Culture and emotion in educational dynamics,
volume II

Edited by
Enrique H. Riquelme, Dario Paez and Silvia Cristina da Costa Dutra

About Frontiers

Frontiers is more than just an open access publisher of scholarly articles: it is a pioneering approach to the world of academia, radically improving the way scholarly research is managed. The grand vision of Frontiers is a world where all people have an equal opportunity to seek, share and generate knowledge. Frontiers provides immediate and permanent online open access to all its publications, but this alone is not enough to realize our grand goals.

Frontiers journal series

The Frontiers journal series is a multi-tier and interdisciplinary set of open-access, online journals, promising a paradigm shift from the current review, selection and dissemination processes in academic publishing. All Frontiers journals are driven by researchers for researchers; therefore, they constitute a service to the scholarly community. At the same time, the *Frontiers journal series* operates on a revolutionary invention, the tiered publishing system, initially addressing specific communities of scholars, and gradually climbing up to broader public understanding, thus serving the interests of the lay society, too.

Dedication to quality

Each Frontiers article is a landmark of the highest quality, thanks to genuinely collaborative interactions between authors and review editors, who include some of the world's best academicians. Research must be certified by peers before entering a stream of knowledge that may eventually reach the public - and shape society; therefore, Frontiers only applies the most rigorous and unbiased reviews. Frontiers revolutionizes research publishing by freely delivering the most outstanding research, evaluated with no bias from both the academic and social point of view. By applying the most advanced information technologies, Frontiers is catapulting scholarly publishing into a new generation.

What are Frontiers Research Topics?

Frontiers Research Topics are very popular trademarks of the *Frontiers journals series*: they are collections of at least ten articles, all centered on a particular subject. With their unique mix of varied contributions from Original Research to Review Articles, Frontiers Research Topics unify the most influential researchers, the latest key findings and historical advances in a hot research area.

Find out more on how to host your own Frontiers Research Topic or contribute to one as an author by contacting the Frontiers editorial office: frontiersin.org/about/contact

Culture and emotion in educational dynamics, volume II

Table of
contents

Editorial: Culture and emotion in educational dynamics, volume II

Enrique H. Riquelme[1]*, Silvia Cristina da Costa Dutra[2] and Dario Paez[3]

[1]Diversidad y Educación Intercultural, Temuco Catholic University, Temuco, Chile, [2]Departamento de Psicología y Sociología, University of Zaragoza, Zaragoza, Spain, [3]Andres Bello University, Santiago, Chile

Editorial on the Research Topic
Culture and Emotion in Educational Dynamics - Volume II

This volume has focused on emotional dynamics in educational environments. In this editorial we offer a themed review of the fascinating and diverse contents of this Field of Investigation. This volume II can be organized into three blocks, the first of them associated with the socio-affective experience of teachers, the second associated with the family-school bond and the third directly linked to the affective dynamics of students of different levels of training.

- Socio-affective factors involved in the teaching experience, highlighting technology, emotions and work performance: Teaching is a profession that faces significant challenges, among which teacher burnout has become a topic of growing concern. In this context, the integration of educational technologies, such as the use of GPT (Generative Pre-trained Transformer), has been the subject of study to understand its impact on the teaching experience. The work of Chen et al. reveals that, although the integration of GPT does not have a significant direct effect on teacher burnout, the classroom climate plays a crucial mediating role. This implies that a positive climate can mitigate the stress faced by educators, suggesting that technology, if used appropriately, can contribute to creating a more favorable environment for teaching.

In the same line, the study by Lai et al. delves into how educators' emotions are shaped by their work context and personal characteristics. Through a phenomenological approach, it *is argued* that emotions are not only individual reactions, but are influenced by sociocultural factors and the environment in which teachers work. This theoretical framework suggests that in order to address teacher burnout, it is essential to consider not only technology, but also the emotional context in which educators operate. In this sense, the management of emotions in the classroom is a critical aspect that affects the work performance of teachers.

Hao's study examines how emotional labor impacts the performance of college educators. The findings indicate that shallow performance, which refers to acting superficially in the classroom, has a negative effect on relational and task performance. On the other hand, deep performance and proactive authenticity are positively correlated with performance in various areas. This suggests that teachers who manage their emotions effectively and who are authentically engaged in their work tend to perform better, which in turn can contribute to a more positive classroom environment.

The importance of socio-emotional skills in teaching is also highlighted by Sáez-Delgado et al.. Their study validates an instrument designed to measure teachers' socio-emotional skills, identifying four key dimensions: cognitive management of emotions, empathy, teacher-student relationship, and adverse classroom climate. The validation of this instrument provides a valuable tool to investigate and improve the socio-emotional competencies of educators, which is essential for their wellbeing and performance. The interrelationship between technology, emotions, and teachers' job performance suggests that a holistic approach is needed to address teacher burnout. The integration of technologies can offer opportunities to improve teaching, but its effectiveness depends largely on the cimate of the classroom and the emotional management of educators. In addition, the development of socio-emotional skills is essential for teachers to manage their emotions and establish positive relationships with students.

- Family-School bonds: relationship between family functionality and the emotional wellbeing of adolescents in the educational context has been the subject of growing interest in research. The study by Molina Moreno et al. addresses this issue by revealing how family functionality positively impacts essential social and emotional competencies, such as optimism, sociability and self-efficacy in adolescents in Spain.

This study establishes that a functional family not only contributes to improving the mental health of young people, but also acts as a partial mediator between humanization competencies and academic burnout. The research underscores the importance of family-centered interventions, suggesting that improving family functionality can foster greater psychological wellbeing and improved academic effectiveness.

In parallel, the study by Ratka-Pauler et al., explores how parents' beliefs about the acquisition of literacy influence their children's learning. The research is based on the theory of planned behavior and focuses on the parents' perspective, showing the importance of their attitudes toward joint literacy activities. The results suggest that parents are active agents in the acquisition of literacy skills, and that their beliefs about these activities may be a determining factor in their children's educational success.

Parental education anxiety also plays a crucial role in children's learning, *as* the study by Yin et al. *suggest*, *examining* the relationship between parental anxiety about child' education and learning anxiety in children. This study highlight how parenting style acts as a mediator and how extracurricular tutoring can moderate the relationship *between parents and children anxiety*. The data reveal an association between parents' educational anxiety and children's learning anxiety. Parenting styles that involve rejection and overprotection increase this Negative affectivity, while a style based on emotional warmth reduces it. In addition, academic tutoring is identified as an important moderator that can lessen the impact of parental anxiety on children's learning anxiety.

- Affective dynamics associated with the student experience: innovative methodologies and recognition of students' emotional needs play a crucial role in their academic success and overall wellbeing. In this sense, valuable perspectives are offered on how different approaches can influence the educational experience, from the use of immersive narratives to the impact of emotional factors on academic performance.

The article by Brunetti et al. presents an educational methodology based on interactive narratives that seek to develop competencies in students through emotional journeys. This methodology is integrated into curricular activities with the aim of achieving both curricular and cross-curricular learning objectives. The theoretical principles of immersive education are articulated around four key concepts: motivation, dramatic structure, self-involvement, and fostering ongoing engagement. These elements not only seek to attract students' attention, but also to manage their emotional reactions, which is essential for effective learning. Research suggests that by engaging students in narratives that resonate emotionally with them, their engagement and, consequently, their academic performance can be improved.

In the same *vein, Yin and Soon Ko's* study examines the effectiveness of group art therapy on the stress coping ability of Chinese students in South Korea. The results demonstrate that participants who attended the art therapy sessions showed a significant reduction in stress and an improvement in their coping skills compared to the control group. This therapeutic approach offers a promising avenue for providing emotional support to international students, helping them manage stress and better adapt to their new academic environment.

In addition, the study by Tassew Woreta addresses the factors that influence the academic engagement of high school students in Ethiopia. Through an integrative model, parental and peer academic socialization, self-efficacy and outcome expectations are identified as significant predictors of academic engagement. Research shows that positive relationships with parents and peers not only boost self-efficacy, but also support more optimistic outcome expectations, which, in turn, translates into greater academic engagement. This emphasizes the need for a supportive social environment that encourages students' active participation in their learning.

The study by Slimi et al. investigates i*mpostor* syndrome, a phenomenon that has increased among doctoral students and can have adverse effects on their mental health and academic career. This study examines the relationship between supervisors' empathy and the presence of this syndrome in PhD students in Tunisia. The results indicate a significant negative correlation: as supervisor empathy increases, the prevalence of impostor syndrome among students decreases. This underscores the importance of empathy in the academic environment, suggesting that supportive and supportive supervision can be a key factor in mitigating students' negative experiences, thereby improving their emotional wellbeing and academic performance.

Finally, the study by Soufi Amlashi et al. examines how acculturation stress affects the psychological health of international students. The systematic review reveals a moderate correlation between acculturation stress and negative psychological outcomes, such as depression and psychological distress. These findings highlight the importance of providing adequate psychological support to international students, who often face additional challenges in adapting to a new cultural environment.

Globally, these studies illustrate the interconnectedness between innovative educational methodologies and students' emotional wellbeing. Immersive education, empathy in supervision, academic socialization, acculturation stress management, and group therapy are aspects that, when addressed, can positively impact the educational experience. Implementing approaches that consider both academic and emotional aspects is essential to creating an educational environment that not only fosters learning, but also supports the holistic wellbeing of students.

Author contributions

ER: Writing – original draft, Writing – review & editing. SC: Writing – review & editing. DP: Writing – review & editing.

Funding

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.

Check for updates

*CORRESPONDENCE
HePing Zhang
✉ 445390696@qq.com

The influence of parents' education anxiety on children's learning anxiety: the mediating role of parenting style and the moderating effect of extracurricular tutoring

Xia Yin[1,2], HePing Zhang[3,4]* and Meng Chen[1]

[1]Institute of Educational Sciences, Hubei University of Education, Wuhan, China, [2]School of Education, Huazhong University of Science and Technology, Wuhan, China, [3]School of Economics and Management, Nanchang Institute of Science and Technology, Nanchang, China, [4]Normal School of Vocational Techniques, Hubei University of Technology, Wuhan, China

Introduction: This study investigates the intricate relationship between parents' education anxiety and children's learning anxiety, examining the mediating role of parenting style and the moderating effect of extracurricular tutoring.

Methods: Utilizing data from the "Survey of Parents and Students in Primary and Secondary Schools," the study employs stratified sampling ($n = 3,298$) and various psychological scales to measure education anxiety, parenting styles, and extracurricular tutoring.

Results: This study reveals that parents' education anxiety significantly influences children's learning anxiety, with a notable positive correlation ($r = 0.301**$). Parenting styles particularly rejection and overprotection style increase this anxiety, while emotional warmth style decreases it. Academic tutoring serves as a moderator, reducing the impact of parental anxiety on children's learning anxiety ($\beta = -0.033$, $p < 0.05$).

Discussion: The study underscores the importance of addressing internal family dynamics to alleviate education anxiety. It advocates for a balanced approach to tutoring, emphasizing the benefits of arts and sports activities in reducing learning anxiety. Parents should be encouraged to adopt emotionally warm parenting styles and to engage their children in a variety of extracurricular activities.

KEYWORDS

educational anxiety, learning anxiety, parenting style, extracurricular tutoring, academic competition

Introduction

In recent years, education anxiety has emerged as a pervasive social phenomenon, particularly manifesting in the psychological experiences of parents in primary and secondary school settings. Current research primarily focuses on unraveling the societal underpinnings of this issue.

Externally, this includes the dearth of accessible, high-quality educational resources (Yang, 2019), the evaluative and selection practices within education systems (Qian and Miao, 2021), the dependence on supplementary tutoring (Ma and Liu, 2021), and the extensive impact of the mass media (Geng, 2021). Internally, factors such as heightened parental expectations (Yin et al., 2022), tendencies toward social comparison and conformity (Zeng, 2020), and the role of family socio-economic status (Gong et al., 2021) are also significant. However, this extensive body of research often neglects a crucial aspect: the effect of parents' education anxiety on children's comprehensive development. As an integral element of the social fabric, this anxiety does not operate in isolation but profoundly affects children. The present scenario among primary and secondary school students witnesses intense academic competition, as evidenced by the Program for International Student Assessment (PISA) 2018 data, which indicates a global average of 44 h per week spent on studying. Research has highlighted that 70.03% of students experience learning anxiety (Ding, 2023), with test anxiety affecting 22.32% of students (Hou et al., 2023). Furthermore, there is a rise in severe psychological issues such as fear of learning, anxiety disorders, and depression among students. Some studies have started to recognize the detrimental impacts of parents' anxiety on children's development, including limitations on academic performance (Gao et al., 2023; Tian and Wang, 2024), as well as increases in emotional and externalizing behavior problems (Bayer et al., 2006). However, limited attention has been given to the intergenerational transmission of anxiety between parents and their offspring.

In the shadow of parents' education anxiety, can children grow freely under the anxious gaze of their parents? Existing research highlights that education anxiety readily triggers behaviors associated with "hothousing" and overparenting. This manifests in two main ways: first, as a robust increase in family education expenditures. Data from the China Education Panel Survey (CEPS) reveal a year-on-year rise in such spending, with 2018 expenditure for extracurricular tutoring being 3.86 times that of 2010 (Xue and Zuo, 2021), and the average number of extracurricular activities per primary and secondary school student reaching 2.54 (Zhang et al., 2021); Second, it manifests as increasingly meticulous parenting practices. The prevalence of high-engagement, high-intensity, and controlling "helicopter parenting" styles is on the rise, with parents acting as their children's "educational brokers" (Yang, 2018). However, the academic returns from such extracurricular tutoring come at the cost of sacrificing children's psychological well-being (Zhang and Gao, 2022), resulting in the emergence of sensitive, fragile, and anxious "orchid children" (Ellis and Boyce, 2018). Past research began to construct an understanding of how parents' education anxiety, by increasing academic burdens and altering parenting behaviors, impacts the development of their children. Within the framework of emotional contagion theory, it is posited that emotions within a family are synchronized or mutually influential. Therefore, it is inferred that parents' education anxiety might be transmitted to children through tutoring and parenting styles, thereby inciting education anxiety in children.

The practical significance of this study lies in forging a path for the internal governance of education anxiety within families. Currently, measures to alleviate education anxiety primarily focus on improving the external environment, such as increasing high-quality educational resources, reforming the educational evaluation system, and combating news media that exaggerate and sensationalize anxiety. However, these measures have not effectively mitigated parents' education anxiety, in part

due to a lack of consideration for internal family factors. The most crucial aspect of internal governance is to prompt parental reflection and awakening regarding education. If parents realize that their own anxiety can be transmitted to their children, causing the children to experience learning anxiety and subsequently affecting their academic and psychological development, they will consciously control their anxiety and actively improve their family education capabilities. In summary, to address education anxiety from a micro-family perspective, it is necessary to explore the mechanism of impact between parents' education anxiety and children's learning anxiety. Based on this, our study attempts to utilize data from the "Survey of Parents and Students in Primary and Secondary Schools" to analyze the influencing factors of family education anxiety and its quantitative relationship with children's learning anxiety, in hopes of finding effective strategies to alleviate education anxiety.

Theoretical framework and hypotheses

The emotional states and behavioral attitudes of individuals or groups can synchronously affect both parties in social interactions. The theory of emotional contagion posits that emotional contagion is an unconscious transmission process of emotional experiences between individuals (Hatfield et al., 1994). This mechanism generally occurs at the following four levels: (1) The individual-level mimicry-feedback mechanism. Hatfield et al. (1993) argue that individuals, upon perceiving others' facial expressions, voices, postures, and movements, engage in mimicry, which, through corresponding feedback and stimuli, blends with the emotional state of the other (Hatfield et al., 1993). (2) The inter-individual level contagion effect mechanism. This level primarily reflects the variability in influence efficacy among individuals. Researchers have found that emotional contagion varies depending on individuals' gender, profession, age, and personality traits (Weisbuch and Ambady, 2008). (3) The interpersonal interaction level emotional transmission mechanism. In interpersonal communication, shared emotions can affect behavioral outcomes, such as customers being influenced by the negative emotions of service staff (Barsade, 2002), or leaders' positive emotions impacting employees' attitudes, behaviors, and performance (Tee, 2015). (4) The group level emotion formation and transmission mechanism. The emotions of team members constructively contribute to group-level emotions, with higher member familiarity strengthening group emotions (Hatfield et al., 2014). In this study, the emotional contagion between parents and children is explored from the third level, examining the emotional contagion mechanism in parent–child interactions, and from the family group level, presenting the results of emotional transmission.

Building upon the fourth level of the theory of emotional contagion, emotions within a group are interconnected over time, gradually becoming synchronized or interactive, with the contagion being stronger among more familiar team members (Hatfield et al., 1994; Barsade, 2002). A family, as a relatively closed and tightly-knit organizational unit characterized mainly by affection and companionship, fosters an environment where emotions are more contagious among its members. Based on this understanding, the following research hypothesis is proposed: Parents' education anxiety positively influences the level of children's learning anxiety (H1).

Based on the third level of the theory of emotional contagion, individuals in interpersonal interactions are consciously or

unconsciously induced by the emotions of other members to share emotions, thereby affecting behavioral outcomes. Tee (2015) divides emotional contagion into implicit and explicit emotional contagion, with the former being an unconscious process and the latter a conscious one. Parents' education anxiety implicitly affects parenting styles, manifested in changes in educational beliefs and attitudes toward children when nurturing them. Existing research widely acknowledges that negative parenting styles are likely to lead to psychosomatic issues in children, such as more depression and anxiety under controlling parenting (Bruggen et al., 2008). Parents with high anxiety, fearing that the external environment might threaten their children's development, tend to adopt overprotective and controlling parenting styles out of a desire to protect their children ("for their own good"), which can exacerbate children's anxiety levels. In contrast, emotionally warm parenting styles can help reduce students' anxiety levels (Liu, 2014; Xue, 2016; Sun and Tang, 2019). Based on these findings, this study infers that parents' education anxiety affects their own parenting styles, which in turn influences children's learning anxiety. Thus, the following research hypothesis posited: Parenting style plays a mediating role between their education anxiety and children's learning anxiety (H2).

Explicit emotional contagion in the context of parents' education anxiety manifests in direct behavioral interventions in children's learning, the most common of which is consciously increasing extracurricular tutoring for the child. Research has shown that overly anxious families tend to focus solely on "academic" tutoring, while families with normal levels of anxiety pay attention to both "academic" and "arts and sports" types of tutoring for their children (Gong et al., 2021). Different types of tutoring have varied impacts on children's academic and psychological well-being. Current research on academic tutoring predominantly supports its positive role in enhancing academic performance (Xue, 2016; Xue and Song, 2018), and there's an observed "placebo effect" on academic emotions (Liu, 2014; Sun and Tang, 2019). Consequently, a greater amount of academic tutoring might transform parental education anxiety, offsetting its negative impact on students' learning anxiety. In contrast, less academic tutoring might amplify the positive influence of parental education anxiety on student learning anxiety. Based on this understanding, the research hypothesis is proposed: The impact of parents' education anxiety on students' learning anxiety is moderated by the amount of academic tutoring (H3a).

Previous research supports a negative correlation between tutoring in the arts and sports and parents' education anxiety (Zhang et al., 2021), indicating that parents who emphasize their children's tutoring in these areas tend to exhibit lower levels of education anxiety. Currently, there is scant evidence supporting the impact of arts and sports tutoring on academic performance and emotional states related to schooling. Based on this observation, research hypothesis is proposed: Arts and sports tutoring does not serve as a moderating factor in the relationship between parents' education anxiety and children's learning anxiety (H3b) (Figure 1).

Materials and methods

Participants

The data for this study were sourced from a survey conducted by the Hubei Teacher Education Research Center and the Student Development Collaborative Research Center, targeting parents and students in primary and secondary schools. The survey employed stratified sampling, selecting 18 primary and secondary schools from five provinces—Hubei, Zhejiang, Guangdong, Jiangsu, and Hunan—based on convenience. Within these selected schools, classes were sampled, and surveys were conducted among all students and parents of the sampled classes. During the implementation process, head teachers of the sampled classes first organized students and parents with unique corresponding codes. Then, students and parents filled out the questionnaires based on their unique identifiers. Finally, the codes of students and parents were effectively linked to form a matched set of parent-student data. The survey collected 7,419 student questionnaires and 6,703 parent questionnaires. After data cleaning, which involved removing unmatched parent questionnaires and samples with non-corresponding invitation codes, a total of 3,298 complete and valid matched parent-student samples were obtained. Among these, 498 parents (15.1%) had received tertiary education or above, 1,040 (31.5%) had completed high school or vocational tutoring, and 1,760 (53.4%) had education levels of middle school or below; 1,431 students (43.4%) were in primary school, 1,396 (42.3%) were in middle school, and 471 (14.3%) were in high school.

Measures

Measurement of parents' education anxiety

In this study, education anxiety is distinctly different from trait anxiety. Education anxiety is essentially a state anxiety, characterized by emotions such as tension, worry, and panic that parents experience during the process of educating their children (Chen and Xiao, 2014). It fluctuates with changes in children's academic performance or other educational factors and may decrease or even disappear once the child leaves the educational setting. In contrast, trait anxiety is more of a personality trait, characterized by its situational breadth and greater stability. The measurement of parents' education anxiety in this research utilized the Parental Educational Anxiety Scale developed by Yin et al. (2022). This scale includes three dimensions: anxiety about learning and development, anxiety about physical and mental health, and anxiety about teachers and resources. Anxiety about learning and development refers to parents' concerns about their children's current academic performance and future prospects, such as concerns about children's grades, getting into a good university, or finding a good job; anxiety about physical and mental health involves concerns about the children's physical (exercise, sleep, personal safety, etc.) and psychological aspects (personality, interpersonal relationships, etc.), such as worries about bullying at school, the nutritional safety of school meals, or whether the child has friends; anxiety about teachers and resources pertains to parents' concerns about the quality of school education, the availability of quality educational resources, such as whether the school is a key school, whether the class teacher is a renowned educator, and the reputation of tutoring institutions.

