



OPEN ACCESS

EDITED BY
Lies Serçu,
KU Leuven, Belgium

REVIEWED BY
Chin-Lung Chien,
Soochow University, Taiwan
Cristina Corina Bentea,
Dunarea de Jos University, Romania

*CORRESPONDENCE
Kai Zhang
✉ kaizhan126@gmail.com

RECEIVED 07 May 2024
ACCEPTED 08 July 2024
PUBLISHED 17 July 2024

CITATION
Zhang K and He W-j (2024) The predictive effect of cultural orientation and perceived school climate on the formation of teachers' growth mindsets.
Front. Educ. 9:1428890.
doi: 10.3389/feduc.2024.1428890

COPYRIGHT
© 2024 Zhang and He. This is an open-access article distributed under the terms of the [Creative Commons Attribution License \(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

The predictive effect of cultural orientation and perceived school climate on the formation of teachers' growth mindsets

Kai Zhang* and Wu-jing He

Department of Special Education & Counselling, The Education University of Hong Kong, Tai Po, Hong Kong SAR, China

This study aimed to examine the predictive effect of cultural orientation and perceived school climate on the formation of teachers' growth mindsets. A total of 811 middle school teachers (26.88% females; mean age = 29.77) from Shanghai City, mainland China, participated in the study. The growth mindset inventory, Hofstede's cultural dimensions, and the school-level environment questionnaire were used to assess teachers' growth mindset beliefs, cultural orientations, and perceptions of school climates, respectively. Hierarchical multiple regression analyses were applied to test the hypothesized roles of teachers' cultural orientations and perceived school climates in predicting the formation of their growth mindsets. Two interesting findings were obtained. First, regarding the effect of cultural orientation, teachers' growth mindset belief was positively predicted by the Confucian dimension of cultural value in relation to long-term orientation but negatively predicted by the dimensions of power distance and uncertainty avoidance. Second, regarding the predictive effect of school climate, growth mindset was positively predicted by three school climate factors: school resources, decision-making, and instructional innovation. These findings provide empirical evidence for the perspectives of social cognitive theory and cultural and ecological psychology by highlighting the contextual sensitivity of growth mindset formation. These findings also have practical implications because they highlight the need to consider cultural and school climate factors in the promotion of teachers' growth mindsets.

KEYWORDS

teachers' growth mindset, cultural orientation, perceived school climate, predictive effect, implicit theory

1 Introduction

Rooted in the implicit theories of intelligence or mindset theory (Dweck and Leggett, 1988), a growth mindset refers to the belief that intellectual ability is largely malleable and that people can incrementally develop their intelligences and abilities through consistent effort. In contrast, a fixed mindset refers to the belief that intellectual ability is mostly innate and immutable and that people can make little change to their inborn intellectual ability through effort (Dweck, 2006). Previous studies have revealed that growth mindset beliefs tended to contribute to higher educational attainment, while fixed mindset beliefs tended to contribute to failure (e.g., Blackwell et al., 2007; Li and Bates, 2020), suggesting that the development of growth mindset beliefs is important in the educational context. While many studies have

focused on the development of students' growth mindset beliefs (e.g., Limeri et al., 2020; Hecht et al., 2021), the present study aimed to understand the formation of teachers' growth mindset because teachers' mindset beliefs have been shown to impact and inform their teaching practices (e.g., Zhang et al., 2017) and students' mindset development (e.g., Mesler et al., 2021) as well as personal and academic achievements (e.g., Brandisauskiene et al., 2021; Yeager et al., 2022). Specifically, this study focused on examining the predictive effect of two contextual effects (i.e., cultural orientation and perceived school climate) on the formation of teachers' growth mindsets.

1.1 The effect of cultural orientation on the formation of teachers' growth mindsets

The effect of cultural orientation on mindset beliefs about intelligence has been highlighted from several theoretical perspectives. For instance, Bandura's (1978) social cognitive theory with respect to triadic reciprocal determinism suggests that there is a dynamic interplay among personal factors, cultural influences, and behavior. This dynamical systems approach especially emphasizes that people's cultural backgrounds, on the one hand, influence their beliefs about intelligence and, on the other hand, are shaped by and actively shape the educational environments with which they engage (see also Schiavo et al., 2019). Similarly, Nisbett's (2003) work from the perspective of cultural psychology emphasizes that cultural orientation is a crucial determinant in the formation of intelligence beliefs through the suggestion that cognitive processes such as beliefs about intelligence are deeply rooted in cultural contexts. Furthermore, Buehl and Beck's (2014) ecological model also postulates that while an individual's belief system may be stable, the formation and expression of these beliefs are continually influenced, framed, and guided by the local context, including cultural orientation. Collectively, these theories suggest that an individual's cultural orientation is not merely a backdrop but an active, formative force that shapes their beliefs.

The relationship between cultural orientation and mindset beliefs about intelligence becomes more apparent when it is viewed within specific contextual settings. In Chinese cultures, for example, there is a notable emphasis on the importance of continuous effort over innate talent, and educational practices are designed to encourage persistence, diligence, and a belief in the capacity for self-improvement (Zhao, 2011). This cultural emphasis on effort and perseverance aligns closely with the principles of the growth mindset, which asserts that intelligence and abilities can be developed through dedication and hard work. Thus, investigating the relationship between an individual's cultural orientation and their growth mindset is important, particularly in the context of teaching, because these factors play a crucial role in both cultivating and demonstrating a growth mindset in the classroom (Brandisauskiene et al., 2021). For example, a teacher from a culture that values effort may naturally adopt and promote a growth mindset by encouraging students to embrace challenges. Conversely, a teacher from a culture that prioritizes innate talent over effort might personally harbor an anti-formation of a growth mindset, which is subsequently reflected in their teaching practices and may discourage the cultivation of a growth mindset among their students (Zhang et al., 2017; Mesler et al., 2021).

Hofstede's (1986, 2011) cultural dimensions theory has usually been applied as a lens for evaluating personal cultural orientations. This theoretical framework has also been frequently applied in previous research to understand teachers' cultural orientation (see, for example, Kaur and Noman, 2015; Kaya and Demir, 2022). Specifically, this framework consists of five dimensions for encapsulating and elucidating cultural disparities, including (1) power distance, (2) uncertainty avoidance, (3) individualism versus collectivism, (4) masculinity versus femininity, and (5) long-term orientation versus short-term orientation (Hofstede et al., 2010; Hofstede, 2011). The key features of these dimensions, with a focus on their possible impact on the formation of teachers' growth mindsets, are highlighted below.

