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The distinct roles of performance and intelligence mindsets in L2 learning: Growth performance mindsets show positive associations with achievement and anxiety

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Abstract

Recent research has yielded inconsistent findings regarding the role of language mindsets in students' outcomes. One possible explanation is that prior studies have primarily focused on language intelligence mindsets, which concern the malleability of language aptitude, while overlooking learners' beliefs about the changeability of their language performance (i.e., language performance mindsets). Thus, we introduce language performance mindsets and examine their unique contributions to second language (L2) learning. Using data

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from 1,248 English learners in China, we assessed students' growth and fixed mindsets about language intelligence and performance, as well as their English achievement and English learning anxiety. Exploratory and confirmatory factor analyses examined the factorial distinction between the two mindsets, while paired-samples *t*-tests compared their mean levels and structural equation modeling examined their associations with achievement and anxiety. Results showed that performance mindsets were structurally distinct from intelligence mindsets and growth performance mindsets were the most prevalent beliefs. Growth intelligence mindsets were significantly associated with lower anxiety but not achievement, whereas growth performance mindsets positively predicted both achievement and anxiety. These findings expand the language mindset framework by highlighting the prevalence and distinct role of performance mindsets in L2 learning and call for further exploration of this dimension.

Keywords: performance mindsets; intelligence mindsets; anxiety; achievement; language learning

1. Introduction

In the field of language education, growing attention has been given to psychological factors that facilitate students' English learning (e.g., Chu et al., 2024; Liu et al., 2024, 2026b; Wang & Guo, 2026). Among these factors are language intelligence mindsets, which concern beliefs about whether language learning ability is unchangeable or malleable (Leis et al., 2025; Lou & Noels, 2016; Mercer & Ryan, 2010). Researchers have documented the detrimental predictive roles of fixed language intelligence mindsets and the protective role of growth language intelligence mindsets in language learning emotions (Derakhshan et al., 2024; Khajavy et al., 2022). However, investigations into the association between language intelligence mindsets and achievement have produced mixed findings (Cheong et al., 2023; Zhang et al., 2026). This inconsistency has prompted researchers to explore moderating mechanisms in the relationships between mindsets and their outcomes (Lou, 2025, for a recent review; Elahi Shirvan et al., 2024). However, an often-overlooked issue concerns how mindsets have been conceptualized and assessed. Existing mindset research in language education primarily captures beliefs about intelligence rather than beliefs directly tied to academic performance, which may help explain their limited predictive effects for second language (L2) achievement.

Researchers in general education have proposed another important type of mindset, namely, performance mindsets, to directly capture people's belief in the changeability of academic performance (Wang & Ng, 2012). For example, studies

have shown that Chinese students placed greater importance on effort than ability in achieving academic success (Sun et al., 2021), suggesting that growth performance mindsets may be prevalent among Chinese students. Beyond its prevalence, this belief may also have important implications for students' learning and academic outcomes. From the perspective of expectancy-value theory (EVT; Eccles & Wigfield, 2020), performance mindsets can be understood as expectancy-related beliefs, reflecting learners' beliefs about whether academic success in language learning is attainable. According to EVT, such performance-related expectancies may directly influence achievement in language learning. In other words, a construct that directly captures learners' beliefs about performance may provide a clearer understanding of the role of language mindsets in L2 learning outcomes.

The potential importance of performance mindsets is further highlighted by their prevalence among learners. Research has shown that students in China and the US place greater importance on effort than ability in achieving academic success, suggesting that effort-based beliefs about performance may be widely shared across cultural contexts (Sun et al., 2021). The widespread endorsement of these beliefs suggests that performance mindsets may represent a common and meaningful aspect of students' beliefs about learning, making it particularly important to understand how they shape students' learning and achievement. Yet, despite the prevalence of performance mindsets among students, little is known about whether these beliefs are distinct from intelligence mindsets and whether they make a unique contribution to predicting learning outcomes in L2 contexts.

The need to examine performance mindsets is also practically relevant in language education. Recent research has increasingly promoted growth language intelligence mindset interventions with the aim of improving language learners' learning outcomes (e.g., Rong et al., 2025; Ye, 2026). However, given that evidence regarding the association between intelligence mindsets and achievement remains mixed (see Lou, 2025), it is important to consider whether a mindset more directly focused on academic performance may provide a more proximal account of students' achievement. Otherwise, substantial resources devoted to interventions targeting intelligence beliefs may not yield the expected improvements in language learning outcomes when the links between language intelligence mindsets and achievement remain inconsistent. Examining performance mindsets may therefore not only extend the conceptualization of language mindsets but also help identify beliefs that are more closely connected to students' actual language learning outcomes. Yet, little is known about whether language performance mindsets constitute a construct distinct from language intelligence mindsets, whether students endorse these two types of mindsets to different degrees, and whether they show distinct or similar associations with language learning outcomes. The present study addresses these gaps by examining the

distinctiveness and mean levels of language performance and intelligence mindsets, as well as their associations with anxiety and achievement in English learning. Addressing these questions can help refine mindset theory and enhance our understanding of how mindsets impact language learning experiences.

2. Literature review

2.1. Intelligence and performance mindsets as related but distinct constructs

Mindsets have become an important research area in education (Yeager & Dweck, 2012), including language education (Liu et al., 2025; Tsang, 2025). The most frequently investigated mindsets in language education are language intelligence mindsets, which refer to individuals' beliefs about the plasticity of their language learning ability, encompassing both general language learning ability and second language learning ability (Lou & Noels, 2016; Mercer & Ryan, 2010). People with a fixed language intelligence mindset view their ability to learn a language as an inherent trait that cannot be changed. By contrast, those who adopt growth mindsets perceive intelligence as malleable, recognizing the potential for improvement and development. Previous studies have primarily concentrated on the "intelligence" or "aptitude" components of language mindsets. For instance, the widely used *Language Mindset Inventory* measures students' beliefs about statements like "You can always change your foreign language ability" (Lou & Noels, 2017).

Importantly, students' beliefs about *intelligence* are distinct from their beliefs about *performance* in language learning, with performance specifically referring to their academic performance in language courses and on language tests. Existing conceptualizations of language mindsets may thus miss this important aspect in classroom settings. Thus, some researchers have proposed performance mindsets, denoting beliefs about the changeability of academic performance (e.g., test scores; Wang & Ng, 2012). This concept is derived from intelligence mindsets, which are typically categorized into fixed and growth mindsets in mindset theory (Dweck & Leggett, 1988) and empirical studies (Khajavy et al., 2022; Li et al., 2024). Therefore, in the domain of language education, we define language performance mindsets as beliefs in the malleability of academic performance in language learning and further subdivide them into fixed and growth performance mindsets. Accordingly, individuals with a fixed language performance mindset perceive their language learning performance, particularly achievement, as unchangeable, whereas those with a growth language performance mindset believe that their language learning outcomes can be improved through effort.

