023.2212644>

- DeVellis RF (2016) Scale development: theory and applications (Applied social research methods). SAGE Publications
- Dreer B (2024) Teachers' well-being and job satisfaction: the important role of positive emotions in the workplace. *Educ Stud* 50(1):61–77. <https://doi.org/10.1080/03055698.2021.1940872>
- Ershadi F, Nazari M, Chegenie MS (2024) Native speakerism as a source of agency-related critical incidents: Implications for non-native English teachers' professional identity construction. *System* 120:103182. <https://doi.org/10.1016/j.system.2023.103182>
- Fornell C, Larcker DF (1981) Evaluating structural equation models with unobservable variables and measurement error. *J Mark Res* 18(1):39–50. <https://doi.org/10.2307/3151312>
- Frenzel AC (2014) Teacher emotions. In: Pekrun R, Linnenbrink-Garcia L. (eds) *International handbook of emotions in education*. Routledge/Taylor and Francis Group, pp 494–518
- Greenier V, Fathi J, Behzadpoor S-F (2023) Teaching for creativity in an EFL context: the predictive roles of school climate, teaching enthusiasm, and metacognition. *Think Skills Creativ* 50:101419. <https://doi.org/10.1016/j.tsc.2023.101419>
- Harrington D (2008) Assessing confirmatory factor analysis: model fit and model revision. In: *Confirmatory factor analysis*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780195339888.003.0004>
- Hassard JS (2012) Rethinking the Hawthorne Studies: the Western Electric research in its social, political and historical context. *Hum Relat* 65(11):1431–1461. <https://doi.org/10.1177/0018726712452168>
- Hiver P, Dörnyei Z (2017) Language teacher immunity: a double-edged sword. *Appl Linguist* 38(3):405–423. <https://doi.org/10.1093/applin/amv034>
- Hong J, Nie Y, Heddy B, Monobe G, Ruan J, You S, Kambara H (2016) Revising and validating Achievement Emotions Questionnaire – Teachers (AEQ-T). *Int J Educ Psychol* 5:80–107. <https://doi.org/10.17583/ijep.2016.1395>
- Hu L-t, Bentler PM (1999) Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct Equ Model* 6(1):1–55. <https://doi.org/10.1080/10705519909540118>
- Jang J, Yoo H, Liou P-Y (2023) Effects of collaboration on teachers' job satisfaction and self-efficacy: personal and structural characteristics as moderators. *Educ Stud* 1–23. <https://doi.org/10.1080/03055698.2023.2256924>
- Johnson B, Stevens JJ (2001) Exploratory and confirmatory factor analysis of the School Level Environment Questionnaire (SLEQ). *Learn Environ Res* 4(3):325–344. <https://doi.org/10.1023/A:1014486821714>
- Johnson B, Stevens JJ, Zvach K (2007) Teachers' perceptions of school climate: a validity study of scores from the revised school level environment questionnaire. *Educ Psychol Meas* 67(5):833–844. <https://doi.org/10.1177/0013164406299102>
- King J, Almkhaild H, Mercer S, Babic S, Mairitsch A, Sulis G (2024) Teacher emotions and the emotional labour of modern language (ML) teachers working in UK secondary schools. *Int Rev Appl Linguist Lang Teach* 62(3):1213–1235. <https://doi.org/10.1515/iral-2024-0080>
- Kolleck N, Schuster J, Hartmann U, Gräsel C (2021) Teachers' professional collaboration and trust relationships: an inferential social network analysis of teacher teams. *Res Educ* 111(1):89–107. <https://doi.org/10.1177/00345237211031585>
- Lawshe CH (1975) A quantitative approach to content validity. *Pers Psychol* 28(4):563–575. <https://doi.org/10.1111/j.1744-6570.1975.tb01393.x>
- Li R, Yao M (2022) What promotes teachers' turnover intention? Evidence from a meta-analysis. *Educ Res Rev* 37:100477. <https://doi.org/10.1016/j.edurev.2022.100477>
- Ma D, Wang Y (2024) Does the work environment matter in shaping English as a foreign language teachers' teaching for creativity: a mixed-methods investigation into the roles of perceived climate, peer group interaction, and supervisory relationship. *Int J Appl Linguist* <https://doi.org/10.1111/ijal.12624>
- MacIntyre PD, Mercer S (2014) Introducing positive psychology to SLA. *Stud Second Lang Learn Teach* 4:153–172. <https://doi.org/10.14746/ssl.2014.4.2.2>
- MacIntyre PD, Ross J, Talbot K, Mercer S, Gregersen T, Banga CA (2019) Stressors, personality and wellbeing among language teachers. *System* 82:26–38. <https://doi.org/10.1016/j.system.2019.02.013>
- Masoom M (2021) Teachers' perception of their work environment: evidence from the primary and secondary schools of Bangladesh. *Educ Res Int* 2021:1–12. <https://doi.org/10.1155/2021/4787558>
- McKenzie JF, Wood ML, Kotecki JE, Clark JK, Brey RA (1999) Establishing content validity: using qualitative and quantitative steps. *Am J Health Behav* 23(4):311–318. <https://doi.org/10.5993/AJHB.23.4.9>
- Mercer S (2023) The wellbeing of language teachers in the private sector: an ecological perspective. *Lang Teach Res* 27:1054–1077. <https://doi.org/10.1177/1362168820973510>
- Miron-Spektor, E, and Rafaeli, A (2009). The effects of anger in the workplace: When, where, and why observing anger enhances or hinders performance. In: Martocchio JJ, Liao H (eds) *Research in personnel and human resources management*. Emerald Group Publishing Limited. [https://doi.org/10.1108/S0742-7301\(2009\)0000028007](https://doi.org/10.1108/S0742-7301(2009)0000028007)