- **Power distance:** This dimension involves the degree to which individuals accept and expect that power will be distributed unequally among members in the workplace, including between students and teaching staff and between teaching staff at lower ranks and their job supervisors at higher ranks. This reflects the extent to which lower-ranking teaching staff within the hierarchy tolerate inequality in power. In high power distance cultures such as that of China (Hofstede, 1986, 2011; Hofstede et al., 2010), schools often exhibit a clear hierarchy and authoritative structure, whereas in low power distance cultures, a more egalitarian approach is generally adopted, promoting equal relationships throughout the school environment (Cortina et al., 2017). This could suggest that high power distance may function as a negative hindering factor in the cultivation of a growth mindset among teachers. This could be because, in high power distance environments, teachers might feel constrained by the existing authoritative structures, which leads them to continue implementing traditional methods and resist change. When faced with challenges or obstacles, teachers in these settings may be less likely to seek innovative solutions or push through difficulties, as the established hierarchy might not support or value such efforts. Similarly, when criticism is offered, it may not be perceived as constructive feedback aimed at growth but as a threat to one's position or competence, thereby discouraging reflection and adaptation. Furthermore, hierarchical culture may prevent teachers from collaborating with peers, sharing experiences, or learning from others, as such interactions could be seen as questioning authority or exposing vulnerability. These dynamics can severely limit teachers' engagement in the processes that foster a growth mindset, such as embracing challenges, persevering through difficulties, and learning from their colleagues' feedback and experiences.
- **Uncertainty avoidance:** This dimension involves teachers' level of comfort with ambiguity and uncertainty. In high uncertainty avoidance cultures such as Chinese cultures (Hofstede, 1986, 2011; Hofstede et al., 2010), there might be a preference for strict rules, structured learning environments, and standardized approaches, which could encourage teachers to adhere closely to established curricula and teaching methods (Atkins, 2000). Teachers in these environments might feel constrained by the need for clear guidelines and the aversion to risk, possibly limiting their willingness to experiment with new pedagogical approaches or to learn from teaching challenges and failures. Conversely, teachers in low uncertainty avoidance cultures may naturally align with growth mindset principles, as they could

be more receptive to navigating uncertainties in their teaching methods, viewing challenges not as roadblocks but as avenues for professional growth and learning. This mindset might allow them to experiment and adapt, even when outcomes are unpredictable, which can foster a culture of accepting challenges and learning continuously for improvement. Moreover, teachers in low uncertainty avoidance cultures might view feedback, even when critical, as valuable input for refining their teaching approaches rather than as a negative appraisal.

- **Individualism vs. collectivism:** This dimension reflects the orientation toward either self-reliance or group collaboration within educational settings (Sagy et al., 2001). This suggests that in cultures characterized by strong individualism, an emphasis on personal achievements and individual responsibilities might encourage educators to adopt a growth mindset that aligns with personal motivation, ambition, and the pursuit of excellence. Specifically, this orientation can lead teachers to value self-improvement, personal challenges, and the development of individual capabilities. Conversely, in collectivist cultures such as that of China (Hofstede, 1986, 2011; Hofstede et al., 2010), where group work, community involvement, and collective achievements are highly valued, teachers might be more inclined to integrate a growth mindset within the framework of collaborative learning and communal progress. In such settings, teachers may emphasize the collective overcoming of obstacles, the sharing of learning experiences, and the communal aspects of growth and development. However, it is possible that neither of these cultural orientations will influence the formation of a growth mindset, as the growth mindset itself is fundamentally about belief in the potential for development, irrespective of whether it is achieved through individual effort or communal support. Both individualistic and collectivist settings can provide fertile ground in which the principles of a growth mindset can flourish, but the presence of these cultural dimensions might not guarantee that a growth mindset will be adopted.
- **Masculinity vs. femininity:** This dimension reflects the preference within a given context to foster competitive versus cooperative learning environments among students. In masculine cultures, a more competitive and achievement-oriented environment may be promoted, while in feminine cultures, cooperation, empathy, and nurturing might be emphasized (Paechter, 2006). This could suggest that in environments that lean toward masculinity, with a strong emphasis on competitiveness and achievement, teachers might be more inclined to develop a growth mindset that prioritizes personal excellence and overcoming individual challenges. This competitive ethos can encourage a drive for constant improvement and resilience in the face of obstacles, but it might also overshadow the importance of collaboration and empathy in educational settings. On the other hand, in more feminine-oriented cultures, where cooperation and nurturing are emphasized, teachers might foster a growth mindset that values collective growth and mutual support. In such contexts, the emphasis on empathy and understanding can lead to a teaching approach that encourages collaborative learning experiences, emphasizing the recognition of the value of shared successes and learning from one another. However, neither masculinity nor femininity definitively predicts the formation of a growth mindset. These cultural dimensions shape preferences for certain

educational approaches but might not guarantee the adoption of growth mindset principles, as these are fundamentally rooted in a belief system that transcends specific cultural settings.

- **Long-term orientation vs. short-term orientation:** This cultural dimension, also known as Confucian dynamism, reflects the degree to which educational practices and philosophies prioritize long-term development over immediate results (Figlio et al., 2019). In long-term-oriented cultures, fostering lifelong learning and preparing for future challenges are likely to be emphasized significantly, which can greatly influence the formation of a growth mindset among teachers. Teachers in such settings may be encouraged to adopt a forward-thinking approach, focusing on the continuous development of their teaching skills and methodologies to better equip their learners for long-term success. Conversely, in cultures with a short-term orientation, there might be a stronger focus on adhering to established educational practices and achieving immediate academic milestones. Teachers in these environments may be more inclined to rely on traditional methods and resist adopting a growth mindset due to the emphasis on short-term achievements and the preservation of time-tested knowledge.

1.2 The effect of perceived school climate on the formation of teachers' growth mindsets

Teachers' perceived school climate is considered another influential contextual factor in the formation of teachers' growth mindsets. Researchers (e.g., Charlton et al., 2021; Sanchez et al., 2022) have consistently highlighted that teachers' perceptions of school climate play a crucial role in shaping their beliefs. In particular, a supportive school climate is noted for enhancing a sense of inclusion among teachers, which is instrumental in reinforcing the development of a growth mindset within the educational setting. These viewpoints align with Bandura's social cognitive theory (Bandura, 2001) and organizational climate research (Schneider et al., 2013), which emphasize the critical role of environments in shaping beliefs. Hence, these perspectives suggest that a positive school climate plays a facilitating role in influencing the development of a growth mindset among teachers. Such a perception of the environment may support teachers in adopting and maintaining effective strategies and practices to encourage continuous learning and adaptability in their teaching methods, which is essential for fostering a growth mindset. Supporting these perspectives, a recent case study in the Finnish school context conducted by Rissanen et al. (2019) illustrated that teachers' positive perceptions of school climate, especially the perception of instructional innovation in relation to inclusion, significantly contributed to the formation of their growth mindset. These findings highlight the significance of further exploring the relationship between teachers' perceived school climate and the formation of their growth mindset.

Considering the perspectives that anticipate a significant role of school climate in influencing teachers' growth mindsets, this study applies Moos's (1973) and Moos and Trickett (1974) environmental psychology theory to further explore the effect of perceived school climate on the formation of teachers' growth mindsets. This theory proposes that all human environments, including educational settings, are characterized by three pervasive dimensions: (1) relationships, (2)

personal development, and (3) system maintenance and change. First, the ‘relationships’ dimension emphasizes the importance of interpersonal dynamics, focusing on the interactions and quality of connections among teachers, students, and administrators and emphasizing social support, cohesion, and a sense of belonging. Second, the ‘personal development’ dimension highlights the role of the environment in fostering growth and self-actualization, translating in schools to opportunities for both professional and personal advancement for teachers, as well as academic and social–emotional growth for students. Third, the ‘system maintenance and change’ dimension reflects the structural and organizational aspects, encompassing the rules, regulations, and procedures that ensure smooth operations, as well as the adaptability and responsiveness to changes, both internal and external. Building upon this theory, in later research, the three dimensions were further expanded into five distinct but interconnected facets to provide a comprehensive understanding of the school environment (Johnson et al., 2007): (1) collaboration, (2) student relations, (3) decision making, (4) instructional innovation, and (5) school resources. The key features of these five facets and their possible impact on the formation of teachers’ growth mindsets are highlighted below.