Scholars have argued that performance and intelligence mindsets are distinct psychological constructs. Tweed and Lehman (2002), for example, noted that people may believe that diligence can lead to favorable educational outcomes, although they may, in the meantime, hold beliefs about the unchangeability of intelligence. This may be particularly true for people from Confucian traditions, who often hold that rewards in education are achievable through effort, irrespective of personal intelligence levels (Lee, 1996). In Confucian cultures, intelligence is not a central focus in educational settings (Li, 2010). Therefore, intelligence and academic performance may not be tightly related, suggesting that beliefs about intelligence and beliefs about performance may represent separate psychological constructs. Conceptually, these two constructs capture different aspects of learning. In essence, intelligence pertains to less observable and abstract cognitive abilities, such as problem-solving, reasoning, and comprehension of complex ideas (Gottfredson, 1997), while school performance signifies visible educational outcomes, typically represented by test scores (Barra & Boccia, 2022). It is possible for a highly intelligent student to underperform academically due to various factors, such as a lack of motivation (Dörnyei, 2001). Thus, intelligence mindsets may have limited effectiveness in explaining achievement in some cases (e.g., Cheong et al., 2023; Liu & Wang, 2025; Wang & Sun, 2025). Consequently, it is essential to explore a new dimension of mindsets, namely, performance mindsets, which directly capture beliefs about the changeability of academic performance to help address the controversies regarding the associations between mindsets and L2 achievement.

The distinction between intelligence and performance mindsets has been supported by a few empirical studies in fields outside of language education. In their longitudinal study, Wang and Ng (2012) examined the structure of mindsets, revealing that performance mindsets are structurally distinct from intelligence mindsets. They also found that Chinese students were significantly more inclined to perceive intelligence as unchangeable than academic performance. Moreover, Sun et al. (2021) found that Chinese and American students had relatively lower levels of growth intelligence mindsets, while placing greater importance on effort than ability in achieving school-level mathematics performance. These findings provide preliminary evidence that performance mindsets and intelligence mindsets may differ in both their structural characteristics and mean levels. Given that performance mindsets and intelligence mindsets have different conceptual focuses, these findings further support the perspective that they may represent distinct psychological constructs. Based on the conceptual perspectives and empirical findings discussed above, we summarize the major similarities and differences between intelligence and performance mindsets in Table 1.

Table 1 Key differences and similarities between intelligence mindsets and performance mindsets

Dimension	Intelligence mindset	Performance mindset
Conceptual differences		
Core focus/ domain	Beliefs about the malleability of intelligence/aptitude in general	Beliefs about the malleability of academic performance (usually on tests/exams)
Conceptual nature	Beliefs about abstract and less observable cognitive abilities (e.g., problem solving, reasoning, comprehension)	Beliefs about measurable and visible academic outcomes (e.g., test scores)
Conceptual distinction	Intelligence does not necessarily determine academic performance (e.g., a student may be intelligent but underperform due to lack of motivation)	Performance varies regardless of intelligence (e.g., some students believe that academic performance can improve through effort despite their intelligence)
Empirical differences in previous research		
Factorial structure	Structurally distinct from each other (Wang & Ng, 2012)	
Mean level	Different mean levels, with students placing greater importance on effort than ability in school-level mathematics achievement, while reporting relatively lower levels of growth intelligence beliefs (Sun et al., 2021)	
Conceptual and empirical similarities		
Conceptual nature	Both constructs reflect learners' implicit beliefs	
Predictive validity	Both fixed performance and fixed intelligence mindsets positively predict helplessness, with the predictive validity of growth mindsets unknown (Wang & Ng, 2012)	

2.2. The roles of intelligence mindsets in anxiety and achievement in language learning

Apart from exploring the mindset structure, another line of research focuses on the associations between mindsets, especially intelligence mindsets, and psychological factors and educational outcomes, such as anxiety and achievement (Jiang et al., 2024; Liu et al., 2025). Although many emotions, such as boredom, embarrassment, and shame, are important in language learning (Guo et al., 2026; Khajavy et al., 2025; Pawlak et al., 2026; Teimouri, 2018; Zhao et al., 2026), anxiety is the primary emotional factor examined in the present study because it has a particularly strong theoretical and empirical basis in research on mindset. First, anxiety can be more directly situated within existing mindset frameworks. The "mindset-goals-responses" model (Lou & Noels, 2017) suggests that fixed and growth mindsets predict distinct goal orientations, leading to varied levels of anxiety. Specifically, learners who endorse growth intelligence mindsets are more likely to have a mastery goal orientation in their learning, prioritizing learning from challenging situations (Dweck & Leggett, 1988; Yeager & Dweck, 2012). Thus, they may feel less anxious in difficult situations. By contrast, although emotions such as boredom, embarrassment, and shame are important in language learning, the existing mindset frameworks do not provide

equally clear theoretical pathways for predicting how language mindsets may relate to these emotions. As the first study examining language performance mindsets in L2 education, we hope to situate this work within the more established theoretical framework linking mindsets and emotion. Second, anxiety has been extensively examined in relation to language intelligence mindsets, providing an established empirical basis for examining the role of language performance mindsets. For example, Cheong et al. (2023) found that growth intelligence mindsets negatively predicted anxiety among learners with low-to-medium English writing proficiency, whereas fixed intelligence mindsets were associated with greater anxiety in English learning (see also Li et al., 2024; Lou et al., 2025; Ozdemir & Papi, 2022). This established evidence provides a useful basis for comparison when examining whether language performance mindsets show similar or distinct associations with anxiety. In contrast, a recent systematic review of 66 studies by Oruç (2025) showed that other emotions, such as shame, anger, and hopelessness, have received little attention in research on language mindsets, making it difficult to derive clear expectations about their associations with the newly proposed construct of language performance mindsets. Thus, focusing on anxiety allows us to build on the existing theoretical framework and empirical evidence on language intelligence mindsets while extending this line of research to language performance mindsets.

Concerning performance outcomes, while scholars have argued that students' intelligence mindsets are meaningful predictors of their L2 achievement, empirical findings on the relationship between language intelligence mindsets and achievement have been mixed. For example, Jiang et al. (2024) surveyed 486 Chinese high school students using questionnaires and found that growth intelligence mindsets were positively associated with English learning achievement. Similarly, Zhang et al. (2026) found that growth intelligence mindsets were positive predictors of English achievement among 411 English learners in Iran. These findings are consistent with previous evidence from 234 university students in Canada, which revealed that students with growth language intelligence mindsets outperformed those with fixed mindsets in L2 courses (Lou et al., 2022). However, Cheong et al. (2023) presented a different result, showing that among students with high writing proficiency, growth intelligence mindsets did not predict English writing achievement. Lou et al. (2025), in their investigation of 342 Canadian university students, also found that growth intelligence mindsets did not directly predict L2 achievement. Similarly, while Bai et al. (2025) reported that Chinese primary school students who endorsed fixed intelligence mindsets scored lower on English tests, Khajavy et al. (2022) found no significant role of fixed language intelligence mindsets in predicting language learning achievement among 489 university students in Iran. These mixed findings are particularly noteworthy given the increasing use of growth language intelligence mindset interventions to promote

language learning outcomes (e.g., Rong et al., 2025; Ye, 2026). They raise questions about whether beliefs about language intelligence alone are sufficiently proximal to students' actual academic performance in language learning. This question highlights the value of examining language performance mindsets, which we argue to be more directly concerned with academic performance and thus offer a more robust account of language achievement.