- Morrison JT (2009) Evaluating factor analysis decisions for scale design in communication research. *Commun Methods Meas* 3(4):195–215. <https://doi.org/10.1080/19312450903378917>
- Pawlak M, Kiermasz Z (2018) The use of language learning strategies in a second and third language: the case of foreign language majors. *Stud Second Lang Learn Teach* 8(2):427–443. <https://doi.org/10.14746/ssl.2018.8.2.11>
- Pekrun R, Perry PR (2014) Control-value theory of achievement emotions. In: *International handbook of emotions in education*. Routledge, pp 120–141
- Peterson RA (2000) A meta-analysis of variance accounted for and factor loadings in exploratory factor analysis. *Mark Lett* 11(3):261–275. <https://doi.org/10.1023/A:1008191211004>
- Podsakoff PM, MacKenzie SB, Lee JY, Podsakoff NP (2003) Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J Appl Psychol* 88(5):879–903. <https://doi.org/10.1037/0021-9010.88.5.879>
- Ryberg R, Her S, Temkin D, Madill R, Kelley C, Thompson J, Gabriel A (2020) Measuring school climate: validating the education department school climate survey in a sample of urban middle and high school students. *AERA Open* 6(3):2332858420948024. <https://doi.org/10.1177/2332858420948024>
- Schoeni RF, Stafford F, McGonagle KA, Andreski P (2013) Response rates in national panel surveys. *Ann Am Acad Polit Soc Sci* 645(1):60–87. <https://doi.org/10.1177/0002716212456363>
- Seligman MEP (2011) *Flourish: a visionary new understanding of happiness and well-being*. Free Press
- Su H, Zhang J, Li P, Pu D, Shang L (2024) The relationships between Chinese teachers' emotions, professional identity, and teaching for creativity: the mediating role of emotional intelligence. *Think Skills Creativ* 52:101531. <https://doi.org/10.1016/j.tsc.2024.101531>
- Sudina E, Plonsky L (2021) Academic perseverance in foreign language learning: an investigation of language-specific grit and its conceptual correlates. *Mod Lang J* 105:829–857. <https://doi.org/10.1111/modl.12738>
- Taamneh M, Aljawarneh N, Al-Okaity M, Taamneh A, Al-Oqaity A (2024) The impact of ethical leadership on organizational citizenship behavior in higher education: the contingent role of organizational justice. *Cogent Bus Manag* 11(1):2294834. <https://doi.org/10.1080/23311975.2023.2294834>
- Thompson B (2004) Exploratory and confirmatory factor analysis: understanding concepts and applications. American Psychological Association. <https://doi.org/10.1037/10694-000>
- Toropova A, Myrberg E, Johansson S (2021) Teacher job satisfaction: the importance of school working conditions and teacher characteristics. *Educ Rev* 73(1):71–97. <https://doi.org/10.1080/00131911.2019.1705247>
- Tripathi A, Kalia P (2022) Examining the effects of supportive work environment and organisational learning culture on organisational performance in information technology companies: the mediating role of learning agility and organisational innovation. *Innovation*, pp 1–21. <https://doi.org/10.1080/14479338.2022.2116640>
- Viladrich C, Angulo-Brunet A, Doval E (2017) A journey around alpha and omega to estimate internal consistency reliability. *Anal Psicol* 33(3):755–782. <https://doi.org/10.6018/analesps.33.3.268401>
- Wang Y, Derakhshan A, Rahimpour H (2022) Developing resilience among Chinese and Iranian EFL teachers: a multi-dimensional cross-cultural study. *J Multiling Multicult Dev*. <https://doi.org/10.1080/01434632.2022.2042540>
- Wang Y, Derakhshan A, Zhang LJ (2021) Researching and practicing positive psychology in second/foreign language learning and teaching: the past, current status and future directions. *Front Psychol* 12:731721. <https://doi.org/10.3389/fpsyg.2021.731721>
- Wartenberg G, Aldrup K, Grund S, Klusmann U (2023) Satisfied and high performing? A meta-analysis and systematic review of the correlates of teachers' job satisfaction. *Educ Psychol Rev* 35(4):114. <https://doi.org/10.1007/s10648-023-09831-4>
- Worthington RL, Whittaker TA (2006) Scale development research: a content analysis and recommendations for best practices. *Counsel Psychol* 34(6):806–838. <https://doi.org/10.1177/0011000006288127>
- Wu H, Zeng Y (2024) A mixed-methods investigation into the interplay between supportive work environment, achievement emotions, and teaching for creativity as perceived by Chinese EFL teachers. *Percept Motor Skills*, pp 1–24. <https://doi.org/10.1177/00315125241272593>
- Wu H, Zeng Y (2025) Validating the Second Language Teaching for Creativity Scale (L2TCS) and applying it to identify Chinese college L2 teachers' latent profiles. *Think Skills Creativ* 56:101781. <https://doi.org/10.1016/j.tsc.2025.101781>
- Yada T, Savolainen H (2023) Principal self-efficacy and school climate as antecedents of collective teacher efficacy. *Sch Effect Sch Improve* 34(2):209–225. <https://doi.org/10.1080/09243453.2023.2170425>
- Yang T, Jiang X, Cheng H (2022) Employee recognition, task performance, and OCB: mediated and moderated by pride. *Sustainability* 14(3)