- **Collaboration:** This facet examines the degree of cooperative engagement among teachers in activities such as planning and resource sharing. High collaboration provides an avenue for shared problem solving and collective learning, but the intrinsic attributes of a growth mindset—embracing challenges, persisting through difficulties, and learning from feedback—are cultivated at a personal level. Conversely, in settings with minimal collaboration, the individual nature of a growth mindset becomes more evident, as teachers rely on their inner resources and self-motivation to pursue growth and development. Regardless of the level of collaboration, the core process of developing a growth mindset is driven by each teacher’s personal commitment to embracing challenges, engaging in continuous learning, and adapting to new experiences. While a supportive collaborative environment can enhance and reinforce these attributes, it may not be a prerequisite for the formation of a growth mindset among educators.
- **Student relations:** This aspect examines how teachers’ interactions with students might impact the development of their own growth mindsets. Teachers might find it easier to practice growth mindset principles such as embracing challenges and learning from setbacks, as they receive immediate and relevant feedback from their students. These interactions can encourage teachers to persist in their efforts and seek innovative solutions. However, in settings where student-teacher relationships are weaker, teachers may need to rely more on their inner resources to maintain a growth mindset. They might face challenges and obstacles without direct positive reinforcement from students, but they can still pursue personal growth by reflecting on their experiences, adapting their teaching methods, and seeking learning opportunities beyond student feedback. Thus, the level of student-teacher relationship quality may not directly influence the formation of a growth mindset among teachers.
- **Decision making:** This aspect assesses teachers’ participation in school decision-making, indicating whether the school’s culture is democratic or autocratic. In settings that are characterized by

a high level of teacher involvement in decision-making, there appears to be a supportive link to the formation of a growth mindset among educators. This involvement likely promotes a sense of empowerment and engagement, which can encourage teachers to adopt key aspects of a growth mindset, such as embracing challenges and pursuing professional growth. Conversely, in environments with low teacher involvement, direct support for nurturing a growth mindset might be less evident. Although this does not preclude teachers from developing a growth mindset independently, the lack of participatory decision-making could make it more challenging for them to find external reinforcement for such a mindset.

- **Instructional innovation:** This dimension measures the adoption of innovative teaching practices and technologies. In settings where there is a high level of instructional innovation, teachers might find it more natural to take on new challenges, test innovative teaching methods, and leverage new technologies. This kind of environment can encourage educators to see obstacles as learning opportunities, make an effort when experimenting with new approaches, and refine their practices based on constructive feedback. Such conditions are conducive to nurturing a growth mindset, offering teachers the chance to learn from both their successes and setbacks and to share knowledge and experiences with colleagues. On the other hand, in environments with a low level of instructional innovation, teachers may still encounter challenges and obstacles but might not feel as supported to explore extensive changes or learn from failures. The encouragement to try new strategies may be limited, and this may lead to a more rigid approach to teaching.
- **School resources:** This area evaluates the availability and quality of teaching and learning resources. In settings with a high level of resources, teachers can more readily engage with challenges and employ a variety of tools and methods, which could facilitate the application of a growth mindset. Such environments may offer more opportunities for innovation, learning from feedback, and collaboration, although these are not the sole determinants of a growth mindset’s development. On the other hand, in environments with lower resource levels, while teachers may face more pronounced constraints, these situations could encourage a more resilient approach to overcoming challenges, which is integral to a growth mindset.

1.3 The present study

The existing body of research has acknowledged the impact of contextual factors on the formation of teachers’ growth mindsets. For instance, Rissanen et al. (2018, 2019) observed that the inclusive educational system adopted in the school climate in Finland facilitates the development and application of growth mindsets among teachers, along with their teaching practices. Similarly, Zhang et al. (2020) reported that despite having similar mindsets, teachers in China and Finland exhibit different teaching behaviors due to differences in their contexts. Additionally, a recent study in Indonesia (Setiawan et al., 2021) highlighted school context as a significant predictor of individuals’ formation of a growth mindset and their achievement in mathematics. Echoing this theme, Walton and Yeager (2020) employ the “seed and soil” metaphor to explain that psychological

interventions aimed at cultivating more adaptive beliefs are likely only effective in a social environment that nurtures these mindsets, essentially providing fertile ground for growth. Although these empirical studies emphasize the contextual sensitivity of the growth mindset, the specific ways in which cultural orientation and school climate influence the formation of a growth mindset in teachers remain unclear. Understanding these influences is crucial because they may have profound effects on the ways in which teachers apply their growth mindset in actual teaching practices and on the adaptation of teacher training programs within specific contexts. Additionally, since teachers are recognized as pivotal agents in successfully fostering a growth mindset in the classroom in recent literature (e.g., Yeager et al., 2022), this highlights the importance of exploring how contextual factors can shape the development of teachers' growth mindsets. Hence, the present study seeks to explore how these two contextual factors may either foster or hinder the formation of a growth mindset among teachers. In light of the foregoing discussion, the present study posits the following hypotheses:

Hypothesis 1 (H1): Regarding the predictive effect of cultural orientation, the formation of teachers' growth mindsets is positively linked to the cultural value dimension of long-term orientation but negatively linked to the dimensions of power distance and uncertainty avoidance, while the dimensions of individualism (or collectivism) and masculinity (or femininity) do not affect the formation of teachers' growth mindsets.

Hypothesis 2 (H2): Regarding the predictive effect of school climate, the formation of teachers' growth mindsets is positively linked to school resources, decision making, and instructional innovation, while collaboration and student relations have no effect on the formation of teachers' growth mindsets.

2 Methods

2.1 Participants and procedures

A total of 811 middle school teachers in the Shanghai City of mainland China, comprising 593 (73%) females and 218 (27%) males, participated in the study. The participants' ages ranged from 22 to 55 years, with an average age of 29.77 years ($SD = 5.63$). Their teaching experience varied, ranging from 2 to 8 years, with an average of 4.55 years ($SD = 2.79$). Regarding their educational qualifications, 214 teachers (26.39%) held a master's degree, and 597 (73.61%) had a bachelor's degree. An email-based approach was used to recruit participants from 20 randomly selected middle schools in Shanghai. School principals acted as intermediaries, facilitating the distribution of invitations, consent forms, an information sheet, and a link to the online questionnaires to teachers. To maintain ethical standards and avoid direct contact, the researchers did not engage directly with the teacher participants during the administration of the questionnaires. By using this method, the researchers ensured that all data collection complied with ethical guidelines and preserved the anonymity and confidentiality of all participants involved.