2.3. The roles of performance mindsets in students' learning

Although performance mindsets may provide a promising perspective for understanding students' language learning, their effects have received very limited empirical attention. Regarding the relationships between performance mindsets and educational outcomes, EVT provides a useful framework for understanding the mechanisms linking learners' performance mindsets to academic achievement. According to EVT, students' achievement is influenced by expectancy, or the belief that one can succeed in a given task, and higher expectancy is generally associated with higher academic performance (Eccles, 1983; Eccles & Wigfield, 2020). Language performance mindsets, which reflect learners' beliefs about the malleability of their performance outcomes (e.g., "Students can achieve As in English courses through hard work"), closely parallel the concept of expectancy in EVT. Thus, learners with a growth performance mindset are likely to anticipate success in language tasks, which in turn increases their likelihood of achieving higher academic outcomes. In contrast, students holding a fixed performance mindset may expect less success and, as a result, are more likely to show lower achievement. Empirically, Stevenson et al. (1986) found that the belief in hard work was common among Chinese and Japanese mothers. They reasoned that this belief could drive Chinese and Japanese children to invest effort in learning, ultimately leading to exceptional achievements. Subsequently, Stevenson et al. (1993) found that individuals from Asian cultures generally held a strong belief in the fundamental role of hard work in mathematics performance, and they indicated that these beliefs might account for students' extraordinary performance in mathematics learning. Their studies from general education shed light on the role of performance mindsets in student achievement. However, direct empirical evidence linking performance mindsets to academic achievement remains scarce in both general and language education.

Performance mindsets may also be relevant to students' psychological outcomes, although research in this area is similarly limited. Wang and Ng (2012) appear to be the only researchers who have explored the influence of performance mindsets on students' psychological outcomes. Their investigation of 479 Chinese seventh-grade students revealed comparable effects of fixed performance mindsets

and intelligence mindsets, with both types of mindsets relating to increased feelings of helplessness. However, their study did not explore the effects of growth performance and growth intelligence mindsets. Research has suggested that fixed mindsets are not necessarily the opposite of growth mindsets (Grüning et al., 2024). Thus, it is essential to investigate whether growth performance mindsets exhibit effects similar to those of growth intelligence mindsets in predicting negative emotions such as anxiety.

Taken together, the limited evidence suggests that performance mindsets may be relevant to both academic and psychological outcomes, but direct evidence in language learning remains scarce. In particular, little is known about whether language performance mindsets show similar or distinct associations with anxiety and achievement compared with language intelligence mindsets.

2.4. The current study

Our review of previous studies highlights several gaps. Specifically, findings regarding the relationship between intelligence mindsets and language achievement are mixed. Some studies have found a positive association between growth intelligence mindsets and performance (Jiang et al., 2024), whereas others have found no significant direct predictive effects (Lou et al., 2025). This inconsistency may arise because language intelligence mindsets do not directly address students' academic performance in L2 learning. Therefore, it is important to examine language performance mindsets, which reflect learners' beliefs about the malleability of their academic performance in language learning. However, despite their potential relevance, empirical evidence on performance mindsets and their links to psychological and academic outcomes in language learning remains scarce. More specifically, little is known about whether language performance mindsets differ from language intelligence mindsets in factor structure or mean levels, or whether they make distinct contributions to learners' anxiety and achievement. By addressing these gaps, this study may open new avenues for future research and provide insights for language teaching practice. Accordingly, we propose the following research questions:

RQ1: Are language performance mindsets distinct psychological constructs from language intelligence mindsets?

RQ2: Do language performance mindsets and language intelligence mindsets differ in their mean levels among Chinese EFL learners?

RQ3: Do language performance mindsets and language intelligence mindsets show distinct or similar associations with anxiety and achievement in learning English?

3. Methods

3.1. Participants

All participants were from a public high school in a city in Anhui province, China. In China, English is taught as a foreign language from the third grade in primary school, with at least one 45-minute English lesson scheduled each day. During instruction, students use English textbooks published by the People's Education Press. The instructional approach is similar to that used in most regions of China, characterized by a teacher-centered approach (Zhang & Yanfeng, 2025). Based on their grade levels, participants' overall English proficiency ranged from elementary to intermediate levels.

A total of 1,248 participants with valid responses were included in the analysis, comprising 676 males (54.2%) and 572 females (45.8%). The sample consisted of 354 Grade 10 students (28.4%), 438 Grade 11 students (35.1%), and 456 Grade 12 students (36.5%). Based on their grade levels, participants were generally aged between 15 and 17 years.

3.2. Instrument

This section describes the instruments used to measure the studied variables and reports their reliability and validity. The full questionnaire is provided in the Appendix. We conducted reliability and validity tests to examine whether the original scales were reliable and valid in this study. A scale was considered reliable if it had a McDonald's omega value exceeding 0.7. Validity was deemed acceptable if the following criteria were generally met: RMSEA < 0.06, SRMR < 0.08, and TLI and CFI > 0.95 (Hu & Bentler, 1999).

3.2.1. Language performance mindsets

We developed a 6-item language performance mindset scale based on the questionnaires from Lottero-Perdue and Lachapelle (2019), Sun et al. (2021), and Wang and Ng (2012). Specifically, we used three items directly assessing performance mindsets from Wang and Ng (2012) and two items assessing the relative importance of effort and ability in achieving educational performance from Sun et al. (2021). Both sets of items were originally developed for non-language learning contexts. To adapt these items to the context of English learning in China, we modified their original wording accordingly. For example, the item "A

student's grades in school are not something that can be changed" from Wang and Ng (2012) was adapted to "A student's English grades in school are not something that can be changed." Because only two fixed performance mindset items were available from Wang and Ng (2012), we needed one more fixed performance mindset item to maintain the consistency of the two subscales. Thus, following the conceptualization of performance mindsets proposed by Wang and Ng (2012), we adapted an item from the fixed intelligence mindset scale developed by Lottero-Perdue and Lachapelle (2019). Specifically, the original item "Students can learn new things about engineering, but they can't really change how smart at engineering," was adapted to "Students can learn new things in English classes, but they can't really change their English academic performance." The final scale employed a 6-point Likert format, with higher scores indicating stronger endorsement of the respective mindset. Following confirmatory factor analysis (CFA), all items were retained, with three items evaluating fixed language performance mindsets (e.g., "A student's English grades in school are not something that can be changed") and three items measuring growth language performance mindsets (e.g., "How well a student does in English courses is something that can be changed"). The scale demonstrated good reliability and validity in this study (see Table 2).

3.2.2. Language intelligence mindsets

In this study, we utilized the L2 aptitude belief sub-dimensions from the *Language Mindset Inventory*, which consists of six items (Lou & Noels, 2019). We included only this dimension because it most directly reflects school-age learners' mindsets in second language learning (Lou et al., 2022). In addition, many empirical studies in second language education have similarly focused on this dimension rather than employing the full inventory (e.g., Liu & Wang, 2025). We modified the original expression "foreign language" to "English" to better fit the context of English learning. This scale used a 6-point Likert format, with higher scores reflecting higher levels of the corresponding language intelligence mindset. Following CFA, three items were kept to measure students' fixed language intelligence mindsets (e.g., "To be honest, you can't really change your basic ability to learn and use English"), and three items were retained to assess growth language intelligence mindsets (e.g., "No matter who you are, you can always improve your basic ability to learn English"). The scale had good reliability and validity in this study (see Table 2).