To verify the reliability and validity of the questionnaire, the data sample was split into two halves. The first half of the valid samples ($n = 3,351$) was used for the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity. The results showed a KMO value of 0.885 and a Bartlett's test value of 14888.36 ($p < 0.001$), indicating that the sample data was suitable for factor analysis. Subsequently, Principal Component Analysis (PCA) with varimax rotation was used to extract the number of factors, identifying three factors with eigenvalues
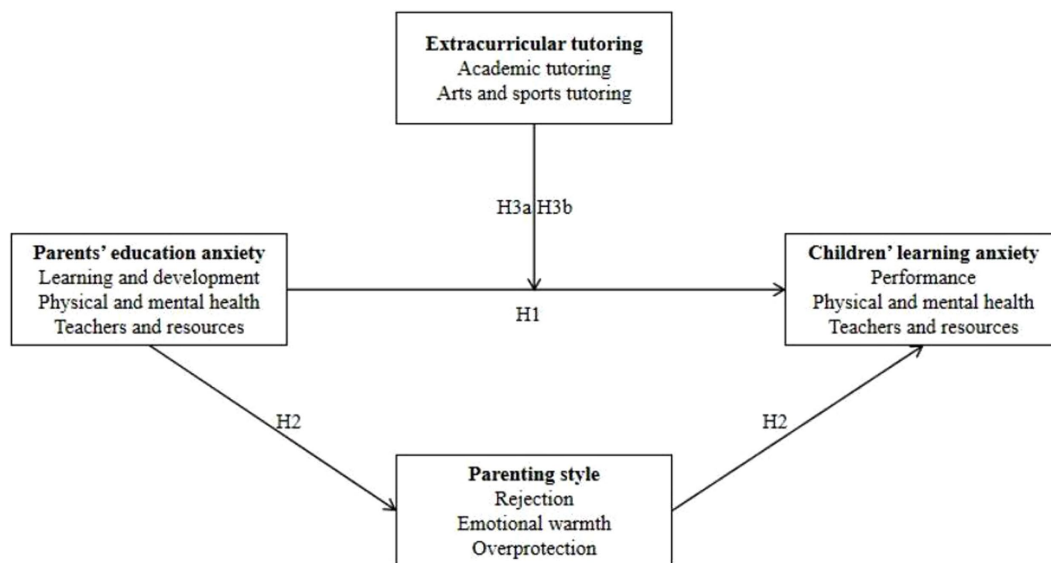
FIGURE 1
Conceptual framework.

greater than 1, accounting for a cumulative total variance of 62.24%. The second half of the sample ($n = 3,352$) was then used to test the validity of the 12 items identified. The results of the Education Anxiety Scale showed a χ^2/df ratio of 3.484, Comparative Fit Index (CFI) of 0.953, Goodness of Fit Index (GFI) of 0.905, Tucker-Lewis Index (TLI) of 0.952, Root Mean Square Error of Approximation (RMSEA) of 0.071, and Root Mean Square Residual (RMR) of 0.032. All these fit indices reached an acceptable range, indicating good model fit. In this study, the internal consistency coefficient (Cronbach's alpha) for the scale was 0.874, demonstrating that the scale has good reliability and validity. These findings corroborate the utility of the scale as a reliable and valid instrument for gaging parents' education anxiety.

Measurement of learning anxiety

Learning anxiety refers to the negative emotional states of tension, worry, and fear experienced by students during learning activities (Collie et al., 2017). Some researchers have narrowed this concept to focus on subject-specific anxieties, like anxiety related to foreign languages (Horwitz et al., 1986) or mathematics (Richardson and Suinn, 1972), or specifically exam anxiety (Sarason et al., 1978). In this study, learning anxiety is conceptualized as a pervasive form that can occur at any time, place, or in relation to any aspect of learning. Consistent with the dimensions of parents' education anxiety, students' learning anxiety was categorized into three dimensions: performance anxiety, physical and mental health anxiety, and teachers and resources anxiety. This classification took into consideration the intrinsic characteristics of students. The data of 7,419 students was similarly split into two halves for analysis. The results of the first half of the data indicated a KMO measure of 0.927 and a Bartlett's test value of 21387.05 ($p < 0.001$), demonstrating the suitability of the data for factor analysis. Three common factors explained a cumulative variance of 61.17%. The Confirmatory Factor Analysis (CFA) of the second half showed a χ^2/df ratio of 4.776, CFI of 0.898, GFI of 0.911, TLI of 0.952, RMSEA of 0.085, and RMR of 0.042. These fit indices reached

acceptable levels, indicating a good model fit. Cronbach's alpha for this learning anxiety scale was 0.913, suggesting that the scale has good reliability.

Measurement of parenting styles

This study utilized the Shortened Egna Minnen Betraffende Upfostran-Chinese (S-EMBU-C), revised by Jiang et al. (2010). The S-EMBU-C consists of separate versions for fathers and mothers, each containing 21 items. The questionnaire is divided into three dimensions: rejection, emotional warmth, and overprotection. It employs a 4-point Likert scale for scoring (1-never, 2-seldom, 3-often, 4-always), with higher scores indicating higher levels of parental rejection, overprotection or emotional warmth. In line with previous research, this study combined the dimensions of fathers and mothers into a single parental dimension to measure the overall family parenting style. The Cronbach's alpha of the scale in this study was 0.794, indicating a good level of reliability. This approach reflects an integrated assessment of the family's parenting style, providing insights into the collective influence of both parents on their children.

Measurement of extracurricular tutoring

The study addressed the measurement of extracurricular tutoring, categorizing it into academic tutoring and arts/sports tutoring. Specific survey items were employed to gage each type. For academic tutoring, participants were queried about the number of academic subject tutoring classes (such as language, mathematics, foreign languages, biology, chemistry, etc.) attended by their child in the past year. Similarly, for arts and sports tutoring, inquiries were made regarding the attendance of arts and sports classes (such as music, chess, calligraphy, painting, sports, etc.).

This study employs SPSS 25.0 for descriptive and correlation analyses; uses Amos for confirmatory structural analysis and mediation effect testing on various scales; and utilizes the PROCESS plugin for testing moderation effects.

Results

Common method bias test

To address potential common method bias, this study employed several control strategies during the survey process. These included the implementation of anonymous surveys and the incorporation of reverse-scored items. Moreover, Harman's single-factor test was utilized to assess the presence of common method bias. The analysis yielded 17 factors with eigenvalues exceeding 1, with the first factor accounting for 14.47% of the variance. This percentage falls well below the critical threshold of 40%, thereby suggesting that common method bias is not a significant concern in this dataset.

Descriptive and correlative analysis

The results presented in Table 1 reveal a notable positive correlation between parents' education anxiety and children's learning anxiety ($r = 0.301^{**}$), indicating that higher levels of parents' education anxiety correlate with increased learning anxiety among children. Additionally, there is a discernible correlation between parents' education anxiety and their parenting styles. Specifically, parents' education anxiety is positively correlated with overprotective and rejecting parenting styles ($r = 0.166^{**}$, $r = 0.159^{**}$), and negatively correlated with emotional warmth ($r = -0.133^{**}$). Parenting styles also show significant correlations with children's learning anxiety, where overprotective and rejecting styles positively correlate with learning anxiety ($r = 0.223^{**}$, $r = 0.219^{**}$), and emotional warmth negatively correlates ($r = -0.204^{**}$).

Mediating effects of parenting styles on parents' education anxiety and children's learning anxiety

The identified significant correlations among parents' education anxiety, parenting styles, and children's learning anxiety provided a basis for mediation effect testing. Employing a structural equation model (SEM), the study achieved favorable fit indices ($\chi^2/df = 4.411$, RMR = 0.022, GFI = 0.995, AGFI = 0.990, NFI = 0.987, RFI = 0.979). As depicted in Figure 2, parents' education anxiety was found to positively predict children's learning anxiety ($\beta = 0.26$, $p < 0.001$), signifying that heightened levels of parents' education anxiety contribute to increased

learning anxiety in children. When integrating parenting styles into the model, it was observed that parental education anxiety influences children's learning anxiety positively through overprotective and rejecting parenting styles, and negatively through emotion warmth styles.

To further verify the mediating role of parenting styles, this study employed the Bootstrap percentile method (2000 iterations) for testing. If the 95% confidence interval of the indirect effect does not include zero, it indicates a significant mediation effect; otherwise, there is no mediation effect. As shown in Table 2, the confidence intervals of all three mediating paths for the impact of parents' education anxiety on children's learning anxiety do not include zero, confirming the mediation effect. In path 1, the mediation effect of education anxiety—rejection—learning anxiety is 0.015, accounting for 15% of the total effect; in path 2, the mediation effect of education anxiety—emotional warmth—learning anxiety is 0.036, accounting for 36%; and in path 3, the mediation effect of education anxiety—overprotection - learning anxiety is 0.049, accounting for 49%.

Moderating effect of extracurricular tutoring on the relationship between parents' education anxiety and children's learning anxiety

The moderating role of extracurricular tutoring was explored using PROCESS for moderation analysis. The results, as shown in Table 3, indicate that the interaction term coefficient between education anxiety and academic tutoring is significant ($\beta = -0.033$, $p < 0.05$), implying that the extent of academic tutoring moderates the relationship between parents' education anxiety and children's learning anxiety. Conversely, the interaction term between education anxiety and arts and sports tutoring is not significant ($\beta = -0.029$, $p > 0.05$), suggesting that arts and sports tutoring does not moderate this relationship. Interestingly, the data indicates that arts and sports tutoring has a negative impact on children's learning anxiety ($\beta = -0.058$, $p < 0.01$), denoting that increased engagement in arts and sports tutoring is associated with lower levels of learning anxiety.

To further clarify the moderating effect of academic tutoring, as shown in the simple slope analysis in Figure 3, when the frequency of academic tutoring sessions is low, parents' education anxiety has a higher predictive effect on children's learning anxiety. As the number of academic tutoring sessions increases, the impact of parents' education anxiety on children's learning anxiety decreases. Specifically, for every unit increase in the moderator variable, the number of

TABLE 1 Descriptive statistics of the variables and the correlations between variables.

	M	SD	1	2	3	4	5	6	7
Education anxiety	3.05	0.78	–						
learning anxiety	2.53	0.84	0.301^{**a}	–					
Rejection	1.55	0.56	0.166^{**}	0.223^{**}	–				
Emotional warmth	3.06	0.72	-0.133^{**}	-0.204^{**}	-0.293^{**}	–			
Overprotection	2.18	0.51	0.159^{**}	0.219^{**}	0.577^{**}	-0.071	–		
Arts/sports tutoring	2.33	1.40	-0.065^{**}	-0.083^{**}	-0.016	0.096^{**}	-0.015	–	
Academic tutoring	1.63	1.08	0.027	0.005	0.041^{*}	0.046^{**}	0.058^{**}	0.280^{**}	–

[a]$^{**}p < 0.01$.

FIGURE 2
The mediation model of parenting style. RJ, rejection; EW, emotional warmth; OP, overprotection; EA, education anxiety; LA, learning anxiety; LD, learning and development; PM, physical and mental; TR, teachers and resources; PF, performance.
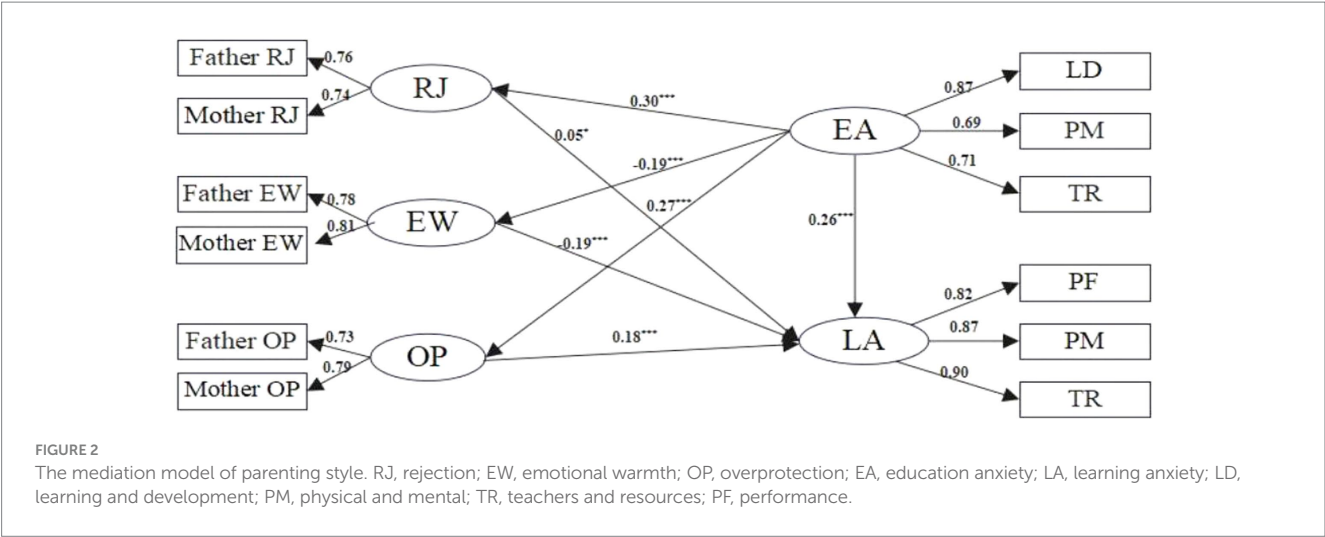
TABLE 2 Mediation effect test of parenting style.

Path	Standardized effect size	Bootstrap SE	Bootstrap 95% confidence interval	Percentage of mediation effect
Education anxiety—rejection—learning anxiety	0.015	0.001	[0.008–0.024]	15%
Education anxiety—emotional warmth—learning anxiety	0.036	0.021	[0.011–0.048]	36%
Education anxiety—overprotection—learning anxiety	0.049	0.005	[0.032–0.053]	49%

TABLE 3 Moderating effect analysis of extracurricular tutoring.

Independent variables	Dependent variables: children's learning anxiety		
	Model 2	Model 3	Model 4
Academic tutoring	0.024	0.026	0.026
Arts/sports tutoring	−0.055**[a]	−0.054**	−0.058**
Education anxiety	0.283***[b]	0.282***	0.283***
Education anxiety*academic tutoring		−0.033*	
Education anxiety*arts/sports tutoring			−0.029
Adjust R^2	0.100	0.104	0.100
F	31.429***	29.347***	29.257***

[a]**$p < 0.01$.
[b]**$p < 0.001$.

academic tutoring sessions, the impact of parents' education anxiety on children's learning anxiety decreases by 0.033 units.

Discussion

This study initiated an examination of the prevalent phenomenon of education anxiety, focusing on the emotional contagion mechanism through which parents' education anxiety impacts their children's learning anxiety within the family environment. This inquiry is especially relevant in light of the growing acknowledgment of the family's significant influence on the emotional and academic development of children. Initially, we discovered that parents' education anxiety significantly and positively impacts their children's learning anxiety. This finding corroborates the hypothesis H1, aligning with the theory of emotional contagion. Grounded in the ecosystem theory, the family is conceptualized as the individual's microsystem,

exerting a profound influence on the individual's development. This study underscores that when parents exhibit anxiety concerning their children's education, such anxiety is directly perceived by the children, thereby becoming a contributing factor to their learning anxiety.

Further, the transmission of parents' education anxiety to their children is significantly mediated by parenting styles. It was found that rejection and overprotection parenting styles exacerbate the impact of parents' education anxiety on children's learning anxiety, whereas emotional warmth style has a mitigating effect. This finding, confirming hypothesis H2, echoes the results of Gao et al. (2023), highlighting the mediating role of negative parenting styles in the nexus between education anxiety and adolescent emotional well-being. Anxious parents often adopt an intensive parenting approach, exerting strict control over their children's academic and personal lives, which can stifle the development of self-belief and lead to anxiety. Research by Yang and Hou (2009) supports this, demonstrating a positive correlation between children's anxiety and

FIGURE 3
The moderating effect diagram of academic tutoring.
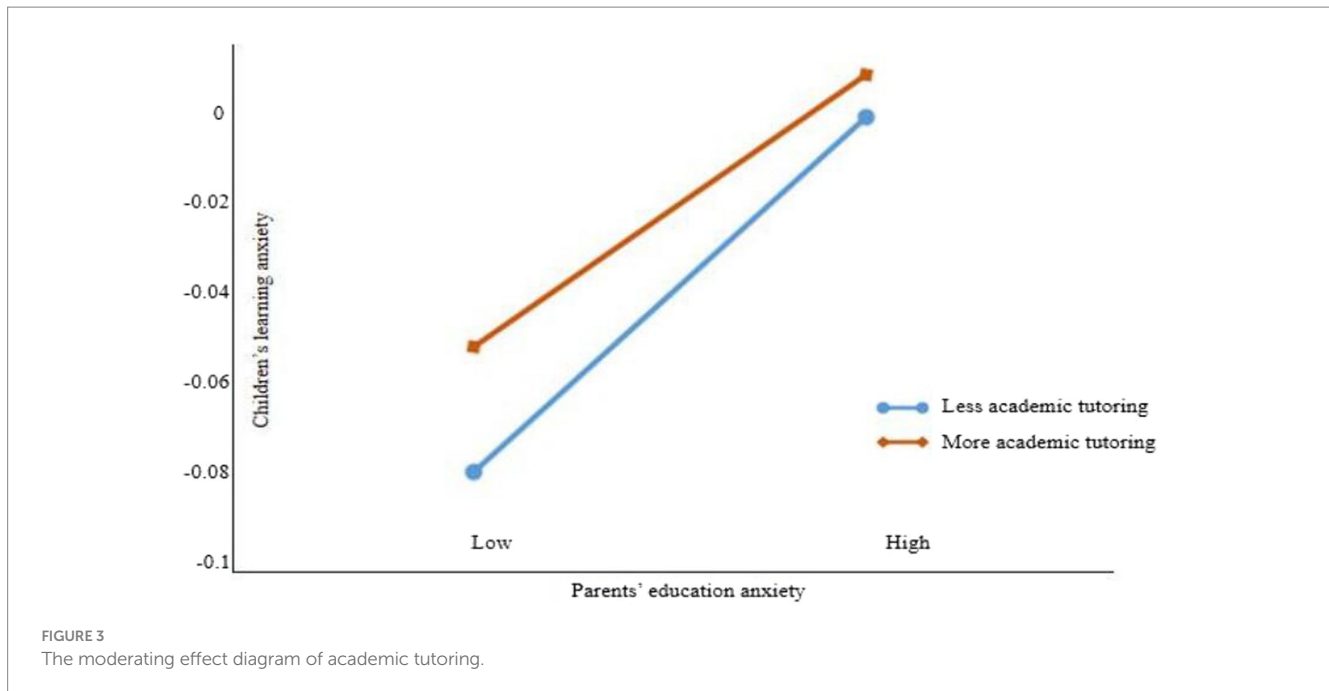
negative parenting styles, such as overprotection and rejection, and a negative correlation with positive styles, such as emotional warmth style. This indicates that children are not only directly affected by their parents' anxiety but also indirectly through the comprehensive influence of parenting styles on their learning anxiety.

Lastly, the study investigated the moderating role of extracurricular tutoring in the relationship between parents' education anxiety and children's learning anxiety, confirming hypothesis H3. Academic tutoring was found to play a negative moderating role, while arts and sports tutoring did not exhibit a moderating effect. An increase in academic tutoring sessions was observed to mitigate the impact of parents' education anxiety on children's learning anxiety, albeit with a modest impact coefficient of 0.033. This suggests that academic tutoring may serve as a conduit for transforming and alleviating some of the parents' education anxiety, thereby lessening its influence on children. This interpretation of these findings may be influenced by the cultural perspectives of our study participants. Given that our data originates from China, where schools predominantly emphasize academic achievement in selecting students, it follows that parents are highly anxious about their children's grades, and children themselves are equally concerned about academic performance. When parents provide additional subject-specific tutoring for their children, it can mitigate the intensity of the anxiety transmission chain between parents and children. Conversely, arts and sports tutoring directly and significantly reduces students' learning anxiety, indicating its potential to enhance non-cognitive abilities (Fang, 2018), and suggesting that parents seeking to alleviate their children's learning anxiety should consider increasing engagement in arts and sports over merely academic tutoring sessions.

Implications and conclusion

This research unveils the intricate mechanisms influencing family education anxiety, offering substantial theoretical and practical implications. Theoretically, it pioneers a dual-perspective approach, integrating insights from both parents and students. This method diverges from traditional models that solely focus on parents' perspectives, thus neglecting the agency of the student. By correlating data collected from parents about family education with data from students on their learning experiences, a more holistic view emerges, capturing the diverse perspectives and beliefs of these key stakeholders. This approach objectively illuminates the impact of parent–child relationships on education anxiety. Moreover, the study elucidates the nature of family education anxiety, encompassing concerns about learning development, mental and physical health, and the quality of educational resources. This clarity in definition addresses the previously ambiguous concept of education anxiety. Significantly, the research introduces an integrated theoretical model that links family situational factors, education anxiety, and learning anxiety, unveiling the emotional contagion mechanism within familial settings. This model not only applies the theory of emotional contagion in a new context but also expands its scope. Practically, the identified factors affecting family education anxiety provide essential insights for reforming fundamental education in China and mitigating widespread societal education anxiety. The insights into the interaction between family education anxiety and student learning anxiety are crucial for enhancing parental educational strategies, fostering positive family learning environments, and promoting a scientific approach to parenting. This study suggests strategies to improve the mental and physical well-being of primary and secondary school students, addressing the root causes of parents' education anxiety and children's learning anxiety.

For administrators and policymakers in China's fundamental education system, a broad societal perspective on education anxiety is imperative. Recognizing that education anxiety is a symptom of broader societal issues, mere educational reform might be insufficient (Peng and Dang, 2021). The study highlights the deep societal conflicts reflected in family education anxiety

during China's transitional phase, marked by market economy influences, consumerism, competition, and cultural clashes. Current educational reforms, primarily aimed at altering evaluation methods, reducing academic burdens, and enhancing in-school education quality, need to transcend educational boundaries and integrate with social security systems to establish a balanced educational ecosystem. For parents, understanding the impact of their anxiety on their children's emotions is crucial. Conscious efforts to control this anxiety can significantly benefit their children's learning psychology. Emphasizing emotional communication, reducing academic pressure, and avoiding excessive interference in their children's learning and life are recommended. Overbearing behaviors can harm parent–child relationships and negatively impact children's mental and physical development. Moderation in academic tutoring and increased emphasis on arts and sports can alleviate student learning anxiety and promote social and emotional skills development.

This research also has certain limitations. Firstly, although the study attempted to cover a broad range of educational stages, urban and rural areas, and diverse characteristics, it was conducted based on convenience sampling in only some provinces and cities, not encompassing the entire country. Future studies should include underdeveloped western regions as well as areas with intense educational resource competition, such as Beijing and Shanghai. Secondly, while the scales used in this study have been tested and found to have good reliability and validity, they are self-reported and thus susceptible to subjective biases. Future research could employ triangulation methods to enhance the validity of the data. Lastly, given the data sample, it is impossible to exhaust all influencing factors. This research is exploratory and empirically based on theoretical foundations. Future studies are needed to further explore causal relationships.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by Ethics Committee of Hubei University of Education. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

XY: Conceptualization, Data curation, Investigation, Writing – original draft. HZ: Funding acquisition, Methodology, Resources, Supervision, Writing – review & editing. MC: Formal analysis, Investigation, Methodology, Resources, Supervision, Writing – review & editing.