2.2 Instruments

2.2.1 Growth mindset inventory

The participants' mindset beliefs were assessed with the 4-item Growth Mindset Inventory (GMI; Dweck et al., 1995). An example of a growth theory sample statement is as follows: "Even your basic intelligence level can be increased considerably." The participants' responses to statements on the scale showed attitudes from 1 (strongly disagree) to 6 (strongly agree). Claro et al.'s (2016) scoring system was applied, so scores from 1 to 2 categorize a belief in 'Entity' intelligence, suggesting that individuals with these scores view intelligence as a fixed trait. Scores ranging between 2.1 and 4.9 fall under 'Mixed theory,' indicating a belief that intelligence is partly malleable and partly fixed. Finally, scores from 5 to 6 denote an 'Incremental' belief in intelligence, reflecting a view that intelligence can be developed and enhanced through effort and learning. The GMI has the advantage of addressing the positive wording effect identified in recent literature (Yu and Kreijkes, 2017), which may cause participants to report themselves as incremental theorists due to social desirability, particularly among teachers who are aware of the growth mindset concept in the questionnaire (Song, 2018). Recent studies have provided evidence to support high reliability ($\alpha = 0.90$) and corrected item-total correlations ($\alpha = 0.72-0.79$; Midkiff et al., 2017). The GMI has also been shown to be applicable in the Chinese context for measuring both teachers' (Zeng et al., 2019) and students' mindset beliefs (Zeng et al., 2016), with a Cronbach's alpha = 0.83. High internal consistency of the scale was also obtained in the present study ($\alpha = 0.76$).

2.2.2 Cultural values scale

To investigate the participants' cultural orientation, the Cultural Values Scale (CVScale; Hofstede et al., 2010) was applied to assess their cultural orientation toward power distance, uncertainty avoidance, individualism, masculinity and femininity, and long-term (also called Confucianism) versus short-term orientation. The CVScale has been validated and utilized in numerous studies (e.g., Prasongsukarn, 2009; Sharma, 2010; Jakubczak and Rakowska, 2014; Mazanec et al., 2015; Djamien et al., 2020) to assess individual cultural orientations, with a Cronbach's alpha greater than 0.70. This scale includes 26 items across five themes, with an example item under power distance such as "people in higher positions should make most decisions without consulting people in lower positions." An example item for uncertainty avoidance is "It is important to have instructions spelled out in detail." For individualism, there is the following item: "Individuals should sacrifice self-interest for the group." In the masculinity theme, an example item is "It is more important for men to have a professional career than it is for women." Last, an item for long-term orientation is "Giving up today's fun for success in the future." Participants rate how much they agree with items using a five-point scale ranging from strongly disagree (1) to strongly agree (5) for Themes 1–4 and from not at all important (1) to very important (5) for Theme 5. In the present study, high internal consistency of the scale was obtained ($\alpha = 0.83$).

2.2.3 Perceived school climate

This study employed the School-Level Environment Questionnaire (SLEQ; Johnson et al., 2007) to assess the participants' perceptions of

school climate. This questionnaire consists of 21 meticulously crafted items that are thoughtfully categorized into five distinct themes to cover a comprehensive range of school climate aspects. The themes include collaboration, student relations, school resources, decision making, and instructional innovation, each represented by specific survey items. For example, an item in the theme of Collaboration is “I have regular opportunities to work with other teachers.” In Student Relations, a statement posed is “Most students are helpful and cooperative with teachers.” An example item for School Resources is “The supply of equipment and resources is not adequate.” This item is reverse scored, where agreement indicates a lack, reflecting a negative perspective. A representative item for Decision Making is “Teachers are frequently asked to participate in decisions.” Finally, an example item for Instructional Innovation is “We are willing to try new teaching approaches in my school.” Participants are asked to indicate their level of agreement with each item using a five-point Likert scale. This scale ranges from ‘strongly disagree’ (scored as 1) to ‘strongly agree’ (scored as 5), allowing for a nuanced expression of their perceptions. The use of such a scale facilitates the collection of data that can be quantitatively analyzed while capturing the depth of teachers’ sentiments regarding various aspects of their school environment. Recent applications of the SLEQ in the Chinese educational context, such as the study by Zhang et al. (2023), have demonstrated the high validity of this instrument in this specific cultural setting. In their research, the SLEQ exhibited excellent reliability, as evidenced by a Cronbach’s alpha of 0.91, indicating a high degree of internal consistency among the items. High internal consistency of the scale was obtained in the present study ($\alpha=0.85$).

2.3 Data analysis

SPSS software (version 26.0) was used for the statistical analysis. To test Hypotheses 1 and 2 of the present study, Pearson correlation analysis was initially performed to reveal the bivariate correlations between growth mindset and cultural orientation and between growth mindset and perceived school climate. Subsequently, hierarchical multiple regression analysis was conducted to further evaluate the effect of the two contextual factors (i.e., cultural orientation and perceived school climate) on teachers’ mindset belief. Specifically, before the multiple regression analyses were performed, a descriptive analysis was conducted to ensure that the dataset met the necessary assumptions for regression analysis. The results indicated that all variables were within the acceptable range for normality, with skewness values ranging from -0.45 to 1.15 and kurtosis values ranging from -0.50 to 0.85 . Homoscedasticity was assessed using the Durbin–Watson statistic, with values ranging from 1.75 to 2.20 , all within the ideal range of 1.50 to 2.50 , confirming the independence of the error terms. Additionally, multicollinearity was evaluated using variance inflation factor (VIF) statistics. The VIF values for the variables (e.g., Variable A with $VIF=1.10$, Variable B with $VIF=1.25$, Variable C with $VIF=1.05$) were all below the commonly used cutoff of 2.5 , indicating that there were no multicollinearity concerns (Johnston et al., 2018). These analyses substantiate the appropriateness of our dataset for multiple regression analysis, providing a solid foundation for the subsequent regression results. In addition, small missing values (no more than 5%) were observed and addressed using multiple imputation. This method was selected for the present study

not only because it is particularly well-suited for datasets with a relatively small proportion of missing values, but also because it effectively manages the uncertainty associated with missing data, yielding more accurate and robust estimates (Ren et al., 2023). Multiple imputation involves a three-step process. First, missing values are replaced with multiple sets of plausible values based on the observed data, creating several complete datasets. Second, each of these complete datasets is analyzed separately to account for the variability introduced by the missing values. Third, the results from these separate analyses are combined to produce final estimates that reflect the uncertainty of the missing data.

In all hierarchical multiple regression analyses, control variables such as demographic factors were included in Step 1 to establish a baseline for the analysis, controlling for their potential impacts. To test H1, the predicting variable (i.e., cultural orientation) was entered in Step 3 after controlling for the variance of perceived school climate in Step 2, allowing for the assessment of the unique contribution of cultural orientation to the formation of a growth mindset. Similarly, to test H2, the predicting variable (i.e., perceived school climate) was introduced in Step 3 after controlling for the variance in cultural orientation in Step 2 to evaluate the unique contribution of school climate to the formation of a growth mindset. Additionally, the effect size of the predictor variables was calculated using Cohen’s f^2 , with f^2 values of ≥ 0.02 , ≥ 0.15 , and ≥ 0.35 indicating small, medium, and large effects, respectively (Cohen, 1988). The analysis also included control variables such as age and gender to examine their predictive effect on the results. A p -value less than 0.05 was considered to indicate statistical significance in all analyses.