- Zeng Y, Yu J, Wu H, Liu W (2024) Exploring the impact of a supportive work environment on Chinese L2 teachers' emotions: a partial least squares-SEM approach. *Behav Sci* 14(5):370. <https://doi.org/10.3390/bs14050370>
- Zhang LJ, Fathi J, Mohammaddokht F (2023) Predicting teaching enjoyment from teachers' perceived school climate, self-efficacy, and psychological wellbeing at work: EFL teachers. *Percept Motor Skills* 130(5):2269–2299. <https://doi.org/10.1177/00315125231182269>
- Zhao X, Danping W (2024) Unpacking the antecedents of boredom and its impact on university learners' engagement in languages other than English: a qualitative study in the distance online learning context. *Int J Appl Linguist*. <https://doi.org/10.1111/ijal.12680>
- Zhao X, Lan G, Zhang H (2024) The predictive effect of language achievement on multiple emotions in languages other than English: validating a distal mediation model based on the control-value theory. *Appl Linguist Rev* 15(6):2713–2732. <https://doi.org/10.1515/applirev-2023-0046>
- Zhao X, Wang D (2024) Domain-specific L2 grit, anxiety, boredom, and enjoyment in online Chinese learning. *Asia Pac Educ Res* 33(4):783–794. <https://doi.org/10.1007/s40299-023-00777-3>
- Zhi Y, Derakhshan A (2024) An investigation into Chinese EFL teachers' organizational commitment: do emotion regulation ability and workplace buoyancy matter? *Asia Pac Educ Res*. <https://doi.org/10.1007/s40299-024-00888-5>
- Zhong C-B, House J (2012) Hawthorne revisited: organizational implications of the physical work environment. *Res Organ Behav* 32:3–22. <https://doi.org/10.1016/j.riob.2012.10.004>

## Acknowledgements

The study was supported by Postgraduate Scientific Research Innovation Project of Hunan Province (No. CX20240519), Hunan Provincial Department of Education Scientific Research Project (No. 24A0076), Research Output of the Guangxi Young and Middle-Aged University Teachers' Basic Research Capacity Enhancement Program (No. 2025KY0015), and the Hunan Provincial Social Science Fund in the field of Education (No. JJ231825). and Tenglong Innovative Talent Fund of Hunan Normal University (No. 2025TL207).

## Author contributions

H.W. and F.L. wrote the main manuscript text, and H.W. prepared Figs. 1–4. All authors reviewed the manuscript.

## Competing interests

The authors declare no competing interests.

## Ethical approval

All procedures involving human participants in this study adhered to the 1964 Helsinki Declaration, its subsequent amendments, and comparable ethical standards. This study was approved by the Research Ethics Committee of Hunan Normal University on August 17, 2023 (No. 2023677).

## Informed consent

In this study, electronic informed consent was obtained from all participants between August 19 and 30, 2023. Prior to participation, participants were informed of the study objectives, confidentiality of their responses, the absence of risks in the study, and their right to withdraw at any time without repercussions. All collected data were anonymized to protect participants' identities and ensure confidentiality.

## Additional information

**Supplementary information** The online version contains supplementary material available at <https://doi.org/10.1057/s41599-025-05846-0>.

**Correspondence** and requests for materials should be addressed to Fenfang Liao.

**Reprints and permission information** is available at <http://www.nature.com/reprints>

**Publisher's note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

© The Author(s) 2025