Funding

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

Barsade, S. G. (2002). The ripple effect: Emotional contagion and its influence on group behavior. *Adm. Sci. Q.* 47, 644–675. doi: 10.2307/3094912

Bayer, J. K., Sanson, A. V., and Hemphill, S. A. (2006). Parent influences on early childhood internalizing difficulties. *J. Appl. Dev. Psychol.* 27, 542–559. doi: 10.1016/j.appdev.2006.08.002

Bruggen, C. O. V. D., Stams, G. J. J. M., and Bögels, S. M. (2008). Research review: The relation between child and parent anxiety and parental control: A meta-analytic review. *J. Child Psychol. Psychiatry* 49, 1257–1269. doi: 10.1111/j.1469-7610.2008.01898.x

Chen, H. Z., and Xiao, W. (2014). An analysis of the Chinese parents' education-anxiety. *J. Natl. Acad. Educ. Admin.* 2, 18–23.

Collie, R. J., Ginns, P., Martin, A. J., and Papworth, B. (2017). Academic buoyancy mediates academic anxiety's effects on learning strategies: an investigation of English- and Chinese-speaking Australian students. *Educ. Psychol.* 37, 947–964. doi: 10.1080/01443410.2017.1291910

Ding, Y. D. (2023). How parental rearing styles relieve students' learning anxiety: an intermediary analysis based on academic achievement and emotional cognition. *J. School. Stud.* 20, 90–99.

Ellis, B. J., and Boyce, W. T. (2018). Biological sensitivity to context. *Curr. Dir. Psychol. Sci.* 17, 183–187. doi: 10.1111/j.1467-8721.2008.00571.x

Fang, C. C. (2018). Family background, extracurricular tutoring and students' non-cognitive ability. *Forum Contemp. Educ.* 4, 39–46. doi: 10.13694/j.cnki.ddjylt.2018.04.006

Gao, Y. B., Hu, J. J., Zhou, L. H., and Tu, X. Q. (2023). The relation between parental educational anxiety and adolescent emotional and behavioral problems: the mediating role of negative parenting styles. *Chin. J. Appl. Psychol.* 29, 80–88. doi: 10.20058/j.cnki.cjap.022012

Geng, Y. (2021). Mobius ring: the group of pushing kids to be best and educational anxiety. *China Youth Study* 11, 80–87. doi: 10.19633/j.cnki.11-2579/d.2021.0167

Gong, Y. X., Chen, T., and Xue, H. P. (2021). Love boundary: ls family education anxiety increasing extra-curricular tutoring input? *Res. Educ. Dev.* 41, 82–92. doi: 10.14121/j.cnki.1008-3855.2021.z2.013

Hatfield, E., Cacioppo, J. T., and Rapson, L. R. (1993). Emotional contagion. *Curr. Dir. Psychol. Sci.* 2, 96–100. doi: 10.1111/1467-8721.ep10770953

Hatfield, E., Cacioppo, J. T., and Rapson, L. R. (1994). *Emotional contagion*. Cambridge: Cambridge University Press.

Hatfield, E., Carpenter, M., and Rapson, L. R. (2014). Emotional contagion as a precursor to collective emotions. In ScheveC. Von and M. Salmela (Eds.), *Collective emotions* (pp.108–122). Oxford: Oxford University Press.

Horwitz, E. K., Horwitz, M. B., and Cope, J. (1986). Foreign language classroom anxiety. *Mod. Lang. J.* 70, 125–132. doi: 10.1111/j.1540-4781.1986.tb05256.x

Hou, R., Jin, L., and He, J. (2023). The effects of study with me on university students' test anxiety: multiple mediation effects models. *J. Southwest Univ. (Nat. Sci. Ed.)* 45, 44–55. doi: 10.13718/j.cnki.xdzk.2023.12.006

Jiang, J., Lu, Z. R., Jiang, B. J., and Xu, Y. (2010). Revision of the short-form Egna Minnen av Barndoms Uppfostran for Chinese. *Psychol. Dev. Educ.* 1, 94–99. doi: 10.16187/j.cnki.issn1001-4918.2010.01.017

Liu, D. Z. (2014). The disadvantages outweigh the benefits of primary students' extracurricular tutoring. *J. Chin. Soc. Educ.* 11, 19–23.

Ma, J. S., and Liu, Y. H. (2021). Capital expansion in education: harm and governance. *Tsinghua J. Educ.* 42, 50–61. doi: 10.14138/j.1001-4519.2021.04.005012

Ministry of Education (MOE). Opinions on further reducing the homework and after-school tutoring burden for students in compulsory education. (2021). Available at: https://www.gov.cn/zhengce/2021-07/24/content_5627132.htm.

Peng, P., and Dang, Y. (2021). Can restricting capital reduce student burden?-A review off "capital expansion in education: harmand governance". *Tsinghua J. Educ.* 42, 29–35. doi: 10.14138/j.1001-4519.2021.06.002907

Qian, J., and Miao, J. D. (2021). Possible ways to solve parents' educational anxiety: constructing an educational evaluation system to promote students' well-rounded development. *J. Chin. Soc. Educ.* 9, 38–43.

Richardson, F. C., and Suinn, R. M. (1972). The mathematics anxiety rating scale:psychometric data. *J. Couns. Psychol.* 19, 551–554. doi: 10.1037/h0033456

Sarason, I. G., Johnson, J. H., and Siegel, J. M. (1978). Assessing the impact of life changes: development of the life experiences survey. *J. Consult. Clin. Psychol.* 46, 932–946. doi: 10.1037/0022-006X.46.5.932

Sun, L. X., and Tang, J. J. (2019). The effectiveness of private tutoring: an estimation based on China education panel survey. *Peking Univ. Educ. Rev.* 17, 123–141.

Tee, E. Y. J. (2015). The emotional link: leadership and the role of implicit and explicit emotional contagion processes across multiple organizational levels. *Leadersh. Q.* 26, 654–670. doi: 10.1016/j.leaqua.2015.05.009

Tian, H. J., and Wang, J. Y. (2024). The "paradox of control" in the relationship between parenting anxiety and adolescents' academic self-imposed restrictions. *J. Chin. Youth Soc. Sci.* 43, 44–56. doi: 10.16034/j.cnki.10-1318/c.2024.02.006

Weisbuch, M., and Ambady, N. (2008). Affective divergence: Automatic responses to others' emotions depend on group membership. *J. Pers. Soc. Psychol.* 95, 1063–1079. doi: 10.1037/a0011993

Xue, H. P. (2016). Extracurricular tutoring, student achievements and social reproduction. *Educ. Econ.* 2, 32–43. doi: 10.3969/j.issn.1003-4870.2016.02.005

Xue, H. P., and Song, H. S. (2018). An empirical study on the effects of extracurricular tutoring time on middle school student: based on PISA 2012 Shanghai data. *Educ. Sci. Res.* 4, 55–60.

Xue, H. P., and Zuo, S. Y. (2021). The current status and trend of primary and secondary school students participating in extracurricular tutoring. *Educ. Sci. Res.* 1, 16–25.

Yang, K. (2018). Motherhood as educational agent: changes in motherhood in the context of market-oriented education. *J. Chin. Women's Stud.* 2, 79–90.

Yang, X. W. (2019). Diagnosis, origin tracing, and prescription of Chinese parents' educational anxiety. *People's Tribune*. 34, 104–105. doi: 10.3969/j.issn.1004-3381.2019.34.035

Yang, C., and Hou, D. H. (2009). A study on the relationship between parental rearing pattern and the trait anxiety of adolescents. *J. Psychol. Sci.* 32, 1274–1275. doi: 10.16719/j.cnki.1671-6981.2009.05.061

Yin, X., Liu, Y. C., Zhang, H. P., and Tu, W. T. (2022). Parental expectation deviation and educational anxiety. *Youth Stud.* 1, 40–48.

Zeng, P. S. (2020). How can educational consumption return to rationality? *People's Tribune*. 1, 56–57.

Zhang, Q., and Gao, Y. Y. (2022). Competition and game: the academic returns and mental health costs of private tutoring. *Chin. J. Sociol.* 42, 159–194. doi: 10.15992/j.cnki.31-1123/c.2022.03.001

Zhang, H. P., Zhang, Q. G., and Yin, X. (2021). On family capital, shadow education and the equity of educational opportunities. *Educ. Res. Monthly*. 2, 3–11. doi: 10.16477/j.cnki.issn1674-2311.2021.02.001

The effect of group art therapy on the stress coping ability of Chinese international students in South Korea: using the person-in-the-rain test

Yue Yin[1] and Kyung Soon Ko[2]*

[1]Kunming University, Kunming, China, [2]Department of Creative Arts Therapy, Jeonju University, Jeonju, Republic of Korea

Introduction: This study aimed to determine the effectiveness of group therapy on the stress coping skills of Chinese students in Korea using a pre-test post-test control group design.

Methods: Thirty participants were randomly placed into an experimental group (EG; $n = 15$) and a control group (CG; $n = 15$). The EG completed eight 120-min sessions of group art therapy. The Person-in-the-Rain (PITR) drawing test was conducted with both groups before and after the EG completed art therapy.

Results: The test revealed that EG members demonstrated lower stress and significantly higher stress resources and coping abilities than the CG members after the intervention. The group art therapy program improved the EG participants' ability to deal with stress.

Discussion: This study's findings may offer insights useful for determining how best to provide psychological and emotional support to international students who have left their home countries and are continuing their academic journeys abroad.

KEYWORDS

group art therapy, stress coping, Chinese students, PITR, study abroad

1 Introduction

Globalization has encouraged and enabled more students to study abroad (Hwang, 2017; Luo, 2022; Yang, 2022). In 2004, the Korean government launched the "Study Korea Project" to attract international students; as a result, the number of foreign students enrolled in courses at domestic educational institutions increased to approximately 160,000 by 2019 (Hwang, 2019). According to the Korean Education Statistics Service (2022), there were 166,892 foreign students residing in Korea, including 67,439 (44.2%) from China.

An "international student" is a person who resides in another country to complete formal studies at an educational institution (Dunne, 2009; Yoo, 2011). Along these lines, Sovic (2008) states that international students' transitions from one country to another may involve positive and negative emotions. Notably, the process of adapting to a new country can have social, cultural, and academic effects on students that may significantly impact their achievements. Additionally, international students must leave their families and other members of their social

support networks behind (Werkman, 1980; Walton, 1990). Sovic (2008) states that these kinds of transitions are closely associated with the concepts central to Bowlby's (1973) attachment theory. Given that the number of Chinese students in Korea has tremendously increased in recent years, various studies have been conducted on the causes of their stress.

Some Chinese students in Korea, who have left their home country and cultures, experience some difficulties in adapting to their new culture and problems with studying (Hu, 2011; Hoang, 2021) due to cultural discrimination, homesickness (Hoang, 2021), financial burdens, interpersonal difficulties, family expectations, identity development tasks (Cho and Jon, 2009; Xu, 2021), environmental changes, role changes, identity confusion, perceived discrimination, cultural conflicts, and inconveniences (Park et al., 2010).

Burns (1991) states that "stress occurs when the individual believes that they cannot meet the demand being made on them by the environment" (p. 67). The stresses of cultural adjustment are accompanied by physical, psychological, social, and identity confusion as well as anxiety, depression, isolation, and somatization (Ju and Kim, 2017). The stress that occurs during the cultural adjustment process can negatively affect depression and daily life in general. For example, 50% of Chinese international students who visited a school counseling center were depressed, mainly due to cultural adjustment and academic stress (Zhao, 2016). Along these lines, cultural adjustment stress among Chinese students in Korea has been linked to academic stress (Kim, 2007; Kim, 2010). Multiple stresses have been associated with mental health problems, such as anxiety and depression (Koung and Jang, 2010). There seems to be a benefit in providing emotional and psychological support to those who need it during their academic journey abroad.

Art therapy facilitates free exploration and creativity, allowing participants to express things that they may find difficult or impossible to express verbally by enabling them to respond to defense mechanisms for ambiguity and confusion with relative ease (Rubin, 2011; Greenberg, 2017). Creating art can be an effective way to encourage people who experience psycho-emotional difficulties, including those who may find it difficult to directly express their emotions, thoughts, or feelings (Wadeson, 1987; Malchiodi, 2005).

Interactions between participants in group art therapy can make art therapy a way to examine lifestyles and explore interpersonal relationships (Park, 2020). Yalom (1995) argues that the forces and energies generated in a group interact in complicated ways and suggests that group cohesion compels actions, thoughts, emotions, and experiences that can energize group members. Through this process, group members gradually gain a deeper understanding of themselves, and these changes can persist even after the group no longer meets.

As noted above, the rising number of Chinese international students in Korea has inspired related studies. In particular, existing studies suggest that art therapy can be a means of self-expression for international students who may have trouble expressing themselves due to the influence of cultural collectivism. For example, previous studies have found that expressive enhancement (Cho, 2022), sense of belonging, emotional support (Li and Han, 2019), and the expression of repressed emotions (Park and Lee, 2016) can reduce stress.

These findings suggest that social and emotional support programs are necessary to help international students cope with stress. However, no studies have yet been conducted on whether group art

therapy affects international students' abilities to cope with stress. As completing an academic degree abroad usually takes at least a couple of years, it is important to explore whether there is the possibility of using art therapy as a verbal and non-verbal method to help Chinese international students cope with stress during school.

This study sought to uncover the benefit of group art therapy on the abilities of Chinese students studying in Korea to cope with stress. Specifically, we provided group art therapy to an experimental group (EG) and studied the group members' abilities to cope with stress after the therapy against the stress coping ability of a control group (CG). We measured the ability to cope with stress using the Person-in-the-Rain (PITR) drawing test. Through this study, we hope to find a way to support Chinese students who have left their home countries for academic purposes by determining how to best help them cope with stress in their new environment and culture. The following hypothesis was tested: group art therapy will significantly increase the stress coping ability of Chinese students in Korea.

2 Materials and methods

2.1 Study design

In this study, a pre-test post-test control group design was used to investigate the impact of eight sessions of group art therapy on the stress coping ability of international students studying in Korea (Table 1). We used the PITR drawing test to measure the students' coping abilities.

2.2 Participant recruitment

To recruit participants for the experiment, the purpose of the study and the criteria for participation were posted on an online chat room (WeChat). Among the applicants, 30 participants who met the recruitment criteria were selected. The inclusion criteria were as follows: (1) Chinese student studying in Korea and currently residing in Korea, (2) currently completing a university or graduate degree; (3) experiencing stress. Regarding the participants' proficiency in Korean as assessed by the Test of Proficiency in Korean (TOPIK), in the experimental group (EG), 12 students (80.0%) scored at level 2 or below, while 3 students (20.0%) scored at level 3 or above. Moreover, 10 students (66.7%) below level 2 had no recorded TOPIK grade. In the control group (CG), 10 students (66.7%) scored at level 2 or below, and 5 students (33.3%) scored at level 3 or above. Additionally, 9 students (60.0%) below level 2 had no recorded TOPIK grade. It should be noted that all participants were required to achieve at least a level 4 proficiency to graduate from university. The demographic information of the participants is shown in Table 2.

TABLE 1 Study design.

Participants	Pre-test	Group art therapy	Post-test
EG ($n = 15$)	Q_1	X	Q_2
CG ($n = 15$)	Q_3	–	Q_4

Q_1, Q_3, pre-test (PITR); X, eight sessions of group art therapy; Q_2 Q_4, post-test (PITR); –, no intervention.

TABLE 2 Demographic characteristics of participants.

Domain	Area	EG (n = 15)		CG (n = 15)		Total	
		n	%	n	%	N	%
Sex	Male	10	66.7	12	80.0	22	73.3
	Female	5	33.3	3	20.0	8	26.7
Residency (months)	<12	4	26.7	6	40.0	10	33.3
	≥12	11	73.3	9	60.0	20	66.7
TOPIK level	Under 2	12	80.0	10	66.7	22	73.3
	Over 3	3	20.0	5	33.3	8	26.7
Major	Arts	10	66.7	2	13.3	12	40.0
	Natural sciences	5	33.3	5	33.4	10	33.3
	Humanities and social sciences	0	0.0	8	53.3	8	26.7
Degree	BA and MA	7	46.7	4	26.7	11	36.7
	Doctorate	8	53.3	11	73.3	19	63.3

TABLE 3 PITR scoring scale (Lack, 1996).

Domain	Item	Scoring standard
Stress (S) = Sum of S1–S16	S1–S8	Existence: 1 point, none: 0 points (per question)
	S9–S16	# of figures (1 point)
Resource (R) = Sum of (R1–R16)–(R17–R19)	R1–R16	Existence: 1 point, none: 0 point (per question)
Coping (C) = Sum of R–S	R17–R19	Existence: 1 point, none: 0 point (per question) except, R18, which is scored by # of figures (1 point)
		Score of R – Score of S

2.3 Measurement: person-in-the-rain drawing test

The PITR test was devised by Arnold and Abraham (Hammer, 1958) and is used to determine whether the test taker can cope with stress. Specifically, the test taker uses pencil drawings to convey information about their level of stress and their ability to cope with it. The amount, direction, and intensity of rain depicted in the picture show the participants' subjective perception of their amount of stress, and the objects that protect the figure, such as umbrellas, raincoats, and boots; the facial expressions; the position of the figure; and the size of the figure are interpreted as stress coping resources (Jue, 2019). In this study, we used the Korean version (Lee, 2008) of Lack's (1996) PITR-SRC interpretation method to score the participants' drawings.

The PITR questions consist of 35 items within three domains (see Table 3). The stress domain (S) focuses on stress levels and includes 16 items, S1–S16. The resource domain (R) focuses on stress resources and includes 19 items, R1–R19. The coping domain (C) focuses on the ability to cope with stress and includes 3 items. If the coping ability score is positive (+), then there are more resources than stress and thus relatively little stress. Meanwhile, if the coping ability score is positive (+), then a negative number (−) indicates more stress than resources.

2.4 Procedure of facilitating the PITR test

The participants completed the PITR drawing test before and after the EG participated in a group art therapy program. In order to

conduct the PITR test, the researcher provided the participants with A4 paper (210 × 297 mm), a 4B pencil, and an eraser and asked them to draw a person in the rain for 15 min. Next, the researcher advised the participants as follows: "It's raining. Draw a person in the rain. At this time, please draw the person in full form, not in the shape of a cartoon or a stick." The researcher allowed the participants to draw freely; that is, the researcher did not advise participants on things such as the size and shape of the drawing or the position of the figure. When participants asked the research questions about how they should draw while completing the test, the researcher responded, "You can draw whatever you want." Finally, we collected qualitative data in written form by asking participants who they drew, what the person in their drawing was doing, and how the person in their drawing felt. This was scored as supplementary data for the PITR picture analysis index. In particular, if it is not a picture of only one person, when scoring R11-R15, it was scored by referring to the answer of "Who is the main character in the picture?" (R11-Whole face; R12-Smile; R13-Centred figure; R14-Size of figure; R15-Full figure).

2.5 Procedure of grading of the PITR test

To ensure the reliability of the PITR scoring procedure and results, three graders, including researchers, scored the tests. Before scoring, 60 original copies and copies of the pre- and post-test PITR results from the EG and CG, scoring guidelines, and scoring tables were given to the graders. To minimize grader bias, 60 copies of the PITR test results were randomly numbered so that participants could not

be identified. A Chinese interpreter was included to facilitate communication between graders while they scored the tests.

Before scoring, the researcher conducted a test to ensure the graders understood the analysis criteria for each item in the test. After a thorough discussion of the scoring system and criteria, each rater independently scored all 60 tests to ensure reliability. In addition, to ensure consistency, the graders evaluated the items when the grading results were checked against each other. A Pearson correlation analysis was performed to analyze the raters' comparative confidence levels (see Table 4).

TABLE 4 Validity check between graders for the PITR.

Grader	Stress	Resource	Coping
A and B	0.782**	0.843***	0.810***
B and C	0.936***	0.982***	0.952***
A and C	0.814**	0.823***	0.811***

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Raters A and B had a high "stress" confidence correlation coefficient of 0.782, a "stress resources" confidence correlation coefficient of 0.843, and a "coping ability" confidence correlation coefficient of 0.810. Meanwhile, Raters B and C had a "stress" confidence correlation coefficient of 0.936, a "stress resource" confidence correlation coefficient of 0.982, and a "coping ability" confidence correlation coefficient of 0.952. Lastly, Raters A and C had a "stress" confidence correlation coefficient of 0.814, "stress resources" confidence correlation coefficient of 0.823, and a "coping ability" confidence correlation coefficient of 0.811. These results suggest that the three graders were fully familiar with the scoring criteria and independently graded according to these clear criteria (see Figures 1–4).

2.6 Intervention

The 30 Chinese international student participants living in Korea were randomly divided into the EG ($n = 15$) and CG ($n = 15$). As

FIGURE 1
Representative participant's PITR drawing, scored from 0 to −9.

FIGURE 2
Representative participant's PITR drawing, scored from −10 to −1.

FIGURE 3
Representative participant's PITR drawing, scored from −20 to −11.

FIGURE 4
Representative participant's PITR drawing, scored from −30 to −21.

established above, the EG completed an eight-session group art therapy program facilitated by an experienced Korean art therapist and the CG did not complete this program. Each session of the therapy program was 120 min long (this length was based on interpretation time and group size) and comprised three phases: the introductory phase (20 min), the task and activity phase (60 min), and the organizing and verbal sharing phase (40 min). The EG's program consisted of themes related to stress, such as emotional suppression, barriers, cultural adaptation stress, academic stress, self-acceptance, positive images, and future vision after reviewing literature and consulting with a therapist experienced with diverse cultures. Table 5 shows intervention.

2.7 Data analysis

The data were analyzed as follows: SPSS 26.0 was used for statistical processing. A frequency analysis was performed to assess the demographic characteristics of the participants. Mann–Whitney

U tests were performed to test the homogeneity of the EG and CG before the program was implemented. A comparative analysis was performed based on the PITR-SRC (Lack, 1996) scoring method developed by Lee (2008) and reliability tests were performed to determine if the raters' scoring results matched. A Wilcoxon signed-rank test was performed to check for differences in scores between the groups. Finally, participants' nonverbal expressions, verbal expressions, and changes were analyzed in the context of the PITR.

2.8 Ethical considerations

This study is part of the author's doctoral dissertation (Yin, 2023) and its description has been modified to align with the journal format. This study was approved by the Institutional Review Board (IRB) of the Jeonju university (JJIRB-220421-HR-2022-0407). The researcher advised the participants on the purpose of the study, their right to confidentiality, and their right to stop participating in the study without any penalty. All data were gathered after IRB approval and

TABLE 5 The themes and goals of each art therapy session.