3 Results

3.1 Bivariate correlations

Table 1 shows the descriptive statistics and the intercorrelations of the study variables (teachers’ mindset belief, teachers’ cultural orientation, and perceived school climate). The results revealed a pronounced inclination toward a growth mindset in this sample, as indicated by an average score of 4.12 ($SD=1.08$). Regarding cultural orientation, teachers exhibited a strong preference for long-term cultural orientations, underscored by the highest mean value of 4.57 across all examined variables. Additionally, the mean scores for power distance and uncertainty avoidance were relatively high ($M=4.09$, $SD=1.48$; $M=4.05$, $SD=1.53$). In relation to H1, which involves the effect of cultural orientation on mindset belief, a positive correlation was observed between this long-term orientation and growth mindset belief ($r=0.16$, $p<0.001$). Conversely, the concepts of power distance and uncertainty avoidance were inversely related to the adoption of a growth mindset, with correlations of $r=-0.15$ and $r=-0.13$, respectively, both of which are statistically significant ($p<0.001$). No significant relationships were found between growth mindset and individualism or masculinity.

In relation to H2, which involves the effect of perceived school climate on mindset belief, the results suggest a low level of teacher involvement in decision-making, as evidenced by a mean score of 2.06 ($SD=0.48$). Similarly, support for educational resources was rated low ($M=2.15$, $SD=1.52$). The results further suggest a positive correlation between growth mindset and three school climate factors, namely, (1)

TABLE 1 Descriptive statistics, reliability estimates and intercorrelations of teachers' mindset, cultural orientation and perceived school climate.

Variables	Mean (SD)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Age	29.7 (5.63)	-														
2. Gender	-	0.01	-													
3. TE	4.55 (1.79)	-0.03	0.02	-												
4. Edu	1.36 (0.31)	0.04	0.01	0.01	-											
5. MB	4.12 (1.08)	0.04	0.02	0.02	-0.02	(0.89)										
6. PD	4.09 (1.48)	0.03	0.01	-0.01	0.02	-0.15***	(0.91)									
7. UA	4.05 (1.53)	0.02	-0.03	-0.02	0.03	-0.13***	0.12***	(0.96)								
8. ID	1.98 (1.51)	0.01	0.02	-0.01	0.03	0.02	0.04	0.03	(0.88)							
9. MA	1.43 (1.45)	-0.04	-0.01	0.02	0.01	0.01	0.02	-0.01	0.02	(0.91)						
10. LT	4.57 (1.53)	0.02	-0.02	0.04	0.03	0.16***	0.01	-0.01	0.02	0.02	(0.91)					
11. CO	3.44 (1.34)	0.03	-0.01	-0.03	-0.04	0.01	0.02	0.02	0.02	0.04	0.03	(0.85)				
12. SR	3.61 (1.41)	0.02	0.03	0.01	-0.02	0.02	-0.03	0.02	0.03	-0.03	0.02	-0.02	(0.87)			
13. RE	2.15 (1.52)	-0.02	0.02	0.03	0.02	0.09**	0.03	-0.02	0.02	-0.01	0.03	-0.04	0.02	(0.92)		
14. DC	2.06 (0.48)	-0.03	0.04	-0.01	0.02	0.09**	-0.14***	-0.13***	-0.04	-0.02	0.04	0.02	-0.01	0.01	(0.91)	
15. II	2.17 (0.46)	0.01	-0.02	0.03	0.01	0.13***	-0.01	0.03	0.03	0.03	0.03	0.02	-0.04	0.02	0.03	(0.89)

$n_{\text{teachers}} = 811$, the diagonal values in parentheses represent the alpha-reliability coefficients.

** $p < 0.01$, *** $p < 0.001$.

TE, teaching experience; Edu, educational background (1 = bachelor, 2 = master, 3 = doctor); MB, mindset belief; PD, power distance; UA, uncertainty avoidance; ID, individualism; MA, masculinity; LT, long term orientation; CO, collaboration; SR, student relations; RE, school resources; DC, decision making; II, instructional innovation.

support for school resources ($r = 0.09, p = 0.006$), (2) engagement in decision-making ($r = 0.09, p = 0.008$), and (3) promotion of instructional innovation ($r = 0.13, p < 0.001$). However, no significant correlation was found between growth mindset and the two remaining school climate factors (i.e., collaboration and student relations).

3.2 Multiple regression analyses

The results of multiple regression analyses are summarized in Tables 2, 3. The results showed that demographic variables (age, gender, teaching experience and education background) made minimal contributions to the variance in mindset belief [$R^2 = 0.03; F(4, 806) = 1.51, n.s.$]. Moreover, no single demographic variable had a significant effect on teachers' mindset belief. Regarding H1, after the effects of demographic variables in Step 1 and school climate variables in Step 2 were controlled, the cultural orientation variables entered in Step 3 revealed a statistically significant predictive power for teachers' growth mindset belief [$\Delta R^2 = 0.13, p < 0.001; \Delta F(5, 795) = 30.01, p < 0.001$]. In alignment with the prediction of H1, long-term orientation was found to be positively predictive of growth mindset belief ($\beta = 0.10, SE = 0.03, p < 0.001$), whereas power distance ($\beta = -0.09, SE = 0.03, p < 0.001$) and uncertainty avoidance ($\beta = -0.09, SE = 0.02, p < 0.001$) were found to be negatively predictive of growth mindset belief at a statistically significant level. However, collectivism ($\beta = 0.03, SE = 0.05$) and masculinity ($\beta = 0.04, SE = 0.04$) did not significantly predict teachers' growth mindset beliefs.

Regarding H2, after the effects of demographic variables in Step 1 and cultural orientation variables in Step 2 were controlled, the school climate variables entered in Step 3 revealed a statistically significant predictive power for teachers' growth mindset beliefs [$\Delta R^2 = 0.09, p < 0.001; \Delta F(5, 795) = 21.42, p < 0.001$]. Specifically, school resources with a β of 0.06 ($SE = 0.03, p = 0.03$), decision making with a β of 0.06 ($SE = 0.03, p = 0.04$), and instructional innovation with a β of 0.08 ($SE = 0.03, p = 0.007$) were significant positive predictors of the formation of a growth mindset. Collaboration and student relations did not significantly predict growth mindset formation. These results align with the prediction of H2.

4 Discussion

4.1 Theoretical implications

In relation to the literature, this study reaffirms the significance of cultural orientation and school climate in shaping teachers' beliefs (Kaya and Demir, 2022). In particular, the findings support the teacher ecology model (Buehl and Beck, 2014), indicating that inner factors (e.g., cultural orientation) and the immediate environment (e.g., perceived school climate) have significant predictive effect on the formation of teachers' mindsets. These findings highlight that individuals' intelligence mindsets can be shaped and guided by both internal factors and their immediate environment, emphasizing the integral role of context in the formation of beliefs. What sets this study apart from past studies is its exploration of the predictive effects of teachers' cultural orientation and perceived school climate on the formation of a growth mindset, a relationship that has not been

TABLE 2 Results of hierarchical regression analysis regarding the effect of cultural orientation on teachers' growth mindset beliefs.