3.2.3. English learning anxiety

The 8-item language learning anxiety scale developed by Dewaele and MacIntyre (2014) was utilized to assess students' English learning anxiety using a 6-point Likert format. In this study, "foreign language" from the original anxiety scale was modified to "English." Additionally, the following two items from the original anxiety scale were reverse-coded ("I don't worry about making mistakes in English class," "I feel confident when I speak in English class"), so that higher scores indicate greater levels of anxiety. Following CFA, 8 items were retained to measure anxiety (e.g., "Even if I am well prepared for English class, I feel anxious about it"). This scale demonstrated high reliability and validity in this study (see Table 2).

3.2.4. English learning achievement

English learning achievement was measured by students' self-reported scores on their latest English test. Grade 10 students were instructed to provide their scores from the senior high school entrance examination (with a maximum score of 120), whereas Grade 11 and 12 students were requested to share their scores from the latest final exam (with a maximum score of 150). The examinations were administered by the provincial or local Education Bureau. Thus, all participants in the same grade level had completed identical examinations, which comprised sections on listening, reading, and writing. Regarding scoring, objective items were machine-scored, whereas subjective items, such as writing, were independently scored by at least two teachers, with the average of their scores used as the final score. In this study, the test scores were standardized by grade level.

Table 2 Reliability and validity of the scales

Variables	RMSEA	SRMR	TLI	CFI	Omega
Language performance mindsets	.066	.027	.965	.984	.791 (.701)
Language intelligence mindsets	.057	.026	.985	.992	.879 (.859)
Anxiety	.067	.025	.964	.977	.884

Note. N = 1,248; omega values outside the parentheses correspond to growth performance mindsets and growth intelligence mindsets, while values inside the parentheses correspond to fixed performance mindsets and fixed intelligence mindsets

3.3. Data collection and analysis

In 2024, we employed convenience sampling to recruit 1,442 senior high school students in Anhui Province, China. During data collection, participants were informed of

the research objectives and data protection measures. Participants were also informed of the survey's anonymous nature and were encouraged to respond truthfully, with the assurance that their answers were not associated with test scores and that there were no right or wrong answers. Ethics approval was waived by the corresponding author's institution, and all participants provided informed consent. Questionnaires with missing data, outliers, identical response patterns, a response time of less than 2 minutes, or unreliable answers (e.g., scores exceeding the maximum points) were discarded. Ultimately, 1,248 valid responses were retained for the analyses.

To answer RQ1, the total sample of 1,248 participants was randomly divided into two independent subsamples, with 626 participants assigned to the exploratory factor analysis (EFA) and 622 participants assigned to CFA. EFA was conducted first using SPSS version 27.0 to identify the underlying latent structure of language intelligence mindsets and language performance mindsets based on the observed item responses. Subsequently, CFA was conducted using R version 4.5.1 on the second subsample of 622 participants to validate the factor structure identified in the EFA. This two-step approach, using two subsamples, allows for exploration of the factor structure in the first subsample and validation of the constructs' distinctiveness in the second. This scale validation method has been widely adopted in research in language education and educational psychology (e.g., Liu, 2025; Reho et al., 2024; Yao, 2026).

To address RQ2, descriptive statistics were calculated for the full sample, and paired-samples *t*-tests were conducted to examine differences between the mean levels of fixed performance mindsets and fixed intelligence mindsets, as well as between growth performance mindsets and growth intelligence mindsets using SPSS 27.0. A paired-samples *t*-test is a widely used method for assessing mean differences between related variables (e.g., Wang & Ng, 2012). To assess the magnitude of these differences, effect sizes for *t*-tests are measured using Cohen's *d*, with values of 0.2, 0.5, and 0.8 generally indicating small, medium, and large effects, respectively (Fey et al., 2022).

Finally, to address RQ3, we first examined the correlations among the studied variables using Pearson correlations in SPSS 27.0. Structural equation modeling (SEM) was conducted using the lavaan package in R. The model included four latent predictor variables, namely, fixed performance mindset, growth performance mindset, fixed intelligence mindset, and growth intelligence mindset, two observed covariates, gender and grade, and two outcome variables, that is, English learning anxiety and English learning achievement. To estimate the model, maximum likelihood estimation was used, and standardized coefficients were reported to facilitate comparisons across predictors. To evaluate model fit, CFI, TLI, RMSEA, and SRMR were examined. Following Hu and Bentler (1999), CFI

and TLI values greater than .95, RMSEA values below .06, and SRMR values below .08 were considered indicative of good model fit. In addition, R^2 values were reported to indicate the proportion of variance explained in each outcome variable. Also, to examine the relative importance of the predictors, we estimated their contributions based on the squared standardized regression coefficients using R version 4.5.1. Specifically, the squared standardized coefficients for each predictor were calculated separately for English learning anxiety and English achievement and then rescaled so that their sum corresponded to the total R^2 of the respective outcome. This procedure provided an estimate of each predictor's relative contribution to the explained variance in the two outcome variables.

4. Results

4.1. Exploratory factor analysis and confirmatory factor analysis

Before conducting EFA, the normality of the 12 items regarding mindsets was checked. The results showed that the absolute values of skewness and kurtosis for the 12 items were within 2 and 7, respectively, indicating a normal distribution (Kim, 2013). Additionally, the suitability for performing EFA was further confirmed by a Kaiser-Meyer-Olkin value of 0.89 and a significant result from Bartlett's test of sphericity (Howard, 2015). Consequently, we conducted a four-factor EFA using principal axis factorization and varimax rotation.

Table 3 Results of exploratory factor analysis

Items	Factors			
	Fixed performance	Growth performance	Fixed intelligence	Growth intelligence
FPM1	**.463**	-.266	.291	-.180
FPM2	**.680**	-.163	.194	-.164
FPM3	**.539**	-.152	.219	-.043
GPM1	-.364	**.466**	-.216	.176
GPM2	-.239	**.852**	-.228	.210
GPM3	-.161	**.569**	-.202	.228
FIM1	.301	-.264	**.684**	-.222
FIM2	.261	-.253	**.806**	-.220
FIM3	.318	-.186	**.684**	-.234
GIM1	-.125	.212	-.163	**.681**
GIM2	-.129	.130	-.195	**.863**
GIM3	-.122	.186	-.164	**.734**

Note. *N* = 626; FPM = fixed performance mindset; GPM = growth performance mindset; FIM = fixed intelligence mindset; GIM = growth intelligence mindset; factor loadings > .40 are shown in bold

The results of the EFA showed that students' language mindsets could be categorized into fixed performance, growth performance, fixed intelligence, and growth intelligence mindsets (see Table 3). This four-factor solution explained 60.15% of the total variance. As indicated in Table 3, most items had cross-loadings below 0.3, while all factor loadings for the primary dimension exceeded 0.4, suggesting a sound internal consistency of the four-factor mindset structure (Howard, 2015).