Session #	Theme	Goals
1	Self-introduction	• Building rapport and group cohesion
2	My culture	• Cultural identity ·supportive experiences from group members
3	Difficulties I am facing	• Culture and expression of clash ·sharing difficulties during acculturation
4	Five facial expressions	• Awareness of my emotions and expressions
5	Barriers in front of me	• Expression of academic stress and empathic response • Problem solving to relieve academic stress
6	Magical lamp and miracle question	• Explore inner desires and expressions • Supportive from group members
7	My name card	• The life I want to build and my self-image • Explore inner resources and motivation
8	A gift box for myself	• Internalize a positive self-image

TABLE 6 Verification of homogeneity between the experimental and control groups.

Domain	EG ($n = 15$)		CG ($n = 15$)		Z
	M	SD	M	SD	
Stress (S)	14.67	3.416	11.87	5.817	−2.206
Resource (R)	2.13	4.502	0.33	3.904	−1.334
Coping (C)	−12.53	5.041	−11.53	7.990	−0.166

TABLE 7 PITR results for the experimental and control groups.

Domain	EG ($n = 15$)		CG ($n = 15$)		Z
	M	SD	M	SD	
Stress (S)	5.27	2.120	15.73	5.257	−4.603***
Resource (R)	6.93	4.383	−0.33	3.519	−3.627***
Coping (C)	1.67	4.012	−16.07	6.076	−4.633***

***$p < 0.001$.

participant consent. Since a Korean art therapist facilitated the program, a Chinese interpreter was present during the sessions to facilitate accurate communication. All data were stored on the researcher's personal computer with a password to protect privacy.

3 Results

3.1 Verification of the homogeneity between the experimental and control groups

The Mann–Whitney U test was conducted to determine the homogeneity of the EG and CG. As a result of the homogeneity test of the means of the EG and CG, the average score for the "stress" domain in the PITR test among the EG was 14.67 points; while this is higher than the CG's score of 11.87 points, this difference was not statistically significant ($p > 0.05$). Meanwhile, the mean score for "stress resources" was higher in the EG (2.13) than in the CG (0.33); however, these results were also not statistically significant ($p > 0.05$). Regarding "coping ability," the EG demonstrated a lower mean score (−12.53) than the CG (−11.53); again, these results were not statistically significant ($p > 0.05$). Therefore, the homogeneity of the PITR test between the two groups was confirmed (see Table 6).

3.2 Comparison of the experimental group and control group PITR results

In the post-test conducted after the group art therapy, a Mann–Whitney U analysis was performed to identify the differences in the

post-test results of the EG and CG. The results are shown in Table 7. Specifically, the comparison indicated statistically significant differences across all areas. In the domain of "stress," the EG's mean score (5.27) was lower than the CG's mean score (15.73) ($p < 0.001$). Regarding "stress resources," the EG's mean score (6.93) was higher than the CG's main score (−0.33) ($p < 0.001$). In terms of "coping ability," the EG's mean score (1.67) was statistically significantly higher than the CG's mean score (−16.07) ($p < 0.001$). Therefore, the pre-post test results reveal that the group art therapy program significantly improved the EG's stress-related capacities compared to the CG.

3.3 Comparison of the experimental group and control group PITR pre and post results

To analyze the effect of the group art therapy program on Chinese international students in Korea, we compared the pre-post and post-test PITR results of the two groups. A Wilcoxon signed-rank test was conducted to determine whether the pre- and post-test changes were statistically significant (see Table 8).

The pictures in the EG for the post-test usually appeared to have no rain or a dot shape, and the protagonist in the picture had no contact with the rain. There was not enough wind, puddles, or lightning. Most of the pictures were cloudless or appeared to have friendly clouds. There were also many pictures in which there was appropriate protection, and one or more of the protections were depicted. The impressions of the picture appeared to be positive, with low stress scores and high stress coping resource scores. In the case of the CG, most of the pictures showed a lot of rain, or rain was drawn in various shapes such as dots, lines, circles, and drops. In almost all

TABLE 8 Differences in the pre- and post-test results of the experimental group.

Domain	Pre		Post		Z
	M	SD	M	SD	
Stress (S)	14.67	3.416	5.27	2.120	−3.415**
Resources (R)	2.13	4.502	6.93	4.383	−2.702**
Coping (C)	−12.53	5.041	1.67	4.012	−3.411**

**$p < 0.01$.

TABLE 9 Differences in the pre- and post-test results of the control group.

Domains	Pre		Post		Z
	M	SD	M	SD	
Stress (S)	11.87	5.817	15.73	5.257	−2.332*
Resource (R)	0.33	2.904	−0.33	3.519	−0.126
Coping (C)	−11.53	7.990	−16.07	6.077	−1.652

*$p < 0.05$.

FIGURE 5
Pre- and post-test stress scores for the EG and CG.
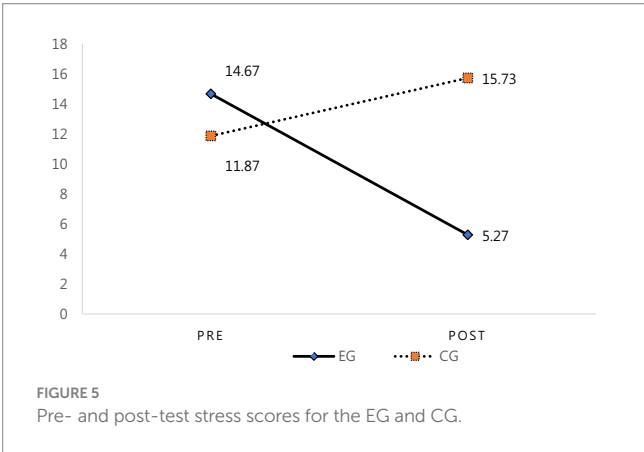
the paintings, the protagonist was shown to be in direct contact with the rain. Wind, puddles, lightning, and dark clouds were also depicted a lot, and the stress was high. In addition, there was no protection or it appeared inappropriately; the protagonist had also omitted body parts or only the back of the character was shown. The protagonist in the picture looked tired and stressed, and depicted exuded a negative vibe. The stress coping resources were low (see Table 9).

The comparison revealed that the score for "stress" significantly decreased in the EG, as shown in Figure 5. Specifically, the EG's pre-test mean score of 14.67 decreased to 5.27 in the post-test; this difference is statistically significantly different ($p < 0.01$). Meanwhile, the CG's pre-test mean score of 11.87 increased to 15.73 in the post-test; this difference is also statistically significantly different ($p < 0.05$) (see Figure 5).

The stress coping ability of the participants who participated in the group art therapy session was improved by comparing the pre-post of the PITR picture in the actual box group. It seems like the stress was reduced after assessing the items, which comprised a stress measure. Looking closely, the "amount of rain" significantly decreased for all 15 participants from 1 to 15, and the "contact of rain" in the pictures of participants 1, 3, 4, 6, 12, 13, and 14 showed that the "wind" item in

the pictures of participants 12 and 14, "hole" item in the pictures of participants 2, 3, 4, 6, 7, 8, 9 and "lighting" item in the pictures of participants 1, 5, 7, 8, 9 disappeared. The "cloud" item in the pictures of participants 3, 4, 5, 6, 8, and 9 showed that the cloud disappeared or the dark cloud became a cloud. It seems that the ability to cope with stress increased throughout the EG through the items, which are measures of coping ability. Looking closely, the pictures of participants 1, 2, 3, 6, 7, 11, and 12 included "protective objects," and the pictures of participants 3, 12, and 14 showed "protective objects" appropriately so that people in the drawing do not get rained on. The "character" in the pictures of participants 2, 3, 4, 5, 6, 11, and 14 were drawn from the back or side; however, the entire figure could be seen more completely as it was from the front side of human body. Moreover, the main character of the paintings of participants 1, 2, 3, 5, 6, 8, 10, 11, 12, and 15 had a smiling expression. As a result, the main character in the picture turned negative emotions into positive ones (see Figures 6, 7).

The "stress resources" of the CG did not change—the group's pre-test and post-test mean scores for this domain were both 0.33 to a post-test mean score of −0.33; this result accordingly did not reveal a statistically significant difference ($p > 0.05$) (see Figure 8).

By comparing the pre-post of the PITR picture in the control group, it was found that the stress and coping ability scales did not change significantly. The stress scale items, namely the "amount of rain," "contact of rain," "wind," "punch," "lightning," and "cloud" did not decrease or disappear. The coping ability scale showed that no protection appeared or it was used inappropriately. Furthermore, most of the protagonists in the picture were not complete or appeared in the back. Overall, this showed that the pre-post of the PITR picture in the CG did not change much. Finally, "coping ability" increased in the EG—the EG's pre-test mean score for this domain was −12.53 and its post-test mean score was 1.67, as shown in Figure 7; this difference was statistically significant ($p < 0.01$). In the CG, the coping ability mean score increased from −11.53 in the pre-test to–16.07 in the post test ($p > 0.05$), which was not significant. Ultimately, these results show that the group art therapy program decreased stress and increased stress resources and coping abilities among Chinese students in Korea (see Figure 9).

4 Discussion

The purpose of this study was to determine whether group art therapy could effectively improve the ability to cope with stress among Chinese international students in Korea using a pre-test post-test control group design. The study involved 30 participants who were randomly divided into an EG ($n = 15$) and a CG ($n = 15$). The EG was provided with eight 120 min of group art therapy. The PITR test was conducted with both groups before and after the group art therapy program to measure their scores across different domains of stress; namely: "stress," "stress resources," and "coping ability."

A Mann–Whitney U analysis was conducted to compare the results of the PITR between the groups. The EG had lower mean scores for "stress" and higher mean scores for "stress resources" and "coping ability" after the therapy than the CG, and these differences were statistically significant. These results suggest that the group art therapy program improved the international students' stress coping ability.
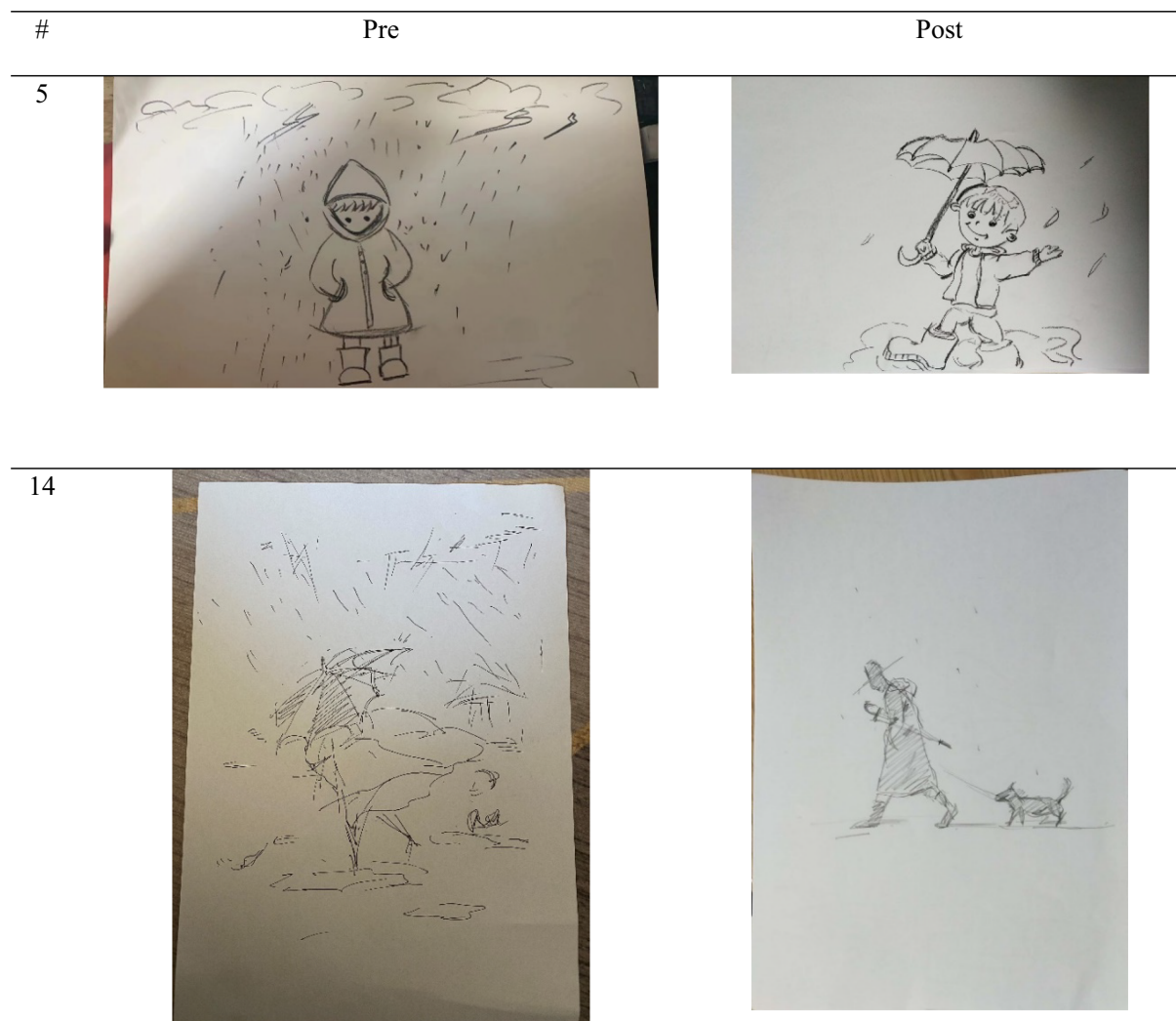
FIGURE 6
Representative sample PITR drawing from EG, participants 5 and 14.

A Wilcoxon signed-rank test was conducted to determine the changes in the pre-post test scores for the PITR. The EG's post-test mean score for "stress" was lower than its pre-test mean score, and its post-test mean scores for "stress resources" and "coping ability" were higher than its pre-test mean scores. Meanwhile, the CG's post-test mean score for "stress" was significantly higher than its pre-test mean score, its post-test mean score for "stress resources" was the same as its pre-test mean score, and its post-test mean score for "coping ability" was higher than its pre-test mean scores (however, these differences were not significant). These findings may be because the students may have been completing their final exams or dissertations, which would have increased their stress levels.

The findings of this study are consistent with previous research indicating that nonverbal expressive art therapy can reduce stress and enhance emotional stability (Park and Lee, 2016; Cho, 2022). Researchers sought to determine how PITR, as a projective measurement, could benefit international students influenced by East Asian culture. In Western contexts, theories of psychological well-being traditionally emphasize self-actualization, which views human potential through an individual lens (Maslow, 1970). In contrast, Eastern philosophies, especially Confucianism, which profoundly influences Eastern psychology, emphasize cooperation and harmony with others (Kim, 2007). The Western psychoanalytic framework categorizes the self into three layers: the id, the ego, and the superego (Freud, 1923), differing significantly from Asian perspectives. In Asian societies, the concept of self is deeply intertwined with the broader socio-cultural context, including community, family, and social connections, where the self is perceived in relation to society, often merging individual and collective identities (Tseng, 2004; Kim, 2007). However, these concepts are not universally applicable. In East Asian cultures, openly sharing emotional struggles and expressing individuality may seem unfamiliar and challenging (Kim et al., 2008). Thus, PITR could serve as a valuable tool for international students, particularly those from East Asian backgrounds, to become aware of and manage their stress levels effectively within a group setting.

This study had some limitations. First, due to the COVID-19 pandemic limiting access to in-person programs, it was challenging to recruit Chinese students from various universities and a Chinese art therapist in Korea. Consequently, the group art therapy sessions were led by a Korean art therapist over eight sessions, with a Chinese translator present. This resulted in not having a therapist with a Chinese cultural background and language proficiency, as

#	Pre	Post
7		
8		
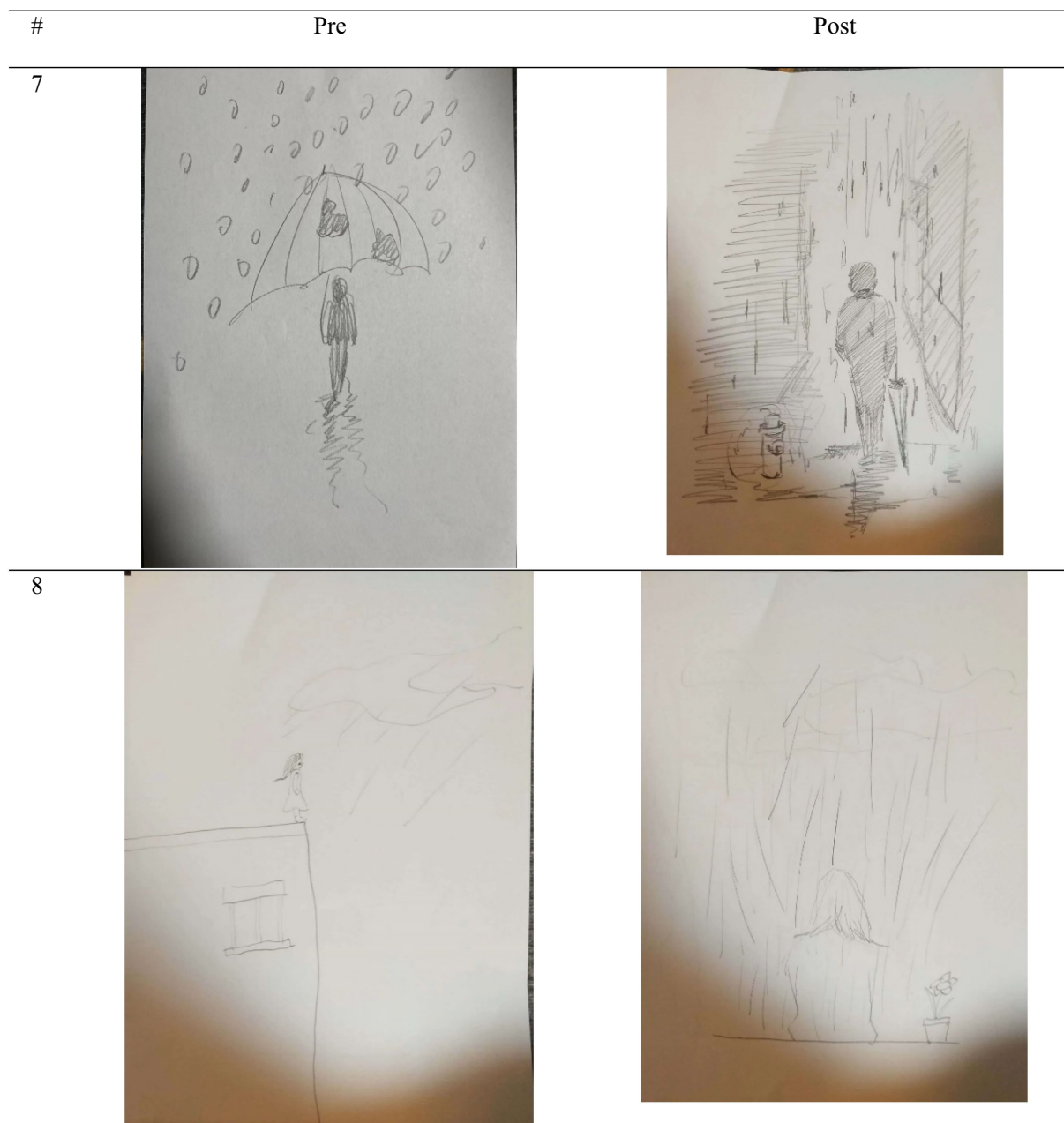
FIGURE 7
Representative sample PITR drawing from CG, participants 7 and 8.

well as a limited number of sessions that may have influenced the study's results. Second, since participants were recruited on a voluntary basis, we did not screen participants. Third, no follow-up tests were conducted after the participants completed the eight art therapy sessions, thus the persistence of the effects could not be confirmed.

Despite these limitations, this study not only provided mean score differences between the control group and experimental group, indicating the effectiveness of group art therapy, but also incorporated visual data obtained through PITR. These drawings intuitively captured the participants' stress levels and coping abilities, offering valuable insights as they reflected upon them. The contents of projective examinations such as PITR convey more vivid content than

language, which may represent the situation of some international students who cannot express themselves verbally.

5 Conclusion

This is particularly relevant for Chinese students studying abroad, as they may be accustomed to not verbally expressing their emotional difficulties due to cultural factors that emphasize community and harmony rather than individual needs. Ultimately, the findings of this study may be applied to enhance the psychological and emotional well-being of Chinese students studying abroad, thereby strengthening their resilience in overcoming stressors during their academic journey.
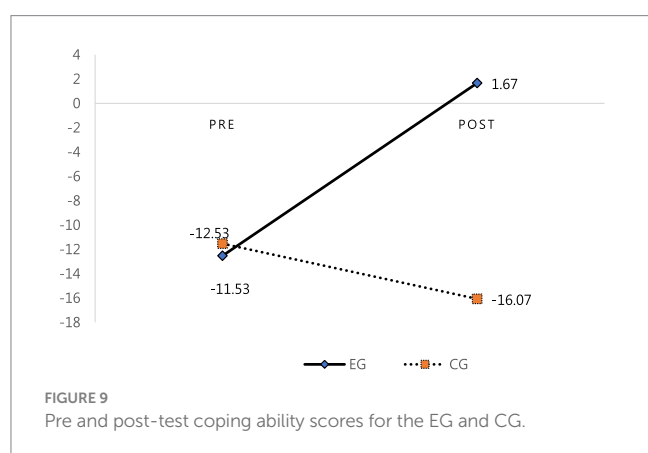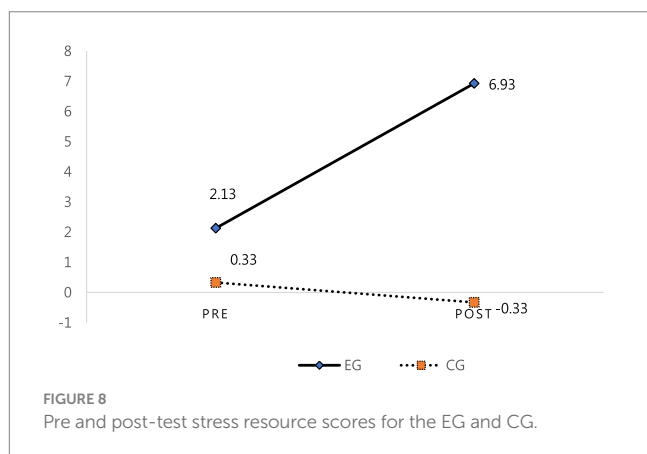
FIGURE 8
Pre and post-test stress resource scores for the EG and CG.

FIGURE 9
Pre and post-test coping ability scores for the EG and CG.