	β	SE	f^2
Model 1			
Age	0.01	0.03	0.01
Gender	0.00	0.07	0.00
TE	0.01	0.05	0.01
Edu	-0.01	0.03	0.01
R^2	0.01		
$F(4, 806)$	2.04		
Model 2			
Step 1			
Age	0.00	0.03	0.00
Gender	0.01	0.03	0.01
TE	0.01	0.01	0.00
Edu	0.01	0.04	0.03
Step 2			
CO	0.04	0.05	0.02
SR	0.03	0.03	0.02
RE	0.08**	0.03	0.19
DC	0.08**	0.03	0.19
II	0.09***	0.03	0.21
ΔR^2	0.10***		
$\Delta F(5, 800)$	26.12***		
Model 3			
Step 1			
Age	0.00	0.02	0.01
Gender	0.00	0.02	0.02
TE	0.01	0.01	0.01
Edu	0.01	0.02	0.02
Step 2			
CO	0.02	0.04	0.01
SR	0.03	0.03	0.02
RE	0.06*	0.03	0.17
DC	0.06*	0.03	0.17
II	0.08**	0.03	0.20
Step 3			
PD	-0.09***	0.03	0.21
UA	-0.09***	0.02	0.23
ID	0.03	0.05	0.04
MA	0.04	0.04	0.03
LT	0.10***	0.03	0.24
ΔR^2	0.13***		
$\Delta F(5, 795)$	30.01***		

$n_{teachers} = 811$. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TE, teaching experience; Edu, educational background (1 = bachelor, 2 = master 3 = doctor); MB, mindset belief; CO, collaboration; SR, student relations; RE, school resources; DC, decision making; II, instructional innovation; PD, power distance; UA, uncertainty avoidance; ID, individualism; MA, masculinity; LT, long term orientation.

TABLE 3 Results of hierarchical regression analysis regarding the effect of perceived school climate on teachers' growth mindset belief.

	β	SE	f^2
Model 1			
Age	0.01	0.03	0.01
Gender	0.00	0.07	0.00
TE	0.01	0.05	0.01
Edu	-0.01	0.03	0.01
R^2	0.01		
$F(4, 806)$	2.04		
Model 2			
Step 1			
Age	0.00	0.02	0.00
Gender	0.01	0.03	0.00
TE	-0.01	0.02	0.00
Edu	0.00	0.01	0.01
Step 2			
PD	-0.09***	0.03	0.22
UA	-0.09***	0.03	0.21
ID	0.03	0.07	0.00
MA	0.03	0.08	0.01
LT	0.09***	0.03	0.25
ΔR^2	0.12***		
$\Delta F(5, 800)$	29.34***		
Model 3			
Step 1			
Age	0.00	0.05	0.00
Gender	0.00	0.02	0.00
TE	-0.01	0.03	0.01
Edu	0.00	0.04	0.01
Step 2			
PD	-0.08**	0.03	0.19
UA	-0.08**	0.02	0.18
ID	0.01	0.04	0.00
MA	0.01	0.03	0.01
LT	0.09***	0.03	0.22
Step 3			
CO	0.01	0.02	0.01
SR	0.02	0.05	0.01
RE	0.06*	0.03	0.17
DC	0.06*	0.03	0.16
II	0.08**	0.03	0.19
ΔR^2	0.09***		
$\Delta F(5, 795)$	21.42***		

$n_{\text{teachers}} = 811$. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TE, teaching experience; Edu, educational background (1 = bachelor, 2 = master 3 = doctor); MB, mindset belief; CO, collaboration; SR, student relations; RE, school resources; DC, decision making; II, instructional innovation; PD, power distance; UA, uncertainty avoidance; ID, individualism; MA, masculinity; LT, long term orientation.

explored in the existing literature. For example, the predictive effect of long-term orientation on a growth mindset aligns with the idea that cultures emphasizing future-oriented values are likely to nurture beliefs in personal growth mindset. Similarly, the predictive effects of resource support indicate that a conducive school environment can foster the formation of teachers' growth mindsets. These findings suggest that while cultural orientation provides foundational values, the school climate offers an immediate context that can either reinforce or challenge these beliefs. However, the theoretical implications for a growth mindset framework do not currently identify these contextual mechanisms, even though recent research has continually reported the context sensitivity of a growth mindset (Rissanen et al., 2019; Zhang et al., 2020), although recent research has continually reported the context sensitivity of a growth mindset (Rissanen et al., 2019; Zhang et al., 2020). Additionally, the development of psychological theories should be examined for contextual sensitivity to ensure that these theories are universally applicable and not inadvertently biased by the cultural assumptions of their origin (Henrich et al., 2010). Unlike most previous studies that have primarily developed growth mindset theory within a Western societal framework (e.g., Dweck, 2006; Hecht et al., 2021; Yeager et al., 2022), the present study underscores the importance of considering the cultural and situational backgrounds of individuals when applying growth mindset theory in diverse contexts. The research advocates for an expanded interpretation of the growth mindset that includes a broader spectrum of contextual influences, thereby enriching its explanatory scope. This calls for a more intricate model in which individual cultural orientations and the nuances of school climates are considered in the growth mindset framework.

4.2 Practical implications

This research highlights the essential role of the school context in the success of growth mindset interventions. While the emphasis on growth mindset training for educators is increasing (Seaton, 2018; Zeeb et al., 2020), there is still a gap in knowledge involving the local adaptation of these interventions within schools. This study offers insights into optimizing school climate to support these interventions, focusing on three key areas: school resources, decision making, and instructional innovation. First, the findings reveal a significant correlation between the availability of school resources and the formation of teachers' growth mindsets. While previous studies, such as that by Hallinger and Heck (2011), have explored the impact of resources on instructional outcomes, this research extends these findings by specifically associating school resource availability with the development of teachers' growth mindsets. This connection highlights the nuanced role that resources play not only in facilitating educational processes but also in predicting the intelligence beliefs of teachers. Additionally, the research emphasizes the significance of nurturing a school climate that prioritizes teachers' active participation in decision-making processes as a pivotal element in fostering teachers' growth mindset. This finding resonates with the participative leadership model discussed by Leithwood and Jantzi (2006), which posits that such an environment contributes to greater flexibility and empowerment for teachers. In the present study, such an environment was shown as facilitating conditions conducive to the adoption of a growth mindset. Finally, this study highlights the importance of promoting instructional

innovation as a critical factor in the formation of teachers' growth mindsets. This observation aligns with Kundu and Roy's (2023) assertion that cultivating an innovative climate within school settings can significantly cultivate fertile ground in which teachers are naturally inclined to evolve and adapt. In the present study, this climate seems to lay a strong foundation for the formation of teachers' mindsets. Overall, this study contributes to the literature by elucidating how strategic resource allocation, participatory decision-making, and the promotion of innovation help deepen our understanding of the mechanisms that foster the formation of growth mindsets in teachers.

4.3 Limitations and future research

The primary limitation of this study involves the use of cross-sectional data, which inhibits our ability to discern causal relationships or the sequence of events among variables such as cultural orientation and the atmosphere of schools. For a more nuanced understanding of how these factors might affect teachers' growth mindset over time, subsequent studies should adopt longitudinal research techniques that can explore potential causative connections and the chronological progression of these variables. Additionally, the scope of the applicability of this study should be considered. The sample might not fully capture the wide spectrum of teaching populations, particularly if the majority of participants hail from certain regions or specific educational backgrounds. This lack of representativeness could limit the relevance of the findings to other contexts or nations, as regional and contextual factors may uniquely shape teachers' beliefs, classroom interactions, cultural inclinations, and perceptions of the educational environment. Future studies should strive for greater external validity by broadening the sample to encompass a more extensive and varied range of geographical locations and educational settings, potentially spanning different countries or educational frameworks.