Table 4 Reliability, convergent validity, and discriminant validity of the mindset constructs

Constructs	AVE	CR	Heterotrait-monotrait value		
			FPM	GPM	FIM
Fixed performance mindset (FPM)	.454	.712	—		
Growth performance mindset (GPM)	.590	.809	.715	—	
Fixed intelligence mindset (FIM)	.699	.874	.773	.688	—
Growth intelligence mindset (GIM)	.681	.864	.557	.602	.598

Note. N = 622; AVE = average variance extracted; CR = composite reliability

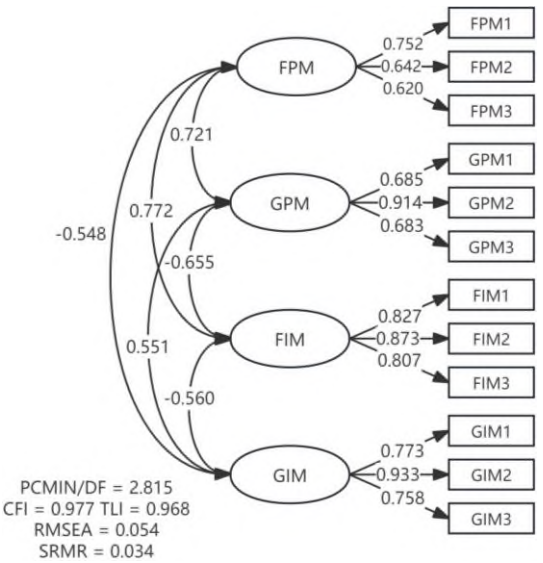


Figure 1 The CFA results of the four-factor mindset structure

Following EFA, CFA was employed to evaluate the validity of the four-factor mindset structure, with all factor loadings higher than .60 (see Figure 1). The model fit indices for the structure were as follows: RMSEA = .054; SRMR = .034; TLI = .968; CFI = .977. Additionally, as shown in Table 4, the average variance extracted (AVE) for most sub-dimensions, excluding fixed performance mindsets, exceeded 0.5, and all composite reliabilities (CR) were above 0.7. Although the AVE for the fixed performance mindset was slightly below the recommended threshold, an AVE value marginally under 0.5 is acceptable in psychological research, provided that the CR is above 0.6

(e.g., Chaves et al., 2023). Therefore, the convergent validity of the four-factor construct was established. Moreover, the heterotrait-monotrait ratio was employed in this study to assess discriminant validity among the constructs, ensuring that intelligence and performance mindsets were empirically distinct. The discriminant validity was satisfactory, as the heterotrait-monotrait values were all below .85 (Henseler et al., 2015). Based on EFA and CFA, language performance mindsets and language intelligence mindsets were structurally different from each other.

4.2. Descriptive statistics and correlation analysis

Descriptive statistics (see Table 5) indicated that the participants did not adopt strong fixed performance or fixed intelligence mindsets. Fixed performance mindsets showed a slightly lower level than fixed intelligence mindsets, though this difference was not statistically significant (t = -1.41, df = 1247, p = .139, d = -.040, 95% CI = [-.095, .016]). Additionally, the participants exhibited a high level of growth performance mindsets and a moderate level of growth intelligence mindsets. A paired-samples t-test further revealed that the levels of growth performance mindsets were significantly higher than those of growth intelligence mindsets, with a large effect size (t = 33.276, df = 1247, p < .001, d = .944; 95% CI = [.875, 1.008]; see Figure 2). These results suggested that participants distinguished between L2 performance mindsets and L2 intelligence mindsets, and that L2 growth performance mindsets were the most prevalent beliefs.

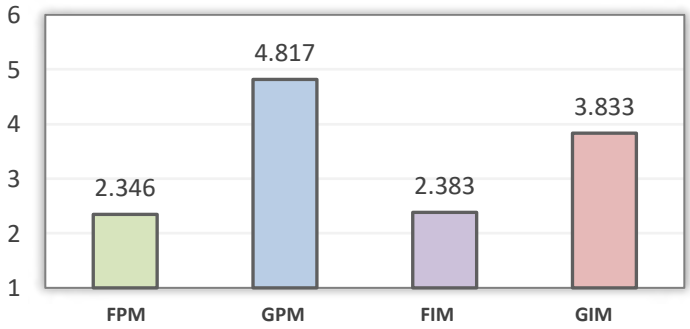


Figure 2 The mean levels of the four mindset variables

Table 5 also indicated that the absolute values of skewness and kurtosis were within 2 and 7, respectively, suggesting normality (Kim, 2013). The correlations among the studied variables fell within the small (.2 < r < .5) to medium range (.5 < r < .8; Sullivan & Feinn, 2012). The variance inflation factor values of the four latent variables ranged between 1.567 and 2.941, suggesting no serious multicollinearity concerns. Therefore, the eight variables could be included in the same model.

Table 5 Descriptive statistics and bivariate correlations among the studied variables

Variables	*M*	*SD*	Skewness	Kurtosis	1	2	3	4	5
1. FPM	2.346	.963	.529	-.039	—				
2. GPM	4.817	.916	-.596	-.032	-.530***	—			
3. FIM	2.383	1.113	.576	-.087	.595***	-.566***	—		
4. GIM	3.833	1.104	.126	-.408	-.393***	.478***	-.495***	—	
5. Anxiety	3.643	1.141	-.157	-.402	.308***	-.223***	.368***	-.286***	—
6. SA	.000	.999	-1.463	5.111	-.201***	.237***	-.192***	.155***	-.256***

Note. *** $p < .001$; $N = 1{,}248$; FPM = fixed performance mindset; GPM = growth performance mindset; FIM = fixed intelligence mindset; GIM = growth intelligence mindset; SA = standardized achievement; the SD of the standardized achievement is not 1 because standardization was conducted separately within each grade level rather than across the full sample

4.3. Structural equation modeling

The final SEM model (see Figure 3) produced satisfactory fit indices: χ^2/df = 3.822; RMSEA = .048; SRMR = .040; TLI = .942; CFI = .951. Table 6 and Figure 3 present the results of the SEM. After controlling for gender and grade, the results showed that fixed performance mindsets, growth performance mindsets, and fixed intelligence mindsets positively predicted anxiety in English learning, whereas growth intelligence mindsets negatively predicted anxiety. Together, these factors accounted for 20.1% of the variance in anxiety. Additionally, English achievement was predicted by fixed and growth performance mindsets, which explained 7.1% of the variance. More details can be found in Figure 3, in which all coefficients are standardized. Solid lines indicate statistically significant paths, whereas dotted lines indicate non-significant paths. For clarity, control variables and correlations among latent variables are not shown in the figure.