Data availability statement

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

References

Bowlby, J. (1973). *Attachment and loss, volume II: separation: anxiety and anger*. London: Hogarth.

Burns, R. D. (1991). Study and stress among first year overseas students in an Australian university. *Higher Educ. Res. Develop.* 10, 61–77. doi: 10.1080/0729436910100106

Cho, Y. S. (2022). Effect of painting-based group art therapy on acculturative stress, self-expression, and quality of life in international students in Korea. Unpublished doctoral dissertation. Kukje Theological University and Seminary.

Cho, H. S., and Jon, T. K. (2009). Factors associated with living satisfaction of studying in Korean universities. *Instit. Soc. Sci.* 20, 193–223.

Dunne, C. (2009). Host students' perspectives of intercultural contact in an Irish university. *J. Stud. Int. Educ.* 13, 222–239. doi: 10.1177/1028315308329787

Freud, S. (1923). *The ego and the id*. London, UK: Hogarth.

Greenberg, L. S. (2017). *Emotion-focused therapy*. Washington D.C, U.S.: American Psychological Association.

Hammer, E. F. (1958). *The clinical application of projective drawings*. Springfield, IL: Charles C Thomas.

Hoang, T. L. (2021). A qualitative study on cultural adaptation stress and the adaptation to college life of Vietnamese students in Korea. Unpublished master's thesis. Gyeongin National University of Education.

Hu, B. Z. (2011). The effect of group art therapy on adopted cross cultural stress of Chinese students. Unpublished master's thesis, Wonkwang University.

Ethics statement

Author contributions

YY: Writing – original draft. KK: Writing – review & editing.

Funding

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.

Hwang, M. H. (2017). A study on the married women immigrants bilingual use in the multicultural era. *Assoc. North East Asian Cult.* 1, 79–96. doi: 10.17949/jneac.1.50.201703.005

Hwang, R. H. (2019). A study on everyday life information seeking behavior of international students based on individual characteristics and acculturation types. Unpublished master's thesis. Chungnam National University.

Ju, D. B., and Kim, H. H. (2017). The influence of foreigner student's cultural adjustment stress on university life adjustment in Korea. *Korean Compar. Educ. Soc.* 23, 123–145.

Jue, J. H. (2019). The person-in-the-rain drawing test as an assessment of soldiers' Army life adjustment and resilience. *Psychology* 10, 1418–1434. doi: 10.4236/psych.2019.1011093

Kim, K. H. (2007). *A study on the ideal man in the philosophy of Confucianism*. Chung-Buk, Korea: Korea National University of Education.

Kim, S. N. (2007). A study on communication strategies for enhancing Chinese students' college adaptation to Korean universities. *J. Polit. Sci. Commun.* 10, 185–206.

Kim, Y. K. (2010). A study on the influence factors of college student's adjustment - focused on comparing poor students and general students in college. Unpublished master's thesis. Chungnam National University.

Kim, H. J., Sherman, D. V., and Taylor, S. E. (2008). Culture and social support. *Am. Psychol.* 63, 518–526. doi: 10.1037/0003-066X

Korean Education Statistics Service (2022). Higher education, international students in Korea. Available at: https://kess.kedi.re.kr/index

Koung, S. Y., and Jang, S. M. (2010). The effect of acculturative stress on depression and drinking problems among Chinese students in Korea. *Mental Health Soc. Work* 34, 399–421.

Lack, H. (1996). The person-in-the-rain projective drawing as a measure of children's coping capacity: A concurrent validity study using Rorschach, psychiatric, and life history variables. Unpublished Doctoral dissertation. The California School of Professional Psychology.

Lee, M. O. (2008). Drawing person-in the rain (PITR). In Proceedings of the 75th continuing education. Korean art therapy association.

Li, M.-H., and Han, K.-A. (2019). A Phenomenological study on group art therapy experiences for self-understanding among Chinese students studying in South Korea. *Korean J. Arts Ther.* 26, 967–990. doi: 10.35594/kata.2019.26.5.009

Luo, J. (2022). A qualitative study on study abroad motivation and cultural adaptation of Chinese students in Korea. Unpublished master's thesis. Kyung Hee University.

Malchiodi, C. A. (2005). *Expressive Therapies: History, Theory, and Practice*. New York and London: The Guilford Press.

Maslow, A. H. (1970). *Motivation and personality. 3rd* Edn. New York, NY: Addison-Wesley Longman.

Park, J. Y. (2020). The effect of group art therapy on the improvement of resilience in adolescents [Unpublished master's thesis]. Ewha Womans University, 137–166

Park, E. M., Hwang, B. G., and Jung, T. Y. (2010). Relationship between college life stress and school adjustment for Chinese international undergraduates in South Korea: moderating effects of some variables. *J. Korean Soc. Stress Med.* 18, 145–152.

Park, W. J., and Lee, S. M. (2016). A study on the effects of sociodrama to reduce acculturative stress among Chinese students in Korea: focusing on non-verbal characteristics of sociodrama. *Korean J. Youth Stud.* 23, 99–124. doi: 10.21509/KJYS.2016.08.23.8.99

Rubin, J. A. (2011). *The art of art therapy*. New YorK: Brunner-Routledge.

Sovic, S. (2008). Coping with stress: the perspective of international students. *Art Des. Commun. High. Educ.* 6, 145–158. doi: 10.1386/adch.6.3.145_1

Tseng, W. S. (2004). Special section: cultural issues in mental health services and treatment. Culture and psychotherapy: Asian perspectives. *J. Ment. Health* 13, 151–161. doi: 10.1080/09638230410001669282

Wadeson, H. (1987). *The dynamics of art psychotherapy*. New York, NY: John Wiley & Son.

Walton, S. J. (1990). Stress management training for overseas effectiveness. *Int. J. Intercult. Relat.* 14, 507–527. doi: 10.1016/0147-1767(90)90033-S

Werkman, S. L. (1980). "Adjustment of Americans after living abroad" in *Uprooting and development: Dilemmas of coping with modernization*. eds. G. V. Coelho and P. I. Ahmed (New York: Plenum Press), 223–247.

Xu, Y. H. (2021). A study on language competences, learning stress, and social network factors affecting Chinese international students' adaptation to university life focusing on the moderating effect of social support. Unpublished doctoral dissertation. Silla University.

Yalom, I. D. (1995). *The theory and practice of group psychotherapy*. (4th ed.). New York: Basic Books.

Yang, H. (2022). A study on the role of public diplomacy for sustainable sino-south Korean relations. Unpublished doctoral dissertation. Soongsil University.

Yin, Y. (2023). The effect of group art therapy on acculturative and academic stress of Chinese graduate students in South Korea. Unpublished doctoral dissertation. Jeonju University, 14

Yoo, C. W. (2011). Character strengths, and acculturation and adjustment to college among international students in Korea. Unpublished master's thesis. Korea University.

Zhao, L. F. (2016). Relationship between acculturative stress and depression in a sample of Chinese students residing in Korea: The mediating effect of ego defense mechanism. Unpublished master's thesis. Konkuk University.

The relationship between acculturative stress and psychological outcomes in international students: a systematic review and meta-analysis

Rasa Soufi Amlashi*, Mohammadreza Majzoobi and
Simon Forstmeier

Developmental Psychology and Clinical Psychology of the Lifespan, University of Siegen, Siegen,
Germany

Introduction: The current systematic review aimed to examine the relationship between acculturative stress (AS) and psychological outcomes in international students to determine the role AS may play in predicting the mental health of international students.

Methods: The studies included in the current systematic review and meta-analysis had considered AS and its impact on psychological outcomes among international students studying abroad. After checking the studies found in our primary search through the scientific databases in terms of our eligibility criteria, 29 studies were included, of which 26 were eligible for a meta-analysis (total $N = 7{,}247$).

Results: Meta-analysis indicated a moderate mean correlation of AS with psychological outcomes like depression, life satisfaction, quality of life, vocational outcome expectations, drinking behaviors, resilience, health promotion behavior, psychological adjustment, psychological distress, negative affect, and mental health symptoms ($r = 0.39$) and depression ($r = 0.41$), respectively.

Discussion: The review of studies revealed a robust relationship between AS and increased negative psychological outcomes such as depression, psychological distress, and general stress, as well as decreased positive psychological outcomes such as psychological adjustment, mental health, life satisfaction, and quality of life.

Introduction

Thanks to the advancement of technology in today's world and the ease of moving from one country to another, it has become common for people to live in a country other than their home country. One of the groups facing this most is students. Today, it is clearly seen that a significant number of people move abroad to pursue a university education. Statistics show that in 2017, 5.3 million students traveled to a country other than their home country to continue their education, more than half of whom were studying in six countries: the United States, the United Kingdom, Australia, France, Germany and Russia (Bustamante,

2020). Moreover, in 2019 alone the number of foreign students entering the United States to study was about 1,095,299, which is 5.5% of all American university students (Bustamante, 2020). This figure for Germany (Learn German, 2020) increased significantly from 301,350 in 2013 to 394,665 in 2019. This statistic for Australia also increased from 465,508 in 2015 to 738,107 in 2019 (Study in Australia, 2019). Having better job opportunities and different experiences and being familiar with other professors' views in more developed countries are the main motivations for people to continue their studies in another country. However, Zhou et al. (2008) stated that one of the most important challenges for students studying abroad is facing a new culture, and other studies have also shown that the most important challenge for students studying abroad is to face the new culture (Yeh and Inose, 2003; Zhou et al., 2008; Luo, 2014).

Culture in general refers to a set of ways of life of a people or a nation based on social, political and economic customs and especially refers to the unique system of national beliefs and morals of human beings (Okonta, 2020). Entering a new culture can contribute to the development of psychological problems such as depression (Bernstein et al., 2011), anxiety (Suarez-Morales and Lopez, 2009), and bulimia nervosa (Kroon Van Diest et al., 2014). Adapting to different conditions in the destination country, managing the leading problems in this new culture and finding a different balance from what was experienced in the country of origin have created a new construct in this area called acculturation (Gholamrezaei, 1995). Various studies have shown a relationship between successful acculturation and self-esteem (Gholamrezaei, 1995), better mental well-being and less depression (Miller et al., 2011; Geeraert et al., 2014; Hirai et al., 2015; Toth-Bos et al., 2020). In contrast, unsuccessful acculturation has negative consequences on individuals' psychological and social/cultural adjustment (Searle and Ward, 1990). Acculturation, whether successful or unsuccessful, is considered as an important challenge that is inevitably associated with stress. This has led to the formation of a construct called acculturative stress (AS), which is the stress of facing those life events that stem from the experience of acculturation (Berry, 2006).

The models of acculturative stress

One of the most prominent and original models in the field of acculturation is Berry's (2006) AS model. According to this model, the differences between the host society and the individual's local society, as well as the requirements of the new culture in which the individual intends to live, are a crucial challenge for immigrants. If a person evaluates this challenge as a serious crisis and doubts his ability to manage it, he may experience AS, and the longer this stress lasts, the more mental resources a person needs to deal with, and in an erosive process, it leads to the creation of psychological disorders such as anxiety, depression, and psychosomatic disorders. Finally, the model states that if a person has a successful socio-cultural adaptation to his host society in a long-term process, he will also experience a suitable psychological adaptation.

The models represented regarding the acculturation stress are usually classified in three categories of psychopathology, stress and coping, and culture learning/social skills (Ward, 2008). Comparing these models, Ward (2008) argued that Berry's model, by focusing on three elements of cultural learning, stress, and coping offers a more positive and adaptive approach compared to earlier

perspectives like Oberg's (1960) culture shock theory, which highlighted emotional distress, shock, and anxiety in the acculturation process. Ward posits that Berry's model is beneficial for two reasons: first, any change in life, whether positive or negative, induces stress and triggers coping strategies; and second, the use of coping styles may either be beneficial, leading to adaptive outcomes, or unsatisfactory, resulting in maladaptive and pathological consequences.

However, Ward (1996) contends that in addition to psychological adaptation, sociocultural adaptation, specifically social skills, should also be considered. Although these two types of adaptation may interact, they also have distinct differences. Psychological adaptation is defined based on concepts such as psychological well-being and satisfaction, viewed within the framework of stress and coping styles, and is significantly influenced by personality, social support, and life changes. In contrast, sociocultural adaptation, which is defined by variables such as skill deficits and social difficulties and viewed from a cultural learning perspective, is generally influenced by factors such as the length of residence in the host society, prior experiences of intercultural relocation, and the extent of interaction with the host culture (Ward, 1996). In other words, culture learning/social skills emphasize behavioral skills (social inadequacies) instead of affective and health outcomes (psychological inadequacies), stating that international students face difficulties because of trouble negotiating everyday social situations, learning second culture and using social skills.

The final stage in Berry's (2006) AS model refers to the adaptation to the host society over time. In other words, the adaptation process is a time-consuming process, and in the middle of this process, people may suffer from the psychological consequences of AS. It is obvious that people can tolerate an optimal level of stress and when this stress becomes a long-term process, it may result in negative psychological consequences. Therefore, the theory underlying this review article assumes that people are thought to be vulnerable to psychological disorders during the acculturation process from the point they experience AS until they reach a relatively complete adaptation to the host culture. We assume that "time" is a very decisive factor in the acculturation process, and the length of time people live in the host society plays a highly determinative role in their mental health. We speculate that the process of acculturation, like other stressful processes, can be described as an inverted U curve. In other words, in the first years of the process of acculturation, people experience a high level of stress, and as time passes and they approach the point of relative adaptation, their stress returns to the optimal level. Therefore, *time* as a variable that is placed on the horizontal axis of the inverted U diagram has a decisive role in reducing stress. According to the Selye's (1956) general adaptation syndrome (GAS) model, when the stress is higher than the optimal level, it triggers the fight-or-flight response. The prolongation of the person's resistance process in stressful situations brings him to the stage of exhaustion, in which the person is enough vulnerable to suffer from psychological disorders. Therefore, the first years of immigration may be years full of psychological damage, and time can moderate these damages. Consistent with the mentioned theory, in recent years, the relationship between AS and important psychological variables such as depression (Revollo et al., 2011; Cho et al., 2018), anxiety and homesickness (Revollo et al., 2011) have been proved.

Previous reviews and meta-analyses

There are found a number of systematic reviews and meta-analyses regarding AS and its psychological outcomes. For instance, Bridges et al. (2021) conducted a systematic review and meta-analysis in order to examine the relationship of acculturation and depression in Latinx adults. Gonzalez-Guarda et al. (2021) considered the relationship between AS and physical health consequences among Latinx individuals in the United States through conducting a systematic review. However, none of them has been conducted in international students. We found only one systematic review conducted in international students in which they examined the efficacy of the psychoeducational, cultural orientation, socio-cultural interventions in reducing AS in international students worldwide (Aljaberi et al., 2021). Therefore, there are not found any systematic review to consider the relationship between AS and psychological outcomes in international students.

The aim of this systematic review

Although there have been many studies considering the correlation of acculturation and its related stress have been conducted with the above-mentioned important psychological variables, and even systematic reviews (Alemu and Cordier, 2017; Alidu and Grunfeld, 2018; Choy et al., 2021) have been done in this area, there is a lack of an integrated and codified message on the relationship between AS and its psychological outcomes for international students. In addition, according to the importance of international students' psychological status in predicting their success in achieving their goals, the study of variables which seem to play a crucial role in predicting their mental status may have worthy implications for researchers, therapists, consolers and even authorities and policy makers working in this field. Therefore, the current systematic review and meta-analysis seeks to provide a pluralization in this regard. The first aim was to synthesize existing studies on the relationship between AS and its psychological outcomes in international students. Likewise, the second purpose was to determine the effect size of the relationship between AS and its psychological outcomes in international students.

Methods

Pre-registration of review protocol

The protocol of the systematic review and meta-analysis has been registered on the Open Science Framework (OSF) website.[1]

Search strategy

To find eligible studies to include in this systematic review and meta-analysis, we used our search query to search in scientific databases, including EBSCOhost (APA, PsycArticles, Psychology and

[1] https://osf.io/6ajcw/?view_only=e7a02547f341464f951fcb4dc23973dc

behavioral sciences collection, PSYNDEX literature with PSYNDEX tests), Proquest (Social Sciences), Wiley Online Library, PubMed, OVID, and Web of Science. Our search query was ("international student*" OR "foreign student*" OR "sojourn*") AND ("accultur*" OR "culture*") AND ("psycho*" OR "mental*" OR "self*" OR "cognit*" OR "emot*" OR "behave*" OR "health*" OR "well-being" OR "adjust*" OR "Adapt*" OR "resilience" OR "Quality" OR "social*" OR "depress*" OR "stress*" OR "anxiety" OR "lonel*" OR "symptom*" OR "drink*" OR "distress" OR "homesickness" OR "life*"). The titles of the articles found using this search query were reviewed by the first author to determine whether they met the criteria to be included in the stage of exact screening of the title and abstract. The selected articles were then reviewed by the second author and an expert in this field, and finally the articles that remained for screening the title and abstract were uploaded in Eppi-Reviewer online software, where both authors could review the existing articles based on eligible criteria. In the first stage in the above-mentioned software, the title and abstract of the articles were reviewed, and then in the second stage, the full-text of the remaining articles was evaluated based on our inclusion and exclusion criteria to determine the final articles suitable for this systematic review. To ensure the literature saturation, a manual search was performed in the references list of residual studies in the full text review phase. Flowchart of studies found through literature search and screening is presented in Figure 1.

Inclusion and exclusion criteria

We looked for studies that have generally examined the relationship between AS (and its related variables such as acculturation, cultural shock and suchlike) and one or more psychological outcomes such as depression, psychological distress, alcohol abuse, mental health symptoms, negative emotions, perceived general stress, premenstrual stress, psychological adjustment, mental health, career outcome expectation, life satisfaction, health-promoting behaviors, quality of life, resilience, a sense of coherence so on in international students. To be included in our systematic review, studies had to (1) be written in English, (2) be published between 1980 and 2020 in a peer-reviewed scientific journal, (3) be conducted on the general and healthy human community studying at a university located in a country other than the home country, (4) study individuals without cognitive impairments or some form of disability, and (5) study heterosexual individuals. Studies conducted on refugees studying in a country other than their home country were excluded. There were no restrictions on the geographical location in which the study was conducted.

Risk of bias

To estimate the risk of bias in the studies included each of these studies was considered by the first author (RA), the second author (SF) and another independent person expert in the field of inquiry. We also used the Agency for Research and Healthcare Quality Scale (AHRQ) as a tool to examine the bias of studies included. This measurement tool is compatible with various study designs (Williams et al., 2010; Taylor et al., 2015; Forrester et al., 2017; Majzoobi and Forstmeier, 2022). This tool contains 11 criteria for assessing the
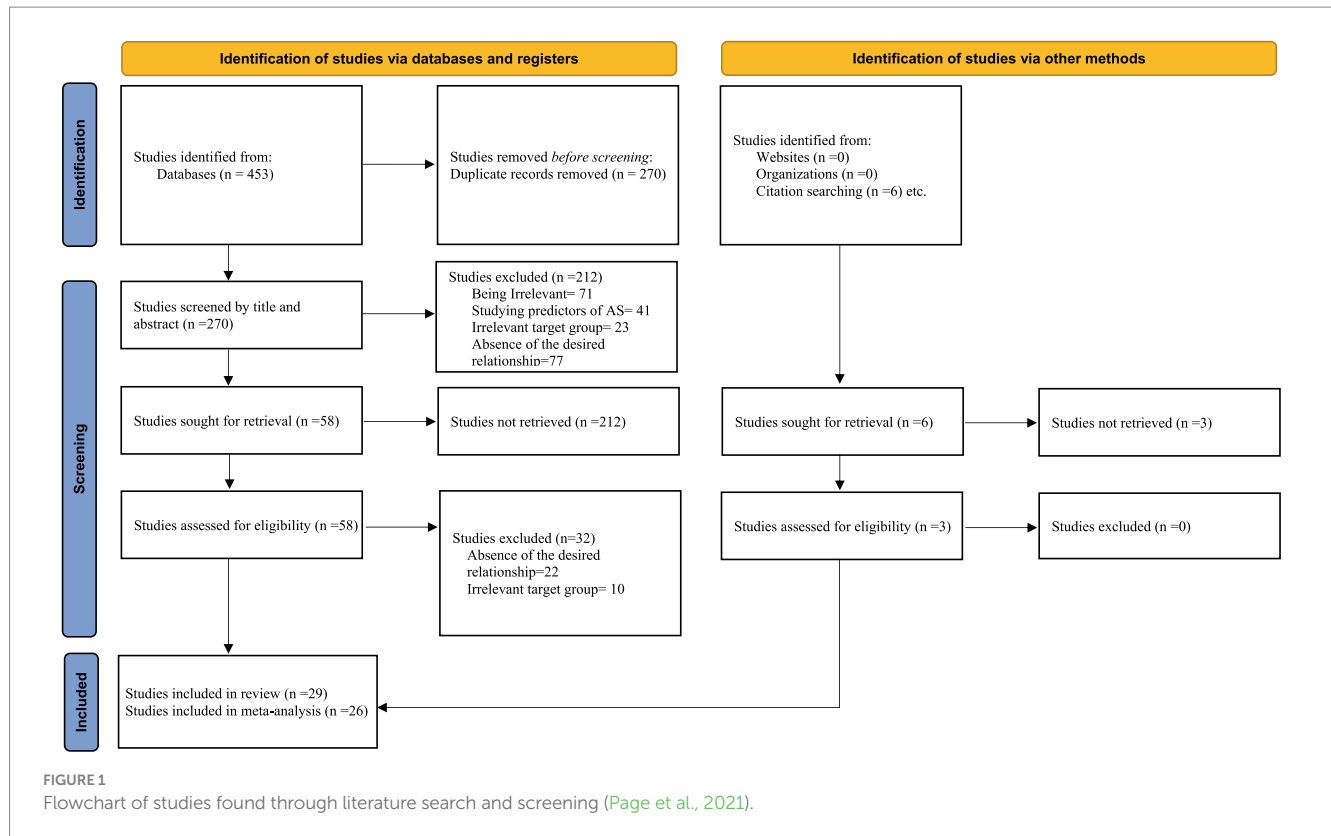
quality of studies, each of which also has several subscales, to assess important methodological factors of a study. The criteria of this scale included unbiased selection of the cohort, selection of minimized baseline differences in prognostic factors, sample size calculated to be at 5% difference, adequate description of the cohort, validated method for ascertaining exposure, validated method for ascertaining clinical outcomes, outcome assessment blind to exposure, adequate follow-up period, completeness of follow-up, analysis controls for confounding, and appropriate analytic methods. The methodology and results of the input studies are reviewed according to the above criteria to determine whether they meet these criteria. Depending on whether they "fully," "to some extent" and "not at all" meet the criteria, one of the words "No," "Yes" and "Partially" is assigned to each study for each criterion. If a study does not meet the required quality or the necessary methodological criteria mentioned in this tool, it is better to consider it as a probably biased article and exclude it from the review. Using this tool, we rated 11 criteria concerning each individual paper via "Yes," "No," "partial," or "cannot tell" terms. The results can be seen in Table 1. In addition, Figure 2 represents a visual representation of bias within and across studies.