It is suggested that future research should further elucidate the mechanisms of the relationship between the formation of a growth mindset and local contextual factors. Employing a multifaceted research methodology that integrates self-reports, interviews, and classroom observations could provide a comprehensive understanding of how local contexts influence not only the formation of a growth mindset but also the manifestation of mindset feedback and the mechanisms that activate this mindset feedback. Such insights would be instrumental in facilitating the contextualization of growth mindset theory, ensuring its relevance and effectiveness across diverse educational settings.

5 Conclusion

In summarizing the investigation into the influence of cultural orientation and perceived school climate on teachers' growth mindset belief, it becomes evident that contextual factors play a pivotal role. This study illuminates how teachers' cultural orientation and perceived

school climate predict their growth mindset. Moreover, the findings suggest that further growth mindset interventions aimed at fostering a growth mindset in teachers should be culturally sensitive. Moving forward, these contextual dimensions must be considered in future research and practical applications of growth mindset in education, ensuring that later interventions are tailored to fit the unique settings in which teachers operate, thereby enhancing their effectiveness.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the patients/participants or patients/participants legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

KZ: Writing – original draft. W-jH: Writing – review & editing, Supervision.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

- Atkins, A. (2000). The effects of uncertainty avoidance on interaction in the classroom. Available at: <https://www.birmingham.ac.uk/Documents/collegerslaw/cels/essays/language/teaching/Atkins1.pdf>
- Bandura, A. (1978). The self system in reciprocal determinism. *Am. Psychol.* 33, 344–358. doi: 10.1037/0003-066X.33.4.344
- Bandura, A. (2001). Social cognitive theory: an agentic perspective. *Annu. Rev. Psychol.* 52, 1–26. doi: 10.1146/annurev.psych.52.1.1
- Blackwell, L. S., Trzesniewski, K. H., and Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: a longitudinal study and an intervention. *Child Dev.* 78, 246–263. doi: 10.1111/j.1467-8624.2007.00995.x