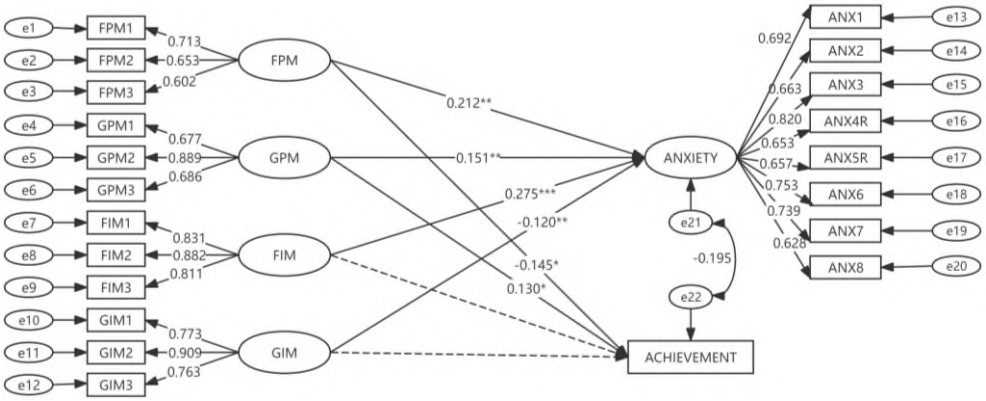


Figure 3 Results of structural equation modeling

Table 6 Results of structural equation modeling

Paths	R^2	β	SE	Z-value	p
Outcome: Anxiety	0.201				
Fixed performance mindset		0.212	0.104	2.819	.005
Growth performance mindset		0.151	0.082	2.755	.006
Fixed intelligence mindset		0.275	0.066	4.524	<.001
Growth intelligence mindset		-0.120	0.047	-3.070	.002
Gender		0.089	0.060	3.206	.001
Grade		-0.077	0.038	-2.78	.005
Outcome: Achievement	0.071				
Fixed performance mindset		-0.145	0.094	-1.965	.049
Growth performance mindset		0.130	0.074	2.396	.017
Fixed intelligence mindset		0.003	0.059	0.056	.955
Growth intelligence mindset		0.023	0.042	0.598	.550
Gender		0.010	0.055	0.352	.725
Grade		0.013	0.034	0.464	.643

Note. N = 1,248; gender and grade were included as covariates; the values shown in bold are statistically significant ($p < .05$)

We also assessed the importance of the four mindset constructs in predicting anxiety and achievement. As shown in Figure 4, fixed intelligence mindsets emerged as the most influential factor in predicting anxiety, followed by fixed performance mindsets, growth intelligence mindsets, and growth performance mindsets. Figure 5 shows that fixed performance mindsets accounted for more variance than growth performance mindsets in predicting achievement.

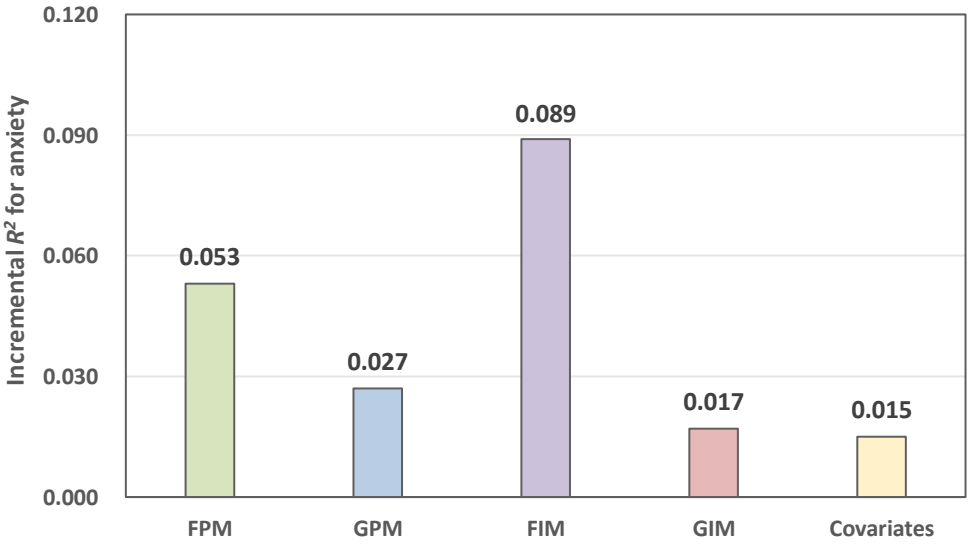


Figure 4 Importance of predictors for anxiety

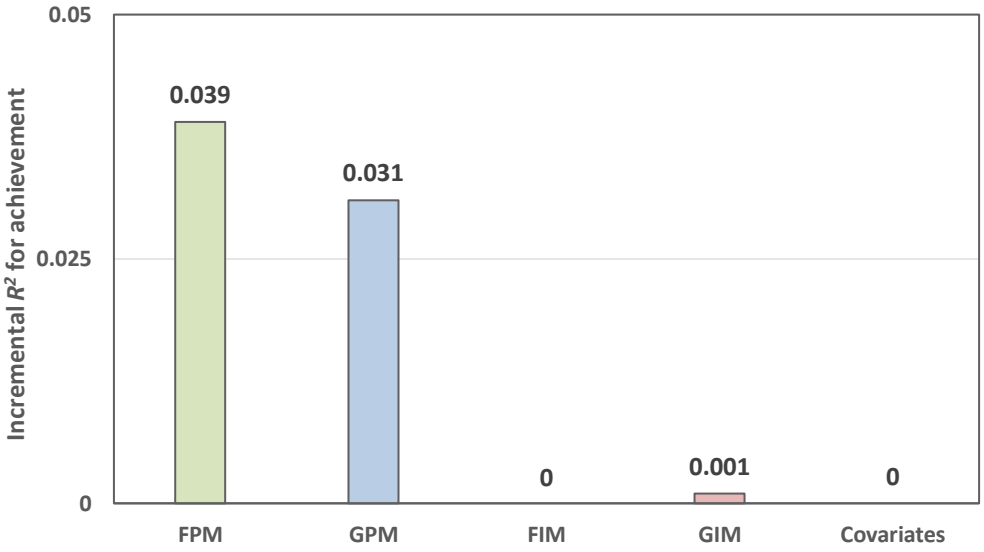


Figure 5 Importance of predictors for achievement

5. Discussion

Building on the findings, this discussion interprets the results in relation to the three research questions. We first discuss the differences between language performance and intelligence mindsets in terms of their factor structure and mean levels, followed by their differential and shared associations with English learning achievement and anxiety. We then consider the theoretical and pedagogical implications of these findings, followed by the limitations of the present study and directions for future research.

5.1. Distinctive factorial structures of language performance and intelligence mindsets (RQ1)

In this study, we extend the mindset framework in L2 learning by distinguishing intelligence and performance mindsets. The findings of RQ1 help us understand how these mindsets differ in their factorial structure. While some items of these two constructs appear to show minor overlap, the strong discriminant validity supported by the EFA and CFA provides robust evidence that the performance mindset is distinct not only conceptually but also empirically from the intelligence mindset. These results align with previous findings in general education (Wang & Ng, 2012).