Meta-analysis

Among the 29 studies included in this systematic review, 26 studies (total $N = 7,247$) in which the relationship between AS and a psychological outcome was studied were included in the meta-analysis. As in some included studies, the relationship between AS and more than one psychological consequence was examined, and in some studies the mentioned relationship was examined more than once.

Our meta-analysis inputs were more than 26 cases and finally reached 34 cases. It should also be noted that the variable of depression, as one of the most important psychological consequences of AS, has been studied in many studies and we were able to perform a separate meta-analysis with 13 inputs to obtain the effect size of AS on depression. Therefore, a separate meta-analysis was performed to investigate this relationship. Pearson's correlation index was used to investigate the relationship between predictor and dependent variables and this index was extracted from the included studies. Cochran's heterogeneity test, which provides both I^2 and Q indices to evaluate the homogeneity of effect sizes, was also used. The I^2 report is mainly due to the fact that this index can provide better information compared to Q when the number of studies included in the meta-analysis is relatively low. One of the important assumptions of meta-analysis is the publication bias index, according to which all studies included in the analysis should have an effect size around the mean. In the present meta-analysis, funnel diagram, Egger's regression index and Kendall's S were used to test the above assumption. It is worth mentioning that in some studies instead of Pearson's r, Beta and Eta values had been reported and as Beta was between 0.5 and −0.5, an online calculator[2] was used to convert them into Pearson's r. The online calculator has been designed based on the equation of $r = 0.98\beta + 0.05\lambda$ by Peterson and Brown (2005). Having validated the efficacy of the equation through using data gained from 200 studies, Peterson and Brown concluded that the equation has sufficient robustness, particularly when the value of r and β are in a range from

---

2 psychometrica.de

TABLE 1 Risk of bias assessment of studies included based on the Agency for Research and Healthcare Quality assessment tool (Williams et al., 2010).

Authors	Unbiased selection of cohort	Selection minimizes baseline differences in prognostic factors	Sample size calculated	Adequate description of the cohort	Validated method for ascertaining AS[a]	Validated method for ascertaining PC[b]	Outcome assessment blind to exposure	Adequate follow-up period	Minimal missing data	Analysis controls for confounding	Analytic methods appropriate
Bai (2016)	Yes	N/A	No	Yes	Yes	Partially	No	N/A	N/A	Yes	Yes
BenGhasheer and Saub (2020)	Yes	N/A	No	Yes	Yes	Yes	No	N/A	N/A	No	Yes
Bhandari (2012)	Yes	N/A	Yes	Yes	Yes	Yes	No	N/A	N/A	Yes	Yes
Chayinska and Mari (2014)	Yes	N/A	No	Yes	Yes	Yes	No	N/A	N/A	No	Yes
Cheung et al. (2020)	Yes	N/A	No	Yes	Yes	Yes	No	N/A	N/A	No	Yes
Constantine et al. (2004)	Yes	N/A	No	Yes	Yes	Yes	No	N/A	N/A	Yes	Yes
Franco et al. (2019)	Yes	N/A	No	Yes	Yes	Yes	No	N/A	N/A	Yes	Yes
Gebregergis et al. (2019)	Yes	N/A	Yes	Yes	Yes	Yes	No	N/A	N/A	Yes	Yes
Gebregergis et al. (2020)	Yes	N/A	Yes	Yes	Yes	Yes	No	N/A	N/A	Yes	Yes
Hamamura and Laird (2014)	Partially	N/A	Yes	Yes	Yes	Yes	No	N/A	N/A	No	Yes
He et al. (2012)	Yes	N/A	No	Yes	Yes	Yes	No	N/A	N/A	No	Yes
Hunt et al. (2017)	Yes	N/A	Yes	Yes	Yes	Yes	No	N/A	N/A	No	Yes
Kim and Cronley (2018)	Yes	N/A	No	Yes	Yes	Yes	No	N/A	N/A	No	Yes
Kim and Yoo (2016)	Yes	N/A	Yes	Yes	Yes	Yes	No	N/A	N/A	No	Yes
Lashari et al. (2018)	Yes	N/A	No	Partially	Yes	Yes	No	N/A	N/A	No	Yes
Lee and Im (2016)	Yes	N/A	Yes	Yes	Yes	Yes	No	N/A	N/A	No	Yes
Lee and Im (2017)	Yes	N/A	Yes	Yes	Yes	Yes	No	N/A	N/A	Yes	Yes

(Continued)

TABLE 1 (Continued)

Authors	Unbiased selection of cohort	Selection minimizes baseline differences in prognostic factors	Sample size calculated	Adequate description of the cohort	Validated method for ascertaining AS[a]	Validated method for ascertaining PC[b]	Outcome assessment blind to exposure	Adequate follow-up period	Minimal missing data	Analysis controls for confounding	Analytic methods appropriate
Lee et al. (2004)	Yes	N/A	No	Yes	Yes	Yes	No	N/A	N/A	Yes	Yes
Liu et al. (2016)	Yes	N/A	No	Yes	Yes	Yes	No	N/A	N/A	Yes	Yes
Pan et al. (2007)	Yes	Yes	Yes	Yes	Yes	Yes	No	N/A	N/A	Yes	Yes
Reynolds and Constantine (2007)	Yes	N/A	No	Yes	Yes	Yes	No	N/A	N/A	Partially	Yes
Taušová et al. (2019)	Partially	N/A	No	Yes	Yes	Yes	No	N/A	N/A	Yes	Yes
Wei et al. (2007)	Yes	N/A	No	Yes	Yes	Yes	No	N/A	N/A	Partially	Yes
Wei et al. (2012a,b)	Yes	N/A	Yes	Yes	Yes	Yes	Partially	N/A	N/A	Yes	Yes
Wei et al. (2012b)	Yes	N/A	Yes	Yes	Yes	Yes	No	N/A	N/A	No	Yes
Yakunina et al. (2013a,b)	Yes	N/A	Yes	Yes	Yes	Yes	No	N/A	N/A	No	Yes
Yakunina et al. (2013b)	Yes	N/A	No	Partially	Yes	Yes	No	N/A	N/A	No	Yes
Yang et al. (2018)	Yes	N/A	No	Yes	Yes	Yes	No	N/A	N/A	Yes	Yes
Zasiekina and Zhuravlova (2019)	No	N/A	No	Partially	Yes	Yes	No	N/A	N/A	Partially	Yes

[a]Acculturation stress.
[b]Psychological consequences.

FIGURE 2
Risk of bias assessment in terms of studies as well as criteria presented in the ARHQ assessment tool.
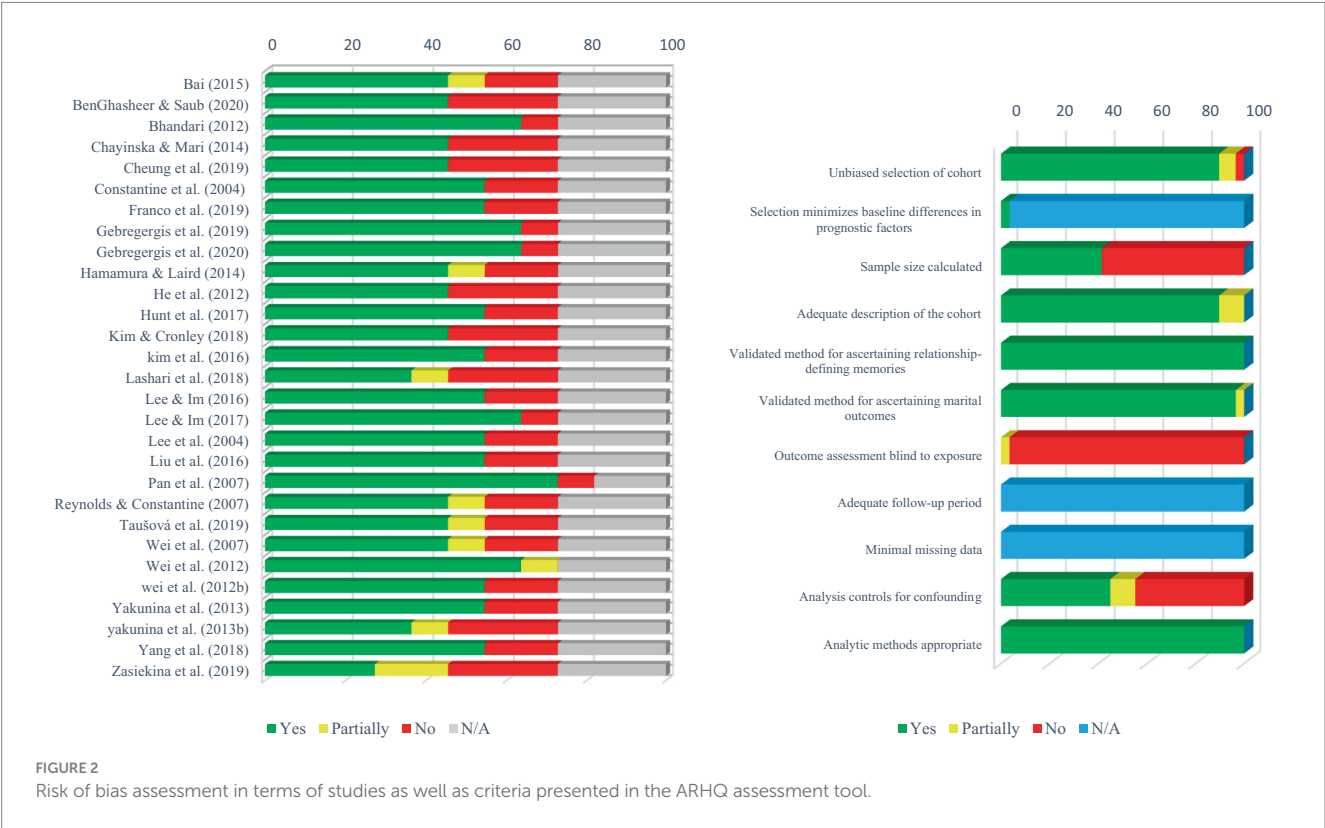
0.5 to 0.5. The value of λ equals one when β is not negative and zero when β is negative. Given that the statistical samples of studies included in this meta-analysis consisted of students from different countries with different races and religious orientations, levels of education and living conditions, we used a random model, based on the advice of Hunter and Schmidt (2004, as cited in Field and Gillett 2010) to report the overall effect size in our meta-analysis. Fixed-effects models assume that the same population value (e.g., r or d) underlies all studies, while random-effects models allow for the possibility that these population parameters vary from study to study. Fixed-effects models only consider simple sampling error, estimated by the sampling error variance formula, ignoring sampling error variance created by variation across studies in the underlying population values. In contrast, random-effects models consider both simple sampling error and the variance created by differences in population parameters across studies. Fixed-effects models tend to underestimate the sampling error variance and the standard error of the mean, leading to narrower confidence intervals. However, random-effects models provide more accurate estimates by incorporating the variability across studies (Schmidt et al., 2009). Therefore, despite the assumption of homogeneity in the current meta-analysis, using a random-effects model is preferable. Random-effects models offer a more realistic and comprehensive consideration of error sources and study differences, ensuring more accurate and reliable results. Many experts believe that there is always some variation in population parameter values across studies due to theoretical or substantive reasons. They argue that real moderator variables cause differences in r and d values between studies. However, some evidence shows that certain study areas are homogeneous at the level of population parameters (this means that population parameters stay the same when sampling error,

measurement error, and range variation are accounted for), but this homogeneity can only be detected using random-effects models, which estimate the level of variability. Fixed-effects models cannot do this because they assume homogeneity from the beginning (Schmidt et al., 2009).

Doing so allows us to more confidently generalize the effect size obtained from the meta-analysis to not only the studies included in our systematic review, but to all studies conducted in this area of research (Field and Gillett, 2010). Comprehensive Meta-Analysis (CMA-2) software was used for meta-analysis.

Results

The characteristics of the studies included in this systematic review and meta-analysis are fully described in Table 2. Accordingly, all studies included were published between 2004 and 2020. Of the total studies, 15 were conducted in the United States, four in China, two in South Korea, two in Malaysia, two in Hong Kong, and one in Italy, Australia, the Netherlands, and Ukraine. Out of the studies included, 25 had a correlational design, two were comparative studies and two had a longitudinal design. Descriptive design of most studies included has allowed us to present more consistent and integrated results. The uniformity of the design of the studies included also facilitated meta-analysis. The statistical population in these studies included international male and female students studying in a country other than their own. The lowest and highest mean ages of participants in the studies included were 19.7 to 31 years, respectively. The minimum and maximum duration of their stay in the foreign country was between 1 month and 5 years. Additional information about the characteristics of the participants can be seen in Table 2.

TABLE 2 Description of studies included.

Author, year, country	Design	Description of participants	Acculturation stress measure	Psychological outcome measure	Key outcome (effect size, if presented)
Bai (2016), USA	Correlational	Chinese international students and visiting scholars in U.S.A ($n = 267$); $M_{age} = 26$ (SD = 4.04); $M_{LOS} = 35$ M (SD = 28,09)	ASSCS (Bai, 2016)	Self-Rating Depression Scale (Zung, 1965)	AS was a significant predictor of depression ($\beta = 0.490$). AS was a significant predictor of life satisfaction ($\beta = 0.505$)
BenGhasheer and Saub (2020), Malaysia	Correlational	International students in Malaysia ($n = 312$); 111 (35.6%) females and 201 (64.4%) males; $M_{age} = 33.6$ (SD = 7.01); 119 (38.1%) Single, 191 (61.2%) Married, 2 (0.6%) Divorced/widowed; 202 (64.7%) Arabic Countries, 77 (24.67%) Asian Countries, 32, (10.2%) African Countries, 1 (0.3) USA; M_{LOS}: 76 (24.4%) 6 M–1 Y, 110 (35.3%) 1–3 Y, 126 (40.4%) >3 Y	ASSIS-36 (Sandhu and Asrabadi, 1994)	OHRQoL (Adulyanon and Sheiham, 1997)	AS was correlated with OHRQoL significantly ($r = 0.2$, $\beta = 0.205$)
Bhandari (2012), South Korea	Correlational	Nepalese international students in South Korea ($n = 130$); 103 (79.2%) Male, 27 (20.8%) Female; Age: 65 (50%) with 20–29, 53 (40.8%) with 30–39, 12 (9.2%) with 40–50; 57 (43.8%) Single, 73 (56.2%) Married; M_{LOS}: 13 (10%) <1 Y, 68 (52.3%) 1–3 Y, 34 (26.2%) 3–5 Y, 14 (10.8%) >5	ASSIS-36	MOS (SF-12) (Quality Metric I, 2010)	AS was correlated with MCS significantly ($r = -0.362$)
Chayinska and Mari (2014), Italy	Correlational	International students in Italy ($n = 144$); 96 (66.7%) females and 48 (33.3%) males; $M_{age} = 24.2$ (SD = 3.6); $M_{LOS} = 34.22$ M (SD = 26.77); 62.5% White, 18.1% Asian, 11.8% Hispanic/Latino, 2.8% Black/African, and 4.8% other; 25% European Union's (EU) countries; 38.9% other European countries; 20.8% Asian countries (7.6% of the whole sample); 11.8% American countries; 3.5% African countries	ASSIS-36	PANAS (Mackinnon et al., 1999)	The subscales of AS included POH ($r = -0.36$), Homesickness ($r = -0.34$), PIA ($r = -0.21$), Insecurity and Fear ($r = -48$), Perceived Discrimination ($r = -32$) were correlated with participant's affects
Cheung et al. (2020), Hong Kong	Correlational	Female international university students in Hong Kong ($n = 154$); $M_{age} = 21.10$ (SD = 2.13, 18–27); $M_{LOS} = 1.49$ Y (SD = 1.48)	MASI (Rodriguez et al., 2002)	PHQ-9 (Kroenke and Spitzer, 2002)	AS was correlated significantly with depression in time 1 ($r = 0.18$), time 2 ($r = 0.38$) and time 3 ($r = 0.41$)
Constantine et al. (2004), USA	Correlational	International college students in USA ($n = 320$); 190 (59.4%) women and 130 (40.6%) men; $M_{age} = 23.63$, (SD = 4.73, 17–51); 81 (25.3%) from African countries, 136 (42.5%) from Asian countries and 103 (32.2%) from Latin American countries	ASSIS-36	CES-D (Radloff, 1977)	AS was correlated significantly with depression ($r = 0.69$)
Franco et al. (2019), USA	Correlational	International university students in USA ($n = 555$); 257 (46.3%) men and 298 (53.7%) women. $M_{age} = 26.35$ (SD = 5.18, 18–50); 295 (53.2%) Asian/Pacific Islander, 138 (24.9%) White/non-Latino/a, 57 (10.3%) Latino/a, 29 (5.2%); Middle Eastern, 25 (4.5%) Black/African and 11 (2.0%) other; 419 (75.5%) single, 135 (24.3%) Married, 1 (2%) Divorced; $M_{LOS} = 3.1$ Y (SD = 2.49, 3 M–15 Y)	ASSIS-36	VOER (McWhirter and Metheny, 2009)	AS was correlated significantly with vocational outcome expectations ($r = -0.31$)
Gebregergis et al. (2019), China	Correlational	International university students in China ($n = 506$); 56% men and 44% women; $M_{age} = 27.32$; $M_{LOS} = 21$ M; 70% Single and 30% Married; 45% Asia, 41% Africa and 14% other	ASSIS-36	CES-D	AS was correlated significantly with depression ($r = 0.37$, $\beta = 0.28$)
Gebregergis et al. (2020), China	Correlational	International university students in China ($n = 506$); 284 (56%) men and 220 (44%) women; $M_{age} = 27.32$ (SD = 5.9, 17–48); $M_{LOS} = 21.7$ M (SD = 21.29, 1–120 M); 352 (70%) Single and 152 (30%) Married; 225 (45%) Asia, 203 (41%) Africa, 32 (6%) Europe, 14 (3%) Oceania, 13 (3%) Latin America, 10 (2%) North America	ASSIS-36	CES-D	AS was correlated significantly with depression ($r = 0.37$, $\beta = 0.22$)
Hamamura and Laird (2014), USA	Comparative	52 East Asian international students and 126 domestic students ($n = 178$); 28.1% men and 71.9% women; $M_{age} = 21.6$ (SD = 3.5, 18–46)	ASSIS-36	CES-D	AS predicted the level of depression among international students ($R^2 = 0.16$)

(Continued)

TABLE 2 (Continued)

Author, year, country	Design	Description of participants	Acculturation stress measure	Psychological outcome measure	Key outcome (effect size, if presented)
He et al. (2012), Australia	Correlational	International university students in Australia ($n=119$); 11 (9.2%) Men and 108 (90.8%) Women; $M_{age}=25.3$, 66 (55.4%) <24 Y, 27 (22.7%) 25–29 Y and 26 (21.9%) >30 Y; $M_{LOS}=42.9\%$ third-year, 25.2% second year, and 31.8% first-year students	ASSIS-36	SOC (Antonovsky, 1987)	AS was correlated significantly with SOC ($r=-0.408$)
Hunt et al. (2017), USA	Correlational	International university students in USA ($n=175$); 43.4% women 56% men; $M_{age}=26.9$ (SD=6.3); 42.9% China, 10.9% India, 5.1% South Korea, 2.9% Vietnam, 2.1% Brazil, 1.7% Iran, 33.4% other	ASSIS-36	BYAACQ (Kahler et al., 2005)	AS was not correlated with alcohol use ($r=-0.12$) and was correlated significantly with negative alcohol-related consequences ($r=0.20$)
Kim and Cronley (2018), USA	Correlational	International university students in USA ($n=322$); 143 (44.4%) women, 179 (55.6%) men; Age=223 (69.3%) 18–25 Y, 73 (22.7%) 26–30 Y, 18 (5.6) 31–35 Y, 8 (2.5%) 36–40 Y; 275 (85.4%) never married and 59 (18.2%) other; 121 (37.6%) India, 76 (23.6%) China, 50 (15.5%) South Korea, 20 (6.2%) Taiwan and 55 (17.1%) other; $M_{LOS}=115$ (35.7%) <6 M, 60 (18.6%) 6 M–1 Y, 53 (16.5%) 1 Y–2 Y, 94 (29.2%) >2 Y	ILS (Yang and Clum, 1995)	MTF (Johnston et al., 2014)	AS was correlated significantly with resilience ($\beta=0.321$, $p<0.001$) and mental health ($\beta=0.594$, $p<0.001$), and was not correlated with Binge Drinking ($\beta=0.321$, $p=092$)
Kim and Yoo (2016), South Korea	Correlational	Chinese international students in South Korea ($n=272$); 180 (66.2%) women and 92 (33.8%) men; Age=8 (2.9%) <21 Y, 88 (32.4%) 22–24 Y and 112 (41.2%) 25–27 Y, 50 (18.4%) 28–30 Y and 14 (5.1%) >31 Y; $M_{LOS}=26$ (9.6%) 6–12 M, 108 (39.7%) 13–36 M, 85 (31.3%) 37–60 M, 53 (19.5%) >61 M	ASSIS 20 (Yang et al., 2007)	MHPLP (Seo, 1996)	AS was correlated significantly with health promotion behavior ($r=-0.29$, $\beta=-0.15$)
Lashari et al. (2018), Malaysia	Correlational	International university students in Malaysia ($n=200$); 55% men and 45% women; $M_{age}=30$ (SD=7.07, 22–45)	ASSIS-36	SACQ (Baker and Siryk, 1989)	AS was correlated significantly with Psychological adjustment ($R^2=0.08$, $\beta=-0.16$)
Lee and Im (2016), USA	Longitudinal causal-comparative	Korean international students and Korean domestic students in USA ($n=187$); $M_{age}=26.15$ (4.22), 64 (65.3%) single, 11 (11.2%) Married, 1 (1%) Divorced/separated/no longer partnered and 22 (22.4%) Partnered; M_{LOS} <60 M	ASSIS-36	PHQ-9; MDQ (Moos, 2010)	AS was correlated significantly with depressive symptoms ($\beta=0.07$) and PMS ($r=0.48$)
Lee and Im (2017), USA	Longitudinal causal-comparative	Korean international students and Korean domestic students in USA ($n=187$), $M_{age}=26.15$ (4.22); 64 (65.3%) single; M_{LOS} <60 M	ASSIS-36	MDQ	AS was correlated significantly with PMS ($\beta=0.35$)
Lee et al. (2004), USA	Correlational	Korean international students in USA ($n=74$); $M_{age}=30$ (19–41 Y), 52 (70%) men and 22 (30%) women; $M_{LOS}=31$ M, 34% <1 Y, two-thirds <3 Y; 37 (50%) Single, 35 (47.3%) Married and 2 (2.7%) divorced or widowed	ILS	BSI (Derogatis and Melisartos, 1983)	AS was correlated significantly with psychological distress ($r=0.56$)
Liu et al. (2016), China	Correlational	International university students in China ($n=567$), (40.7%) women, (59.3%) men; (40.4%) from Africa, (43.84%) from Asia and less than 20% from Europe, North or South America and Oceania, 90% unmarried; $M_{LOS}=14.45$ months	ASSIS-36	CES-D	AS was correlated significantly with depression ($r=0.46$)
Pan et al. (2007), Hong Kong	Comparative	Chinese international students in Australia and Hong Kong ($n=627$, 400 Hong Kong & 227 Australia); Hong Kong: 200 (50%) women, 200 (50%) men, Age=72 (18%) <23 Y, 269 (76.3%) 24–30 Y and 59 (14.8%) >30 Y; 299 (74.8%) single, 97 (24.3%) Married, 4 (1%) other; $M_{LOS}=155$ (38.8%) <0.5 Y, 27 (6.8%) 0.5–1 Y, 79 (19.8%) 1–2 Y, 72 (18%) 2–3 Y, 67 (16.8%) >3 Y; Australia: 152 (57%) women, 75 (33%) men; Age=143 (63%) <23 Y, 78 (34.34%) 24–30 Y and 6 (2.6%) >30 Y; 210 (92.5%) single, 13 (5.7%) Married, 4 (1.8%) other; $M_{LOS}=43$ (18.9%) <0.5 Y, 28 (12.3%) 0.5–1 Y, 47 (20.7%) 1–2 Y, 40 (17.6%) 2–3 Y, 69 (30.4%) >3 Y.	ASSCS (Pan et al., 2007)	CAS (Hamid and Cheng, 1996)	AS was correlated significantly with negative affect in Chinese international students in Australia ($r=0.366$) and Hong Kong ($r=0.443$)