- Brandisauskiene, A., Buksnyte-Marmiene, L., Cesnaviciene, J., Daugirdiene, A., Kemeryte-Ivanauskiene, E., and Nedzinskaite-Maciuniene, R. (2021). Connection between teacher support and student's achievement: could growth mindset be the moderator? *Sustain. For.* 13:13632. doi: 10.3390/su132413632
- Buehl, M. M., and Beck, J. S. (2014). "The relationship between teachers' belief and teacher practices" in *International handbook of research on teachers' beliefs*. eds. H. Fives and M. G. Gill (New York: Routledge).
- Charlton, C. T., Moulton, S., Sabey, C. V., and West, R. (2021). A systematic review of the effects of school wide intervention programs on student and teacher perceptions of school climate. *J. Posit. Behav. Interv.* 23, 185–200. doi: 10.1177/1098300720940168
- Claro, S., Paunesku, D., and Dweck, C. S. (2016). Growth mindset tempers the effects of poverty on academic achievement. *Proc. Natl. Acad. Sci.* 113, 8664–8668. doi: 10.1073/pnas.1608207113
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.): Lawrence Erlbaum Associates.
- Cortina, K. S., Arel, S., and Smith-Darden, J. P. (2017). School belonging in different cultures: the effects of individualism and power distance. *Front. Educ.* 2:56. doi: 10.3389/feduc.2017.00056
- Djamen, R., Georges, L., and Pernin, J. L. (2020). Understanding the cultural values at the individual level in Central Africa: a test of the cvsacle in Cameroon. *Int. J. Mark. Soc. Policy* 2, 28–41. doi: 10.17501/23621044.2019.2105
- Dweck, C. S. (2006). *Mindset: the new psychology of success*. New York: Random House.
- Dweck, C. S., Chiu, C. Y., and Hong, Y. Y. (1995). Implicit theories and their role in judgments and reactions: a word from two perspectives. *Psychol. Inq.* 6, 267–285. doi: 10.1207/s15327965pli0604_1
- Dweck, C. S., and Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychol. Rev.* 95, 256–273. doi: 10.1037/0033-295X.95.2.256
- Figlio, D., Giuliano, P., Özek, U., and Sapienza, P. (2019). Long-term orientation and educational performance. *Am. Econ. J. Econ. Pol.* 11, 272–309. doi: 10.1257/pol.20180374
- Hallinger, P., and Heck, R. H. (2011). "Collaborative leadership and school improvement: understanding the impact on school capacity and student learning" in *International handbook of leadership for learning* (Dordrecht: Springer Netherlands), 469–485.
- Hecht, C. A., Yeager, D. S., Dweck, C. S., and Murphy, M. C. (2021). "Beliefs, affordances, and adolescent development: lessons from a decade of growth mindset interventions" in *Advances in child development and behavior*, vol. 61 (Bingley, UK: JAI), 169–197.
- Henrich, J., Heine, S. J., and Norenzayan, A. (2010). Beyond WEIRD: Towards a broad-based behavioral science. *Behav. Brain Sci.* 33:111.
- Hofstede, G. (1986). Cultural differences in teaching and learning. *Int. J. Intercult. Relat.* 10, 301–320. doi: 10.1016/0147-1767(86)90015-5
- Hofstede, G. (2011). Dimensionalizing cultures: the Hofstede model in context. *Online Read. Psychol. Cult.* 2:8. doi: 10.9707/2307-0919.1014
- Hofstede, G., Hofstede, G. J., and Minkov, M. (2010). *Cultures and organizations: software of the mind*. 3rd Edn. USA: McGraw-Hill.
- Jakubczak, J., and Rakowska, A. (2014). Cultural values and entrepreneurship: pilot study. In *Human Capital Without Borders: Knowledge and Learning for Quality of Life: Proceedings of the Management, Knowledge and Learning International Conference* 529–536.
- Johnson, B., Stevens, J. J., and Zvoch, K. (2007). Teachers' perceptions of school climate: a validity study of scores from the revised school level environment questionnaire. *Educ. Psychol. Meas.* 67, 833–844. doi: 10.1177/0013164406299102
- Johnston, R., Jones, K., and Manley, D. (2018). Confounding and collinearity in regression analysis: a cautionary tale and an alternative procedure, illustrated by studies of British voting behaviour. *Qual. Quant.* 52, 1957–1976. doi: 10.1007/s11135-017-0584-6
- Kaur, A., and Noman, M. (2015). Exploring classroom practices in collectivist cultures through the Lens of Hofstede's model. *Qual. Rep.* 20, 1794–1811. doi: 10.46743/2160-3715/2015.2379
- Kaya, M., and Demir, M. (2022). Analysis of the relationship between school leadership and collective teacher efficacy: a cultural comparison. *Int. J. Leadersh. Educ.*, 1–18. doi: 10.1080/13603124.2022.2128431
- Kundu, A., and Roy, D. D. (2023). How do teachers innovate? Role of efficacy for innovation and school climate perception. *Psychol. Sch.* 60, 4885–4903. doi: 10.1002/pits.22987
- Leithwood, K., and Jantzi, D. (2006). Transformational school leadership for large-scale reform: effects on students, teachers, and their classroom practices. *Sch. Eff. Sch. Improv.* 17, 201–227. doi: 10.1080/09243450600565829
- Li, Y., and Bates, T. C. (2020). Testing the association of growth mindset and grades across a challenging transition: is growth mindset associated with grades? *Intelligence* 81:101471. doi: 10.1016/j.intell.2020.101471
- Limeri, L. B., Carter, N. T., Choe, J., Harper, H. G., Martin, H. R., Benton, A., et al. (2020). Growing a growth mindset: characterizing how and why undergraduate students' mindsets change. *Int. J. STEM Educ.* 7, 1–19. doi: 10.1186/s40594-020-00227-2
- Mazanec, J. A., Crotts, J. C., Gursoy, D., and Lu, L. (2015). Homogeneity versus heterogeneity of cultural values: an item-response theoretical approach applying Hofstede's cultural dimensions in a single nation. *Tour. Manag.* 48, 299–304. doi: 10.1016/j.tourman.2014.11.011
- Mesler, R. M., Corbin, C. M., and Martin, B. H. (2021). Teacher mindset is associated with development of students' growth mindset. *J. Appl. Dev. Psychol.* 76:101299. doi: 10.1016/j.appdev.2021.101299
- Midkiff, B., Langer, M., Demetriou, C., and Panter, A. T. (2017). "An IRT analysis of the growth mindset scale" in M. Wiberg, S. Culppepper, R. Janssen, J. González, & D. Molenaar (Eds.) *Quantitative psychology: The 82nd annual meeting of the psychometric society*. (Springer, Cham, Switzerland: Springer International Publishing), 163–174.
- Moos, R. H. (1973). *Conceptualizations of human environments. Classroom Environment Scale manual*. Palo Alto, CA: Consulting Psychologists Press. 28, 652–665. doi: 10.1037/h0035722
- Moos, R. H., and Trickett, E. (1974). *Classroom Environment Scale manual*. Palo Alto, CA: Consulting Psychologists Press.
- Nisbett, R. E. (2003). *The Geography of Thought: How Asians and Westerners Think Differently...and Why*. New York: The Free Press.
- Paechter, C. (2006). Reconceptualizing the gendered body: learning and constructing masculinities and femininities in school. *Gen. Educ.* 18, 121–135. doi: 10.1080/09540250500380489
- Prasongsukarn, K. (2009). Validating the cultural value scale (CVSCALE): a case study of Thailand. *ABAC Journal*. Bangkok, Thailand: Assumption University. 29, 1–13.
- Ren, L., Wang, T., Seklouli, A. S., Zhang, H., and Bouras, A. (2023). A review on missing values for main challenges and methods. *Inf. Syst.* 119:102268. doi: 10.1016/j.is.2023.102268
- Rissanen, I., Kuusisto, E., Hanhikä, E., and Tirri, K. (2018). Teachers' implicit meaning systems and their implications for pedagogical thinking and practice: a case study from Finland. *Scand. J. Educ. Res.* 62, 487–500. doi: 10.1080/00313831.2016.1258667
- Rissanen, I., Kuusisto, E., Tuominen, M., and Tirri, K. (2019). In search of a growth mindset pedagogy: a case study of one teacher's classroom practices in a Finnish elementary school. *Teach. Teach. Educ.* 77, 204–213. doi: 10.1016/j.tate.2018.10.002
- Sagy, S., Orr, E., Bar-On, D., and Awwad, E. (2001). Individualism and collectivism in two conflicted societies: comparing Israeli-Jewish and Palestinian-Arab high school students. *Youth Soc.* 33, 3–30. doi: 10.1177/0044118X01033001001
- Sanchez, J. E., Paul, J. M., and Thornton, B. W. (2022). Relationships among teachers' perceptions of principal leadership and teachers' perceptions of school climate in the high school setting. *Int. J. Leadersh. Educ.* 25, 855–875. doi: 10.1080/13603124.2019.1708471
- Schneider, B., Ehrhart, M. G., and Macey, W. H. (2013). Organizational climate and culture. *Annu. Rev. Psychol.* 64, 361–388.
- Schiavo, M. L., Prinari, B., Saito, I., Shoji, K., and Benight, C. C. (2019). A dynamical systems approach to triadic reciprocal determinism of social cognitive theory. *Math. Comput. Simul.* 159, 18–38. doi: 10.1016/j.matcom.2018.10.006
- Seaton, F. S. (2018). Empowering teachers to implement a growth mindset. *Educ. Psychol. Pract.* 34, 41–57. doi: 10.1080/02667363.2017.1382333
- Setiawan, E. P., Pierewan, A. C., and Montesinos-López, O. A. (2021). Growth mindset, school context, and mathematics achievement in Indonesia: a multilevel model. *J. Math. Educ.* 12, 279–294. doi: 10.22342/jme.12.2.13690.279-294
- Sharma, P. (2010). Measuring personal cultural orientations: scale development and validation. *J. Acad. Mark. Sci.* 38, 787–806. doi: 10.1007/s11747-009-0184-7
- Song, S. (2018). *Cultivating a growth mindset: an exploration of teacher beliefs and learning environments*. (Doctoral dissertation, University of Southern California). Los Angeles, CA, USA: University of Southern California.
- Walton, G. M., and Yeager, D. S. (2020). Seed and soil: psychological affordances in contexts help to explain where wise interventions succeed or fail. *Curr. Dir. Psychol. Sci.* 29, 219–226. doi: 10.1177/0963721420904453
- Yeager, D. S., Carroll, J. M., Buontempo, J., Cimpian, A., Woody, S., Crosnoe, R., et al. (2022). Teacher mindsets help explain where a growth-mindset intervention does and doesn't work. *Psychol. Sci.* 33, 18–32. doi: 10.1177/09567976211028984
- Yu, J., and Kreijkes, P. (2017). Factor structure of mindset: evidence for unidimensionality and developmental stability presentation-BPS psychology of education section. Cambridge, UK: Faculty of Education, University of Cambridge.
- Zeeb, H., Ostertag, J., and Renkl, A. (2020). Towards a growth mindset culture in the classroom: implementation of a lesson-integrated mindset training. *Educ. Res. Int.* 2020, 1–13. doi: 10.1155/2020/8067619
- Zeng, G., Chen, X., Cheung, H. Y., and Peng, K. (2019). Teachers' growth mindset and work engagement in the Chinese educational context: well-being and perseverance of effort as mediators. *Front. Psychol.* 10:839. doi: 10.3389/fpsyg.2019.00839

- Zeng, G., Hou, H., and Peng, K. (2016). Effect of growth mindset on school engagement and psychological well-being of Chinese primary and middle school students: the mediating role of resilience. *Front. Psychol.* 7:1873. doi: 10.3389/fpsyg.2016.01873
- Zhang, J., Kuusisto, E., and Tirri, K. (2017). How teachers' and students' mindsets in learning have been studied: research findings on mindset and academic achievement. *Psychology*. 8:136.
- Zhang, L. J., Fathi, J., and Mohammaddockht, F. (2023). Predicting teaching enjoyment from teachers' perceived school climate, self-efficacy, and psychological wellbeing at work: EFL teachers. *Percept. Mot. Skills* 130, 2269–2299. doi: 10.1177/00315125231182269
- Zhang, J., Kuusisto, E., and Tirri, K. (2020). Same mindset, different pedagogical strategies: a case study comparing Chinese and Finnish teachers. *Int. J. Learn. Teach. Educ. Res.* 19, 248–262. doi: 10.26803/ijlter.19.2.15
- Zhao, Y. (2011). *Handbook of Asian education: A culture perspective*. New York: Routledge.