This distinction between intelligence and performance mindsets may be particularly meaningful when considered within the Chinese cultural context. Previous research has suggested that a traditional Chinese ethos emphasizing effort, perseverance, and self-improvement may encourage individuals to view effort as a means of overcoming limitations in innate ability (Wang & Sun, 2026). Within such a cultural orientation, individuals may simultaneously believe that underlying ability is relatively fixed while also believing that academic performance can be improved through effort (Lee, 1996). From this perspective, intelligence mindsets and performance mindsets need not represent contradictory beliefs. Rather, they can reflect beliefs about two different aspects of learning. Our findings provide empirical support for this possibility by showing that these two mindsets can be reliably distinguished at the factorial level. The distinct factorial structures therefore suggest that Chinese language learners may conceptualize the fixedness of underlying language ability separately from the malleability of language learning performance.

5.2. Mean levels of language performance and intelligence mindsets (RQ2)

With respect to RQ2, descriptive statistics and paired-samples *t*-tests showed that Chinese participants reported relatively low levels of both fixed language intelligence and fixed language performance mindsets, with no significant difference between the two. Meanwhile, participants were more inclined to believe that effort could improve English learning performance than improving English learning intelligence. This pattern is consistent with Sun et al. (2021), who found that Chinese students tended to attribute academic performance more to effort than to intelligence.

These findings may be explained by several factors, including traditional cultural values, contemporary educational realities, and the characteristics of language learning. First, the Chinese ethos encourages individuals to view effort as capable of bringing about meaningful change and may thereby discourage fixed mindsets (Wang & Sun, 2025). Second, academic achievement is highly valued in contemporary Chinese society, not only as a source of family honor but also for its practical benefits, such as greater opportunities for further education and an improved quality of life (Dai et al., 2025; Tao & Hong, 2013; Wang et al., 2025). Therefore, significant others may repeatedly reinforce the belief among English learners that effort can improve learning outcomes, while encouraging them to work hard to achieve better academic performance. Third, this tendency may be further strengthened in language learning, where changes in performance can be relatively observable to learners themselves and to those around them. For example, learners can clearly perceive improvements in their English reading and grammatical abilities. Such observable changes may provide learners with concrete

evidence that language performance is malleable and can improve through sustained effort, fostering growth performance mindsets.

5.3. Associations of language performance and intelligence mindsets with anxiety and achievement in learning English (RQ3)

Turning to RQ3, results from the SEM showed that growth language performance mindsets had distinct associations with English learning anxiety and achievement compared to growth language intelligence mindsets. Specifically, growth intelligence mindsets failed to predict English achievement, contradicting previous studies (Jiang et al., 2024; Lou & Noels, 2020; Zhang et al., 2026). In contrast, language performance mindsets positively predicted English achievement. The finding suggests that an L2 performance mindset, as a psychological construct that directly measures students' beliefs in the changeability of school performance in language learning, may be a better predictor of L2 achievement than intelligence mindsets. This finding is also consistent with the predictions of EVT (Eccles, 1983; Eccles & Wigfield, 2020), indicating that students who have stronger beliefs in their academic ability are more likely to demonstrate persistence, make more strategic choices in learning, and ultimately achieve higher academic performance. This result may be attributed to the fact that high value is often placed on academic performance rather than intelligence in the Chinese educational context (Dai et al., 2025; Li, 2010). Consequently, in the present study, a growth belief in the malleability of language learning performance, rather than intelligence, was more strongly associated with English learning achievement.

Our findings also highlight the relevance of mindsets to English learning anxiety. Specifically, learners with stronger growth language intelligence mindsets tended to report lower levels of anxiety, consistent with Li et al. (2024). In contrast, stronger growth language performance mindsets coincided with higher levels of anxiety. This distinction may be linked to the different goal orientations individuals possess. Researchers have indicated that students with growth intelligence mindsets tend to adopt a mastery goal in learning, which can reduce language learning anxiety (Li et al., 2024; Lou & Noels, 2016). Based on this link between mindsets and goal orientations, we infer that individuals with growth performance mindsets may be more prone to adopt a performance goal orientation in their learning. Their focus tends to be on demonstrating performance, which may contribute to negative emotions, such as anxiety, in the learning process (Tao & Hong, 2013). However, this finding should be interpreted with caution because the Pearson correlation and SEM results showed different patterns. Specifically, the Pearson correlation indicated a negative association between L2 performance

mindset and English learning anxiety, whereas the SEM results indicated a positive association. Such discrepancies between bivariate correlations and multivariate analyses have also been reported in previous empirical studies, such as Li et al. (2017). One possible explanation is that bivariate correlations capture the overall association between two variables, whereas SEM estimates the association between them while simultaneously accounting for other variables and paths in the model. Consequently, the inclusion of other predictors and pathways may alter the direction or magnitude of the estimated association. Importantly, the discrepancy in the present study does not appear to be attributable to serious multicollinearity or influential outliers, suggesting that the SEM finding should not necessarily be regarded as problematic. Nevertheless, given the inconsistent patterns across analyses, the relationship between performance mindsets and students' emotions in language learning warrants further investigation.

Despite these differences, the findings also revealed similarities between language performance and intelligence mindsets. Specifically, both types of fixed mindsets positively predicted anxiety in English learning, a finding similar to Wang and Ng (2012). According to mindset theory (Yeager & Dweck, 2012), individuals who perceive intelligence as fixed and innate may experience greater stress, as they assume they cannot change their intelligence to cope with challenging situations. Similarly, the belief that academic performance cannot be changed may relate to anxiety, especially in the Chinese context, where academic achievement is strongly emphasized by society (Tao & Hong, 2013).

Regarding achievement outcomes, we detected that fixed language intelligence mindsets did not significantly predict achievement in English learning, while fixed language performance mindsets were only marginally significant (p = .049). This may be related to the contexts in which participants live. Dweck (2002) noted that East Asian students with fixed mindsets may still work hard to achieve academically. It is possible that the socio-cultural significance that East Asian societies place on education may neutralize the negative effects of fixed mindsets on achievement.

5.4. Theoretical and pedagogical implications

These findings contribute to the growing body of research seeking to broaden and advance scholarship on growth mindsets, an area that has attracted increasing attention in recent educational research (King et al., 2026), with implications for both theoretical understanding and pedagogical practice. First, our findings meaningfully expand the mindset construct and suggest that performance mindsets constitute a distinct construct that is separable from intelligence mindsets.

Previous research, such as Wang and Sun (2026), has examined performance mindsets from a culture-specific perspective and suggested that Confucianism and the norm-referenced educational system contribute to the prevalence of performance mindsets in China, highlighting the importance of considering culture in mindset research. While our findings support this assumption in the Chinese context, and we agree that mindset research should move beyond its original Western framework to embrace more culturally specific perspectives, particularly given that many second language learners come from non-Western cultures, we suggest that the implications of performance mindsets may extend beyond cultural specificity and potentially reflect a more universal phenomenon, especially in the language learning context. This is because language performance is often visible and directly observable across different domains of language. For example, second language learners can easily perceive changes in their vocabulary knowledge, listening comprehension, and writing performance, which may make them believe that their language performance can be changed over time. Such performance-related beliefs may therefore represent an important dimension of language mindsets. Building on this possibility, our findings extend the existing language mindset framework by incorporating language performance mindsets as a distinct dimension alongside intelligence mindsets. This extension provides a more comprehensive understanding of learners' beliefs and experiences in language learning.