(Continued)

TABLE 2 (Continued)

Author, year, country	Design	Description of participants	Acculturation stress measure	Psychological outcome measure	Key outcome (effect size, if presented)
Reynolds and Constantine (2007), USA	Correlational	International university students in USA ($n = 261$), 136 (52.1%) women, 125 (47.9%) men; $M_{age} = 19.7$ (SD = 1.74, 18–25 Y); 48 (18.4%) from Africa, 98 (37.5%) from Asia and 115 (44.1%) from Latin America	CADC (Sodowsky and Lai, 1997)	CAS_1 (O'Brien, 1992)	Acculturative distress was significantly negatively predictive of college students' career outcome expectations ($\eta^2 = 0.02$)
Taušová et al. (2019), Netherlands	Correlational	International university students in Netherlands ($n = 319$), 162 women, 157 men; $M_{age} = 24.51$ (SD = 3.57, 17–37 Y); $M_{LOS} = 18.49$ M (SD = 13.93)	ASSIS-36	BSI; SWLS (Diener et al., 1985)	AS was correlated significantly with mental health symptoms (anxiety, depression, and somatization), ($r = 0.46$) and satisfaction with life ($r = -0.41$)
Wei et al. (2007), USA	Correlational	Chinese international students from China and Taiwan ($n = 189$), 96 (51%) women, 92 (49%) men; $M_{age} = 27.97$ (SD = 4.65); 135 (71.4%) from China, 43 (22.8%) from Taiwan and 11 (5.8) not available, $M_{LOS} = 2.86$ Y (SD = 1.98), (38%) single, (48%) married, 1 (1%) Divorced/separated/no longer partnered and (10%) in a dating relationship	ASSIS-36	CES-D	AS was correlated significantly with depression ($r = 0.60$)
Wei et al. (2012a,b), USA	Correlational	Chinese international students in USA ($n = 188$), 94 (51%) women, 92 (49%) men; $M_{age} = 26.6$ (SD = 4.4, 18–39 Y); 166 (88%) from China/Hong Kong, 21 (11%) from Taiwan, $M_{LOS} = 2.6$ Y (SD = 2), Two thirds married or dating, one third single	ASSIS-36	HSC (Green et al., 1988)	AS was correlated significantly with psychological distress ($r = 0.50$)
Wei et al. (2012b), USA	Correlational	International students in USA ($n = 143$), (52%) women, (47%) men; $M_{age} = 28.03$ (SD = 4.44, 22–42 Y); (69%) from China, (13%) from Taiwan, (18%) South Korea, $M_{LOS} = 2.96$ Y (SD = 2.38)	ASSIS-36	PSS (Cohen et al., 1983); OQ (Lambert et al., 2005)	AS was correlated significantly with psychological distress ($r = 0.44$) and perceived general stress ($r = 0.40$)
Yakunina et al. (2013a,b), USA	Correlational	International students in USA ($n = 336$), 169 (51%) women, 165 (49%) men; $M_{age} = 25.1$ (SD = 4.78, 18–46 Y); 219 (65%) from Asia, 45 (13%) from South and Central America, 38 (11%) from Europe, 19 (6%) from the Middle East, 7 (2%) from Africa, 5 (1.5%) from North America, 2 (0.6%) from the Caribbean, 1 (0.1%) from Australia and Oceania, $M_{LOS} = 30.6$ (SD = 22.44, 1–120 M)	ASSIS-36	SOS-10 (Blais et al., 1999)	AS was correlated significantly with psychological adjustment ($r = -0.44$)
Yakunina et al. (2013b), USA	Correlational	International students in USA ($n = 386$), (52%) women, (48%) men; $M_{age} = 24$ (SD = 4, 18–43 Y); (59%) from Asia, (16%) Europe and the former Union of Soviet Socialist Republics, (11%) Middle East, (8%) Latin America, (4%) North America, (2%) Australia, (0.2%) Africa (0.2%)	ASSIS-36	SOS-10	AS was correlated significantly with psychological adjustment ($r = -0.40$)
Yang et al. (2018), China	Correlational	International students in China ($n = 299$), 156 (52.17%) women, 143 (47.83%) men; $M_{age} = 21.87$ (SD = 3.23, 16–45 Y); 184 (61.54%) from Asia, 22 (7.36%) from Africa, 66 (22.07%) from Europe, 27 (9.03%) other; $M_{LOS} = 113$ (37.79%) <6 M, 41 (13.71%) 7–12 M, 62 (20.74%) 13–18 M, 83 (27.76%) >19 M; 220 (73.58%) single, 79 (26.42%) un single	ASSS-28 (Yu et al., 2014)	BSI	AS was correlated significantly with mental health symptoms (Somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism) ($r = 0.458$)
Zasiekina and Zhuravlova (2019), Ukraine	Correlational	African international students (Nigeria, Ghana, Zimbabwe, Namibia, Senegal) ($n = 41$), 12 (29%) female, 29 (71%) male; $M_{age} = 25.14$ (SD = 2.6 Y)	ASSIS-36	Procrastination Scale (Lay, 1986)	Acculturative stress was not a significant predictor of depression ($\beta = -0.07$)

AS, Acculturative Stress; ASSCS, Acculturative Stress Scale for Chinese Students; ASSIS-36, Acculturative Stress Scale for International Students; ASSS-28, Acculturative Stress Scale for Students; BSI, Brief Symptom Inventory; BYAACQ, The Brief Young Adult Alcohol Consequences Questionnaire; CADC, Cultural Adjustment Difficulties Checklist; CAS, The Chinese Affect Scale; CAS1, Career Aspiration Scale; CES-D, Center for Epidemiologic Studies-Depression Scale; HSC, Hopkins Symptom Checklist (Psychological Distress); ILS, Index of Life Stress; MASI, Multidimensional Acculturative Stress Inventory; MCS, Mental Health Component Summary; MDQ, Menstrual Distress Questionnaire; MHPLP, Modified Version of the Health Promotion Lifestyle Profile; MOS (SF-12), Medical Outcomes Study Short Forms; MTF, Monitoring the Future Survey; OHRQo, Oral Health-Related Quality Of Life; OQ, Outcome Questionnaire 10.2 (five items of this scale were used to measure psychological distress); PANAS, Positive and Negative Affect Scale; PHQ-9, Patient Health Questionnaire Depression Module; PIA, Perceived Intergroup Animosity; PMS, Premenstrual Symptoms; POH, Perceived Out-Group Hostility; PSS, Perceived Stress Scale-Short form; SACQ, Student Adaptation to College Questionnaire; SOC, Sense of Coherence; SOS-10, 10-item Schwartz Outcome Scale; SWLS, Satisfaction with Life Scale; VOER, Vocational Outcome Expectations Revised.

Risk of bias assessment

Table 1 provides a complete description of the bias assessment of the studies included. The results reported in this table are obtained from examining the characteristics of the studies included based on the criteria presented in the ARHQ scale. Besides, in Figure 2, the degree of bias of each study based on ARHQ is shown graphically. The first graph in Figure 2 shows the degree of bias of each study, and the second graph shows the results of the overall quality score of the studies included for each of the 11 criteria in the ARHQ. Based on the evaluation, it seems that most of the criteria in ARHQ have been met in the studies. However, the criterion of "Outcome assessment blind to exposure" has not been done in most studies, which can reduce the quality of studies to some extent and increase the type I error in some way. In addition, the two criteria of "sample size calculation" and "analysis controls for confounding" have been observed in almost only half of the studies, which may increase the type II error and type I error, respectively. The absence of accurate sample size calculation, lack of analysis controls for confounding variables, and failure to conduct outcome assessment using a person blind to exposure significantly impact the overall quality and credibility of the studies. These shortcomings indicate reduced generalizability, diminished confidence in results, and compromised interpretability and inference. In studies focusing on complex subjects like humans, the consequences of research are significant. This is because research involving humans requires careful attention to controlling factors that could introduce errors in interpretation and subsequent generalizations. Since humans are the subject of these studies and researchers aim to apply findings to other humans, failure to adhere to these controlling factors can lead to confirming incorrect hypotheses and spreading inaccurate information. Therefore, not following these factors can maintain biases and spread inaccurate information about humans.

To ensure adherence to these standards, authors should prioritize thorough planning and consultation with methodological experts and employ rigorous peer review processes. Additionally, ongoing education and training for researchers on best practices in study design and analysis can further enhance the quality and credibility of research outcomes. One approach to ensure adherence to all principles outlined in the study quality control tool is to conduct all studies through a proposal writing process. In this process, proposals undergo rigorous peer review, and upon meeting all outlined criteria, approval for study execution is granted. The three limitations highlighted above can be subject to specific scrutiny during the review process. By adopting this method, researchers can ensure that studies are meticulously planned and executed, thereby enhancing their quality and credibility. Additionally, this approach promotes transparency and accountability in research practices, ultimately contributing to the advancement of knowledge in the field.

Additional information on the degree of bias of each study can be found in Table 1 and Figure 2.

Measures used in the included studies

All studies included had used valid and standardized questionnaires in the country of study to evaluate the variables. Regarding the variable of AS, most of the studies included, i.e., 21 studies out of 29, have used the ASSIS 36 questionnaire (Sandhu and Asrabadi, 1994) to measure this variable. In other studies, similar questionnaires were usually used to measure the variable of AS. In addition, one of the psychological consequences measured as a dependent variable in the studies included is depression, which in most studies was measured using the CES-D questionnaire (Radloff, 1977). Table 2 lists the names of the questionnaires used in the studies included to measure AS and its psychological consequences.

The relationship between AS and psychological outcomes

A review of studies on the relationship between AS and its consequences in international students showed that AS has a significant relationship with an increase in significant negative psychological consequences such as depression, psychological distress, etc., as well as a decrease in positive psychological consequences such as psychological adjustment, mental health and so on as described in detail below.

The increase of negative psychological consequences

According to the studies included, it seems that the most important negative psychological consequence in international students is depression. Thus, most of the studies included in which the aforementioned relationship was examined showed that there is a significant positive relationship between AS and depression in international students and the correlation coefficient between these two variables ranged from 0.18 to 0.69 (Constantine et al., 2004; Wei et al., 2007; Hamamura and Laird, 2014; Bai, 2016; Liu et al., 2016; Gebregergis et al., 2019, 2020; Cheung et al., 2020). Only one study showed that this relationship is not significant (Zasiekina and Zhuravlova, 2019). Moreover, the relationship between depression, as one of the subscales of mental health syndrome, and AS was examined in two other studies, the results of which indicated a significant positive relationship between them (Kilstoff and Baker, 2006; Yang et al., 2018; Taušová et al., 2019). Therefore, it seems that the higher the AS in international students, the more likely they are to develop depression, one of the most likely negative psychological consequences.

Another common consequence of AS in international students is psychological distress. The correlation between these two variables was examined in three studies included and the correlation coefficient between these two variables ranged from 0.40 to 0.56 (Lee et al., 2004; Wei et al., 2012a,b). Therefore, it can be said that second to depression, psychological distress can also be a negative psychological consequence of AS. Other negative psychological consequences of AS in international students include alcohol abuse (Hunt et al., 2017; Kim and Cronley, 2018), mental health symptoms (Yang et al., 2018; Taušová et al., 2019), negative emotions (Pan et al., 2007), perceived general stress (He et al., 2012), and premenstrual stress (Lee and Im, 2016, 2017).

The decrease of positive psychological consequences

In addition to increasing the negative psychological consequences, AS in international students can also show its negative effects by reducing the positive psychological consequences. Looking at the studies included, it is possible to conclude that the most common
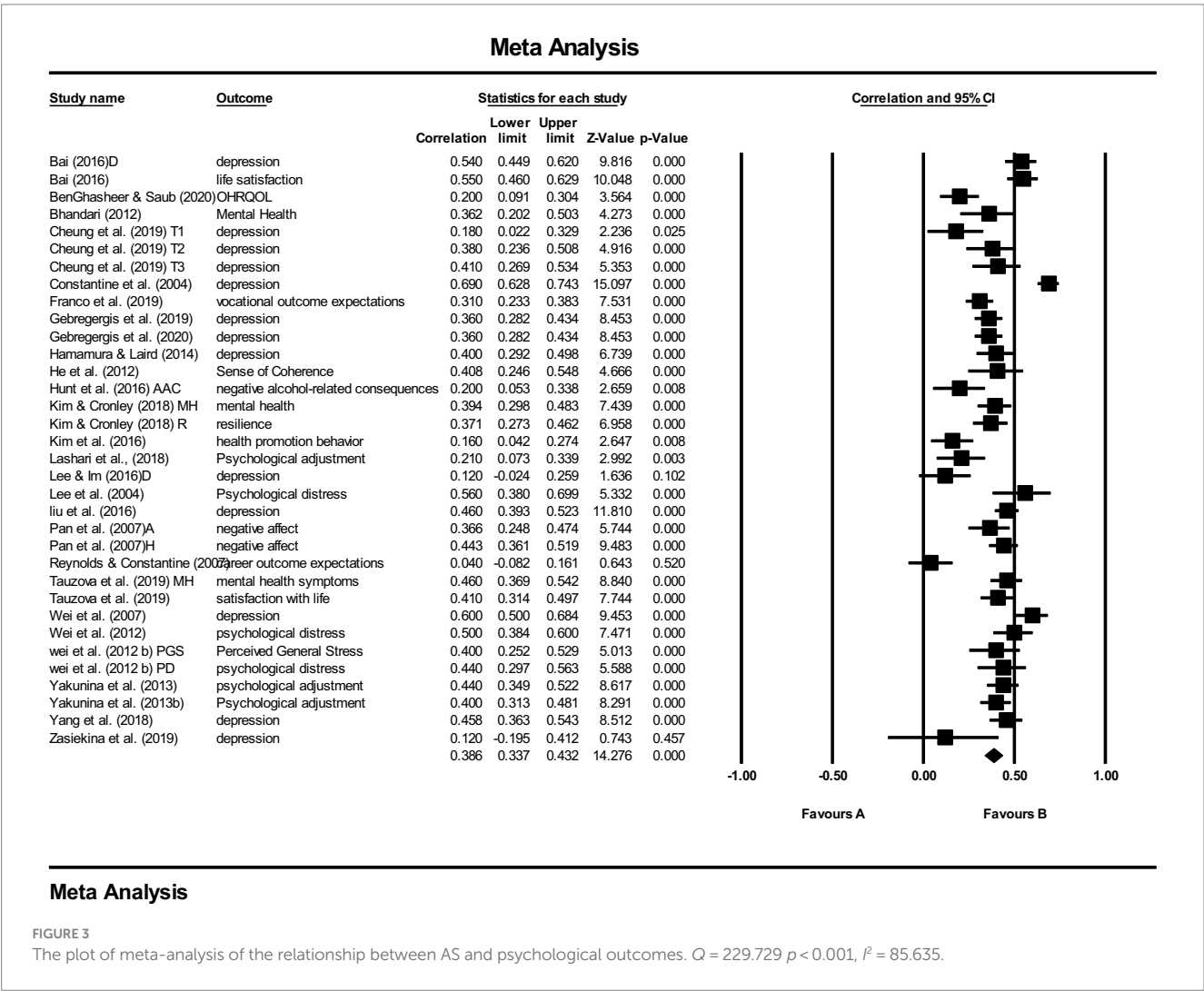
psychological consequences of AS are the decrease of the psychological adjustment (Yakunina et al., 2013a,b; Lashari et al., 2018) and mental health (Bhandari, 2012; Kim and Cronley, 2018) in international students. Therefore, it seems that the higher the AS in international students, the lower the psychological adjustment and their mental health is the most likely psychological consequence. In addition, based on the rest of the studies, it can be stated that AS can negatively associated with the career outcome expectation (Reynolds and Constantine, 2007; Franco et al., 2019), life satisfaction (Bai, 2016; Taušová et al., 2019), health promotion behaviors (Kim and Yoo, 2016), quality of life (BenGhasheer and Saub, 2020), resilience (Kim and Cronley, 2018), and sense of coherence (He et al., 2012) in international students.

Meta-analysis

Two separate meta-analyses were performed to examine (1) the relationship between AS and psychological consequences and (2) the relationship between AS and depression. The results of the first meta-analysis showed that the mean effect size for the relationship between AS and psychological outcomes (like depression, life satisfaction, quality of life, vocational outcome expectations, drinking behaviors, resilience, health promotion behavior, psychological adjustment, psychological distress, negative affect, and mental health symptoms) was $r = 0.39$ (see Figure 3). The results of the second meta-analysis also showed that the effect size for the relationship between AS and depression was $r = 0.41$ (see Figure 4). Both mentioned effect sizes fall into the moderate effect category, according to the Cohen's (1988) classification, which indicates the very important role of AS in predicting the psychological consequences of international students, one of the most important of which is depression.

In addition, Q and I^2 tests were used to examine the heterogeneity of effect sizes. The value of Q was significant for all studies equal to 229,729, with a degree of freedom of 35 for the relationship between AS and psychological consequences ($p < 0.001$), which indicates the heterogeneity of effect sizes. Also, the I^2 value for the above relationship was 85.635. A Q value of 109,568, with a degree of freedom of 12, showed also a significant relationship between AS and depression, indicating a heterogeneity of effect sizes. Also, the amount of I^2 for the above relationship was 89.048. The value of Q at 109.568 was significant for the relationship between AS and depression for the freedom degree 12, indicating the heterogeneity of effect sizes.

Meta Analysis

Study name	Outcome	Statistics for each study					Correlation and 95% CI
		Correlation	Lower limit	Upper limit	Z-Value	p-Value	
Bai (2016)D	depression	0.540	0.449	0.620	9.816	0.000	
Bai (2016)	life satisfaction	0.550	0.460	0.629	10.048	0.000	
BenGhasheer & Saub (2020)	OHRQOL	0.200	0.091	0.304	3.564	0.000	
Bhandari (2012)	Mental Health	0.362	0.202	0.503	4.273	0.000	
Cheung et al. (2019) T1	depression	0.180	0.022	0.329	2.236	0.025	
Cheung et al. (2019) T2	depression	0.380	0.236	0.508	4.916	0.000	
Cheung et al. (2019) T3	depression	0.410	0.269	0.534	5.353	0.000	
Constantine et al. (2004)	depression	0.690	0.628	0.743	15.097	0.000	
Franco et al. (2019)	vocational outcome expectations	0.310	0.233	0.383	7.531	0.000	
Gebregergis et al. (2019)	depression	0.360	0.282	0.434	8.453	0.000	
Gebregergis et al. (2020)	depression	0.360	0.282	0.434	8.453	0.000	
Hamamura & Laird (2014)	depression	0.400	0.292	0.498	6.739	0.000	
He et al. (2012)	Sense of Coherence	0.408	0.246	0.548	4.666	0.000	
Hunt et al. (2016) AAC	negative alcohol-related consequences	0.200	0.053	0.338	2.659	0.008	
Kim & Cronley (2018) MH	mental health	0.394	0.298	0.483	7.439	0.000	
Kim & Cronley (2018) R	resilience	0.371	0.273	0.462	6.958	0.000	
Kim et al. (2016)	health promotion behavior	0.160	0.042	0.274	2.647	0.008	
Lashari et al., (2018)	Psychological adjustment	0.210	0.073	0.339	2.992	0.003	
Lee & Im (2016)D	depression	0.120	-0.024	0.259	1.636	0.102	
Lee et al. (2004)	Psychological distress	0.560	0.380	0.699	5.332	0.000	
liu et al. (2016)	depression	0.460	0.393	0.523	11.810	0.000	
Pan et al. (2007)A	negative affect	0.366	0.248	0.474	5.744	0.000	
Pan et al. (2007)H	negative affect	0.443	0.361	0.519	9.483	0.000	
Reynolds & Constantine (2007)	career outcome expectations	0.040	-0.082	0.161	0.643	0.520	
Tauzova et al. (2019) MH	mental health symptoms	0.460	0.369	0.542	8.840	0.000	
Tauzova et al. (2019)	satisfaction with life	0.410	0.314	0.497	7.744	0.000	
Wei et al. (2007)	depression	0.600	0.500	0.684	9.453	0.000	
Wei et al. (2012)	psychological distress	0.500	0.384	0.600	7.471	0.000	
wei et al. (2012 b) PGS	Perceived General Stress	0.400	0.252	0.529	5.013	0.000	
wei et al. (2012 b) PD	psychological distress	0.440	0.297	0.563	5.588	0.000	
Yakunina et al. (2013)	psychological adjustment	0.440	0.349	0.522	8.617	0.000	
Yakunina et al. (2013b)	Psychological adjustment	0.400	0.313	0.481	8.291	0.000	
Yang et al. (2018)	depression	0.458	0.363	0.543	8.512	0.000	
Zasiekina et al. (2019)	depression	0.120	-0.195	0.412	0.743	0.457	
		0.386	0.337	0.432	14.276	0.000	

Meta Analysis

FIGURE 3
The plot of meta-analysis of the relationship between AS and psychological outcomes. $Q = 229.729$ $p < 0.001$, $I^2 = 85.635$.