Second, our results indicated that growth language performance mindsets served as a better predictor of achievement than growth language intelligence mindsets. Thus, performance mindsets, which directly capture the aspect of performance growth that intelligence mindsets do not detect, may help address debates regarding the role of mindset in achievement. The inconsistent relationships between growth mindsets and academic achievement have generated much debate in both language education and general education in recent years (e.g., Gazmuri, 2025; Lou, 2025; Yeager & Dweck, 2020). Our findings suggest a new possibility that, for achievement outcomes, what seems to matter more is not whether learners believe that intelligence can change, but whether they believe that their academic performance can change. This possibility is particularly important given the growing interest in developing and testing scalable growth mindset interventions, ranging from large-scale national experiments in general education to an increasing number of classroom-based interventions in second language education (Yao et al., 2026; Ye, 2026; Yeager et al., 2019). Identifying which type of mindset is more closely linked to achievement may therefore have implications for successful interventions in second language education and beyond.

The results of this study may also have implications for language teaching practices. Previous research has emphasized the importance of addressing growth language intelligence mindsets (e.g., Rong et al., 2025). Our findings suggest that

performance mindsets also warrant attention in language learning. Specifically, educators and parents should adopt a balanced approach when addressing learners' beliefs about performance. Given the positive association between fixed performance mindsets and anxiety, they may encourage learners to recognize that language performance is not fixed and can improve over time. However, emphasizing the malleability of performance should not be equated with portraying effort as the sole determinant of achievement. Although believing that performance can be improved may be beneficial for academic outcomes, our findings also indicate that a strong growth performance mindset may be associated with greater anxiety. Educators and parents should therefore adopt a more holistic perspective on academic achievement, recognizing that performance is shaped not only by individual effort but also by objective and contextual conditions, such as access to educational resources (Wang & Su, 2026) and avoiding attributing poor performance solely to insufficient effort. Thus, rather than promoting either a fixed view of performance or an overly effort-centered view, educators and parents should encourage learners to view performance as improvable while also recognizing the influence of contextual and structural factors. Such a balanced approach may help support learners' achievement while minimizing the potential emotional costs associated with performance mindsets.

5.5. Limitations and future directions

Despite its merits, this study has limitations that should be addressed in future research. Firstly, the focus on Chinese high school students and the reliance on convenience sampling methods may restrict the generalizability of the results. Future research on performance mindsets should therefore involve participants at diverse life stages and from countries outside of China to investigate whether similar findings can be obtained. Secondly, like many other studies (e.g., Liu et al., 2026a, 2026c; Wang et al., 2026), this study examined language performance mindsets using a cross-sectional design and self-reported measures. Future research could therefore employ longitudinal cross-lagged panel designs to examine their development and reciprocal relationships with learning outcomes, experimental studies to test causal effects, and mediation and moderation analyses to investigate underlying mechanisms and contextual conditions. Thirdly, language performance mindsets may be more directly relevant in achievement-oriented contexts, such as school-based learning (Sun et al., 2021). Future research could therefore investigate whether the role of performance mindsets extends to out-of-class language learning contexts. Finally, our focus on anxiety reflects the exploratory nature of the present study given its theoretical relevance

and the empirical evidence from previous language mindset research. We encourage future research to extend this work by examining whether and how language performance mindsets are associated with other emotions, such as shame, boredom, and enjoyment.

6. Conclusion

This study introduced language performance mindsets as a new construct in language education and examined their unique roles in English learning achievement and anxiety in comparison with language intelligence mindsets. The findings first suggested that language performance mindsets were empirically distinct from intelligence mindsets, with growth language performance mindsets being the most prevalent among the four types of mindsets examined. Importantly, the two types of growth mindsets showed different associations with English learning achievement. Growth language performance mindsets positively predicted English learning achievement, whereas growth language intelligence mindsets did not, suggesting that beliefs about the malleability of language performance may be more closely related to students' academic outcomes than beliefs about the malleability of language intelligence. The two growth mindsets also showed different patterns in relation to English learning anxiety. The SEM results indicated that growth intelligence mindsets were negatively associated with anxiety, whereas growth performance mindsets were positively associated with anxiety. This pattern suggests that growth beliefs about performance may be associated with higher achievement while also being accompanied by greater anxiety, highlighting the need for further research into the emotional implications of language performance mindsets. Taken together, these findings extend existing mindset research by establishing language performance mindsets as a distinct and meaningful dimension and highlighting their unique relevance to both language learning achievement and anxiety. Thus, we call for further investigation into language performance mindsets in language learning.

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APPENDIX

Language performance mindsets scale

Construct	Dimension	Items
Language performance mindsets	Fixed	A student's English grades in school are not something that can be changed (adapted from Wang & Ng, 2012).
Language performance mindsets	Fixed	There is not much that students' efforts can do to influence their English academic performance in school (adapted from Wang & Ng, 2012).
Language performance mindsets	Fixed	Students can learn new things in English classes, but they can't really change their English academic performance (adapted from Lottero-Perdue & Lachapelle, 2019).
Language performance mindsets	Growth	How well a student does in English courses is something that can be changed (adapted from Wang & Ng, 2012).
Language performance mindsets	Growth	Students can achieve As in English courses through hard work (adapted from Sun et al., 2021).
Language performance mindsets	Growth	Students can do well in English listening, speaking, reading, and writing through effort (adapted from Sun et al., 2021).

Language intelligence mindsets scale

Language intelligence mindset	Fixed L2B	You can't change how capable you are at learning English (adapted from Lou & Noels, 2019).
Language intelligence mindset	Fixed L2B	To be honest, you can't really change your basic ability to learn and use English (adapted from Lou & Noels, 2019).
Language intelligence mindset	Fixed L2B	To a large extent, your ability to learn English is innate and you can't change much (adapted from Lou & Noels, 2019).
Language intelligence mindset	Growth L2B	You can always improve how good you are at learning English (adapted from Lou & Noels, 2019).
Language intelligence mindset	Growth L2B	No matter who you are, you can always improve your basic ability to learn English (adapted from Lou & Noels, 2019).
Language intelligence mindset	Growth L2B	No matter how much ability you have in learning English, you can improve it considerably (adapted from Lou & Noels, 2019).

Short-form foreign language classroom anxiety scale

English learning anxiety	Even if I am well prepared for English class, I feel anxious about it (adapted from Dewaele & MacIntyre, 2014).
English learning anxiety	I always feel that the other students speak English better than I do (adapted from Dewaele & MacIntyre, 2014).
English learning anxiety	I can feel my heart pounding when I'm going to be called on in English class (adapted from Dewaele & MacIntyre, 2014).
English learning anxiety	I don't worry about making mistakes in English class (reverse-coded, adapted from Dewaele & MacIntyre, 2014).
English learning anxiety	I feel confident when I speak in English class (reverse-coded, adapted from Dewaele & MacIntyre, 2014).
English learning anxiety	I get nervous and confused when I am speaking in my English class (adapted from Dewaele & MacIntyre, 2014).
English learning anxiety	I start to panic when I have to speak without preparation in English class (adapted from Dewaele & MacIntyre, 2014).
English learning anxiety	It embarrasses me to volunteer answers in my English class (adapted from Dewaele & MacIntyre, 2014).