FIGURE 4
The plot of meta-analysis of the relationship between AS and depression. $Q = 109.568$ $p < 0.001$, $I^2 = 89.048$.

The funnel diagram in Figure 5 shows the extent of publication bias in studies included in the meta-analysis. As can be clearly seen in Figure 5, the studies included in this meta-analysis have formed a symmetric distribution on both sides of the effect size line. There are almost no studies on either side of the effect size line that are extremely far from this line, and most studies are located around this line and inside the drawn triangle. The Kendall's tau value was −0.041, which was not significant in both 1-tailed ($p = 0.366$) and 2-tailed ($p = 0.733$) statuses. Egger's test was also used to check the symmetry of the funnel diagram. Egger's regression intercept value was −0.89, which were not significant in 1-tailed ($p = 0.315$) and 2-tailed ($p = 0.630$) statuses. According to the two indicators above, it seems that there is no publication bias in the studies included.

Discussion

This systematic review including two meta-analyses was conducted to investigate the relationship between AS and psychological consequences in international students. The consideration of the studies included illustrated that AS is one of the effective variables in predicting the increase in important negative psychological consequences such as depression, psychological distress, alcohol abuse, mental health symptoms, negative emotions, perceived general stress, premenstrual stress, and prediction of reducing important psychological outcomes such as psychological adjustment, mental health, career outcome expectation, life satisfaction, health-promoting behaviors, quality of life, resilience and a sense of coherence. These findings were also confirmed in the meta-analyses performed in that it was found that AS was associated with psychological consequences ($r = 0.38$), and with depression in international students ($r = 0.41$).

In interpreting the findings of this systematic review and meta-analysis that the AS in college students is related to their psychological outcomes, and the significant effect size obtained, especially for depression, we can refer again to Berry's (2006) AS model. According to this model, the stage after experiencing stressors, in which a person evaluates the amount of stress ahead and his mental sources to deal with this stress, is the stage of experiencing stress. Therefore, it can be said that people who do not have sufficient mental sources to deal with the AS, in the gap between experiencing stress and reaching relative adaptation, suffer from an erosive stress that reduces their mental energy and prepares the ground for suffering from psychological disorders. The interesting point to note is that the variables mentioned this AS model also include anxiety, depression, and psychosomatic disorders, which are also clearly visible in our findings. To the extent that depression was found to be the most frequent psychological outcome in our systematic review, a separate meta-analysis was performed for it, which demonstrated a significant effect size.

Given that in some studies included the relationship between AS and psychological consequences has been studied as a structural model, in addition to explanations based on models and conceptual theories in this field of inquiry, the role of these mediating variables in the relationship can be also briefly reviewed. Some studies have also pointed out important factors that can control the negative effects of AS, which have also been reviewed.

How AS results in undesirable psychological consequences

Anxiety

He et al. (2012) stated that international students entering a foreign country face challenges such as language skills, adapting to a

FIGURE 5
The funnel plot of standard error for assessment of the publication bias of studies included.
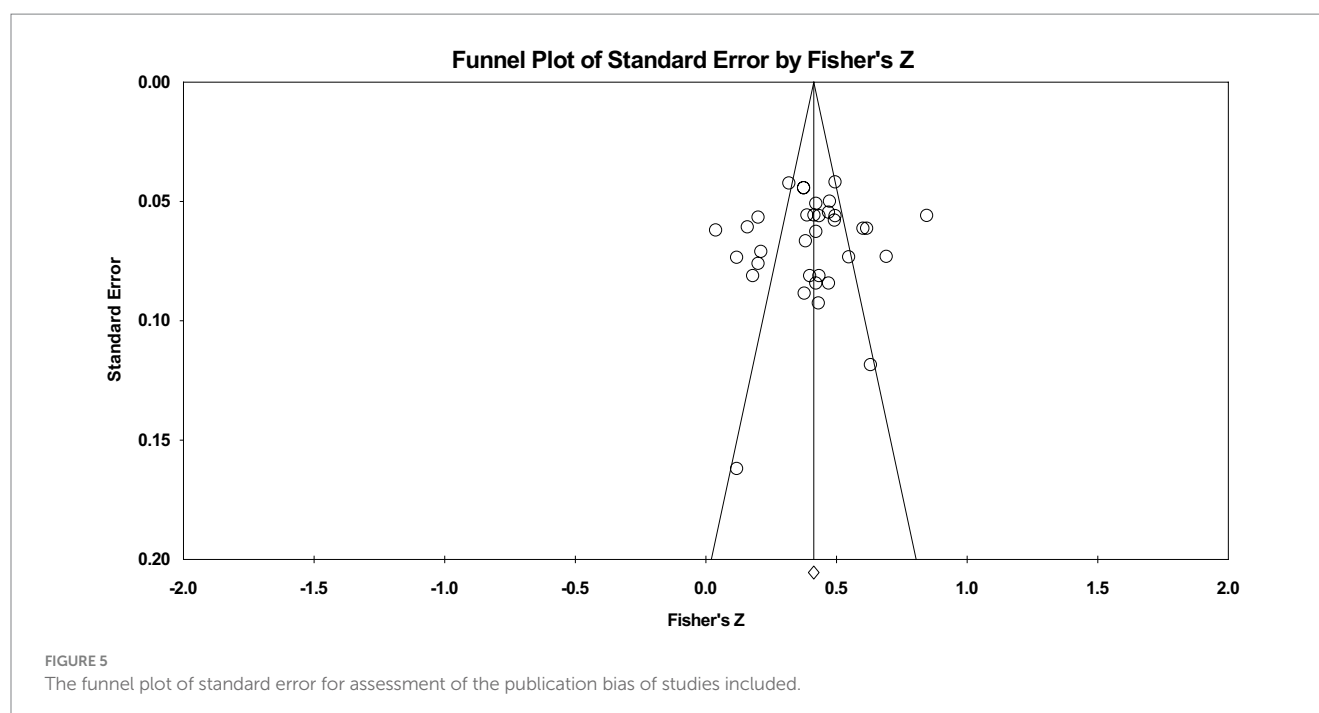
new education system, and adjusting to life (such as finding a place to live and a part-time job for financial support) experience high levels of anxiety. Although this type of anxiety will decrease in the coming years, students will still be involved in stressful challenges such as finding a new curriculum, and deciding on future plans. Perceived anxiety in students is not limited to this extent and sometimes causes international students to stay away from the community. In this way, these students procrastinate their presence in international gatherings. In this regard, Zasiekina and Zhuravlova (2019) believe that one of the reasons for procrastination, which can have devastating effects on the process of acculturation of students, is the fear of negative evaluation. In this way, students procrastinate the performance of academic tasks and interaction with students and people of the host culture for fear of being negatively evaluated, which can deprive them of the space they need to reduce AS and prevent the reduction of AS in them, which in turn paves the way for negative psychological consequences.

As explained in Berry's (2006) model, when faced with a new culture and at the beginning of the acculturation process, individuals compare the upcoming stress and their psychological sources. At this stage, if they assess their sources as sufficient to cope with the AS, they will be less likely to experience anxiety, and if they assess their sources as insufficient, they will experience a high level of anxiety. In other words, the comparison of the upcoming task and the available psychological resources determines the level of individuals' anxiety. Experiencing a high level of anxiety can accelerate the process of people's psychological exhaustion and make them more vulnerable to other psychological disorders. Therefore, the two factors of anxiety as well as the duration of the anxiety (the time factor mentioned earlier) can be the most important predictors of other psychological consequences, one of the most important of which seems to be depression. In this systematic review, depression has been found as a consequence with a moderate effect size.

Depression

When exposed to AS, international students may be reluctant to share their experiences with their peers for fear of embarrassment, as these experiences may indicate their individual failure. In addition, these students may avoid talking to friends or family about their experiences when they return home, as they do not want to burden others with their problems. As a result, carrying these distressing emotions may make these students more vulnerable to depression. International students, on the other hand, usually have outstanding academic performance in their home country and expect to continue to perform well in the host country. But because of a new environment, a different language, and new cultural norms, these students may not be able to maintain the previous quality of their academic performance. The presence of such conditions can contribute to the experience of feeling depressed in these students (Wei et al., 2007).

Alcohol abuse

Due to the presence of anxiety and symptoms of depression and psychological distress, students may use non-constructive ways to alleviate their experienced stress, including alcohol use (e.g., Hunt et al., 2017). One of the variables that can play a mediating role in the relationship between AS and psychological consequences is students' unhealthy behaviors. In a way, during this period, students have problems in terms of nutrition and high-risk behaviors such as smoking and alcohol use that can reduce their quality of life (BenGhasheer and Saub, 2020). Hunt et al. (2017) suggested that international students may use alcohol as a way to cope with AS that leads to more risky behaviors. Although it makes sense to assume that increased alcohol use is likely to increase the consequences of alcohol use, negative ways of coping with AS in students, even when their alcohol use is low, may lead to more risky behaviors. The above can also be confirmed based on Berry (1997), as he has stated that the likelihood of negative consequences of alcohol use can be increased in response to AS and may indicate that the tendency to use alcohol is

one of the coping mechanisms in response to the experience of high levels of stress. Particularly, one the vulnerable populations is international students who do not have access to appropriate internal and external adaptive resources (such as social support, a sense of belonging, etc.). These people may turn to maladaptive patterns of stress reduction, such as alcohol use.

Factors influencing the destructive effects of AS

Although all international students are likely to experience AS, the amount of stress experienced varies based on a number of factors, the most important of which are emotional intelligence, cultural intelligence, social support and language skills. It is worth to be mentioned that there were a number of different variables in the studies included in the current meta-analysis, mentioned as the mediator variables which can buffer the negative effects of AS on international students, among which above-mentioned variables were bolded. Although the frequency of studies in which the above-mentioned variables were examined as a mediator variable between AS and a psychological outcome were not high enough to be included as a mediator variable in the meta-analysis, they were worth enough to be discussed here.

Emotional intelligence

People with high emotional intelligence have the ability to regulate their emotions when interacting with others, as well as using their emotions to enhance their psychological adjustment in a different cultural context. They also have a high level of understanding emotions, which enables them to distinguish between the natural flow of emotions and the incorrect expression of emotions. This high understanding of emotions also enables them to be aware of how situation and culture affect the expression of emotions and to be able to understand the emotional aspects of a situation that may be a source of misunderstanding and miscommunication. On the other hand, people with high emotional intelligence have a sensitive and in-depth view of the cultural aspects of expressing emotions, which enables them to effectively modify and reconstruct their emotional patterns in order to perform better in interaction with people from different cultures. Understanding emotions correctly deciphers the underlying causes of individuals' emotional manifestations, thus facilitating the management of their own and others' emotions. Cognitive flexibility of people with high emotional intelligence enables them to properly manage irrelevant and potentially interfering responses and reduce conflicts. Therefore, understanding emotions and managing them, by providing emotional flexibility in the network of intercultural interactions of international students, play a very important role in the process of acculturation and promote their intercultural compatibility (Gebregergis et al., 2020).

Cultural intelligence

Following Berry's (2003) AS model and Ang and Van Dyne's (2008) cultural intelligence model, international students who are aware of the cultural issues of a society before entering that society are more likely to experience less AS. Berry (2003) states that the psychological resources that individuals bring to the field of acculturation will play a very decisive role in their psychological acculturation. Ang and Van Dyne's (2008) defined cultural intelligence as a mental ability that enables individuals to control and become aware of their own cognitive processes in the face of people from a different culture. Cultural intelligence also enables individuals to critically and consciously modify factors in their culture to better adapt to the host culture. In addition, the ability of these individuals to gain full knowledge and understanding of the cultural practices of the host community enables them to achieve a better cultural understanding that organizes and guides them towards better social interaction in that host culture.

Cultural intelligence helps people in three ways, namely cognitive, motivational and behavioral cultural intelligence. People with high cognitive cultural intelligence perform better in the host culture and form dynamic relationships with people from different cultures. The motivational cultural intelligence of international students makes them eager to acquire important cultural information and learn from students of different cultures. Motivational cultural intelligence also protects individuals by encouraging them to participate in various intercultural experiences of the individual's internal motivations as a source of personal satisfaction, their external motivations as a source of objective benefits, and their self-efficacy as an opportunity to demonstrate their potentials and capacities. Behavioral cultural intelligence, on the other hand, helps individuals to display appropriate verbal and nonverbal behaviors during their socio-cultural interaction with individuals from different cultural contexts (Ang and Van Dyne, 2008). In fact, behavioral cultural intelligence is the most important aspect of cultural intelligence because it enables people to achieve a sense of control and regulate social behaviors, with the least amount of misunderstanding and attributional problems, in a multicultural context (Gebregergis et al., 2019). In this regard, Yakunina et al. (2013a,b) stated that the universal-diverse orientation of international students is closely related to intercultural experiences and openness to cultural differences that can reduce the mental experience of AS. In addition, students with high scores in diverse global orientations are usually better able to discuss the conflicts of cultural values that occur between indigenous and host cultures. This will reduce the stress of students' AS and increase their positive intercultural compatibility.

Social support

Difficulty in regulating emotions can cause people who experience high levels of AS to begin to distance themselves from those around them in the host country, especially because interacting with these individuals may result in different types of AS (such as language restrictions, value clashes across culture, role changes, and discrimination) in them. For international students, people from the host culture, whether other international students or natives of that culture, can provide good support in finding job opportunities, recognizing cultural differences in the workplace, writing a resume, as well as psychological problems. Each of these reasons is sufficient to explain why social support is important in the host culture in creating positive psychological consequences for international students (Franco et al., 2019).

Language skills

Language skills seem to be one of the most important aspects of adapting to a new culture. Thus, relying on the same language speaking friends for social and emotional support may reinforce students' feelings of shame and inadequacy in dealing with issues that

arise in their second language context. Such a lack of language skills and self-confidence may create a negative cycle that prevents international students from seeking academic and social support from people with a host culture. Thus, in the face of academic homework, these students experience more stress in writing an article or presenting an article in the language of the host culture, which in turn increases their feelings of inadequacy, shame, and inferiority (Hamamura and Laird, 2014). Students who think they have poor language skills are less likely to collaborate with intercultural and general counseling groups. Thus, these people think that these advisory groups have little role in guiding and supporting them in regulating the disturbed emotions caused by AS. Hence, they usually rely on themselves and use their willpower to overcome problems. Logically, as a result, these people may experience more stress, which makes them more vulnerable to psychological problems.

Strengths, limitations and recommendations for future research

The current systematic review possesses several notable strengths, among which the following can be highlighted: (1) Prior to conducting this systematic review, a protocol was prepared and registered in the OSF database. (2) The introduction of this review describes the existing models in the field and elucidated the necessity of their implementation. (3) The search for sources was extensive, encompassing all reputable databases in the field, increasing the likelihood of capturing relevant studies. (4) The inclusion criteria were clearly articulated and based on specific keywords and concepts related to acculturative stress and psychological outcomes in international students. (5) The quality and bias of all included studies were assessed using a validated tool. (6) A meta-analysis was performed on the included studies, providing a clear effect size for the relationship between acculturation stress and psychological outcomes. (7) The discussion extensively delved into interpreting the relationship between AS and psychological outcomes and also addressed the mediating variables in this domain.

When interpreting the results, various limitations must be considered. (1) One of the important issues in this systematic review was that all the studies included in this study had a descriptive design and, in our searches, there were no intervention studies that could be included in this review, why we only express its conclusion about the "relationship" of AS with psychological outputs but it cannot speak of "effect" or "effectiveness." (2) Another very important issue in this regard is the use of self-report tools in all studies included. In other words, all this information has been collected through questionnaires and in none of the studies, qualitative or mixed information has been provided in order to examine students' narratives about AS and its psychological consequences for them. (3) The process of converting Beta and Eta values to Pearson's r using an online calculator may introduce potential errors or uncertainties in the effect size estimation. (4) The diverse demographic characteristics of the included studies' participants, such as different countries, races, and educational backgrounds, may limit the generalizability of the findings to a broader international student population. (5) As mentioned in the results of bias assessments, the absence of accurate sample size calculation, lack of analysis controls for confounding variables, and failure to conduct outcome assessment using a person

blind to exposure significantly impact the overall quality and credibility of the studies. These shortcomings reduce generalizability and compromise interpretability and inference.

Given the considerable body of descriptive studies and the conducted systematic reviews and meta-analyses in the field, it is proposed that future studies move beyond and advance towards the design of multivariable structural models. These models can shed light on predictive and outcome variables of AS at the same time within a comprehensive framework. Specifically, it needs to be clarified which variables, such as attachment styles, personality traits, early maladaptive schemas, among others, could serve as stronger predictors for AS, and simultaneously, which variables could be outcomes of AS when AS is positioned as a mediating variable. Furthermore, when AS is considered as a predictor variable in the model, which variables such as self-esteem, social support, stress coping styles, emotion regulation styles, and others, could mediate the relationship between AS and important psychological outcomes like depression, distress and psychological symptoms. Limited studies in this area make it difficult to investigate the role of mediating variables in meta-analyses. It is also advisable for researchers to explore the effectiveness of various psychological interventions on reducing AS among international students to determine which therapeutic interventions are most effective in this area. Conducting structural models and interventional studies in this field of inquiry paves the way for more systematic reviews and meta-analyses, which in turn provide valuable summaries for researchers and therapists working in this field.

Clinical and practical implications

Several clinical and practical implications of the study result relevant to mental health professionals, educators, policymakers, and other stakeholders working with international students can be suggested. First, *time* is a major factor between experiencing stress and reaching the adaptation stage. Therefore, it is recommended that special implementation programs be considered for this time gap in international students. It seems that implementing psychological training, creating social support, and teaching useful coping styles along with intergroup contact to international students based on Berry's (2006) AS model can reduce this harmful gap for students and prevent the acculturation process from becoming an erosive process, which in turn reduces psychological damage.

Second, one treatment method based on new ways to reduce health risk behaviors in international students is to increase their resilience. Preventive strategies focusing on resilience not only seek to reduce the negative consequences, but also to improve the positive aspects that highlight a particular source of support in a particular population. Improving the strengths of individuals in a particular class not only increases self-efficacy and self-adequacy, but also fosters the investment process of these supportive factors in creating positive environmental change. Thus, intervention-based and resilience-focused preventive strategies might not only reduce behaviors such as alcohol use among young people, but also create a wave of health-promoting behaviors on student campuses, where peer influence is an important trigger for high-risk behaviors (Kim and Cronley, 2018). Therefore, decision-makers in the field of international students are advised to have pre-determined intervention packages for working

with international students so that they can familiarize these students with this concept, its implications and consequences at the beginning of their arrival, and take steps to reduce the negative effects of these conditions on students. In line with this goal, examining the effectiveness of different therapies on reducing AS can also have valuable achievements.

Third, as one of the aspects of sociocultural adaptation in the Berry and Sam (1997) model included the intergroup contact, conducting group interventions by host countries for international students is likely to have positive effects on reducing their acculturation stress. To the extent that Berry and Sam suggested, gaining cultural knowledge, social skills, and language proficiency in the host culture, along with interpersonal and intergroup contacts, can help individuals achieve better adaptation to their new environment. According to the Berry's model, the most effective acculturation style that will also be associated with lower acculturation stress is the integration, in which immigrants are encouraged to maintain their culture of origin while simultaneously establishing social connections with various ethnocultural groups to enhance intergroup harmony, social cohesion and well-being (Berry et al., 2022).

Following Ward (2008) who believes the application of cultural learning/social skills approach is essential for explaining, predicting, and managing acculturation-related issues, authorities in universities are recommended that topics such as host country culture education for international students, social skills training through workshops, and the establishment of task forces at universities to carry out these activities and prepare students for life in the host culture can significantly aid in their adaptation to the host country's conditions.

In this regard, Canada, one the pioneers in the policy of multiculturalism (Berry, 2013), has launched a program called the *Youth Perspectives Survey* to identify ways to promote positive intergroup contact (Kaufmann, 2021). It seems that, based on the experiences of Canada and England, developing intergroup contact protocols for international students can have a positive impact on reducing their acculturation stress. In this protocol, elements such as cultural education (raising awareness of differences and cultural histories among groups for better environmental understanding), social activities (encouraging participation in various intergroup social groups and activities to strengthen intergroup contact), cultural counseling (providing cultural counseling services by specialized counselors to improve the psychological well-being and adaptation of international students), joint cultural events (organizing cultural events), communication skills training (enhancing communication and interaction skills for interacting with different groups), assessment and follow-up (conducting evaluations of educational courses and counseling services to determine their effectiveness and implementing appropriate changes), networking (encouraging the creation of communication

networks with students from different countries for sharing experiences and enhancing intergroup contact), stress management (establishing stress and coping management programs) can be included. To confirm the effectiveness of intergroup contact, Ye (2006) has also clearly demonstrated that students who participated in online interindividual interactions perceived less discrimination, experienced fewer negative emotions, and, overall, had lower acculturation stress.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

RS: Writing – original draft, Visualization, Software, Resources, Methodology, Investigation, Formal analysis, Conceptualization. MM: Writing – review & editing, Writing – original draft, Visualization, Software, Resources, Methodology, Formal analysis, Conceptualization. SF: Writing – review & editing, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Conceptualization.

Funding

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

*References marked with an asterisk are studies included in meta-analysis

Alemu, A. M., and Cordier, J. (2017). Factors influencing international student satisfaction in Korean universities. *Int. J. Educ. Dev.* 57, 54–64. doi: 10.1016/j.ijedudev.2017.08.006

Alidu, L., and Grunfeld, E. A. (2018). A systematic review of acculturation, obesity and health behaviours among migrants to high-income countries. *Psychol. Health* 33, 724–745. doi: 10.1080/08870446.2017.1398327

Aljaberi, M. A., Alsalahi, A., Juni, M. H., Noman, S., Al-Tammemi, A. B., and Hamat, R. A. (2021). Efficacy of interventional programs in reducing acculturative stress

and enhancing adjustment of international students to the new host educational environment: a systematic review and meta-analysis. *Int. J. Environ. Res. Public Health* 18:7765. doi: 10.3390/ijerph18157765

Ang, S., and Van Dyne, L. (2008). Conceptualization of cultural intelligence: definition, distinctiveness, and nomological network. In S. Ang and DyneL. Van (Eds.), *Handbook of cultural intelligence: theory, measurement, and applications.* 3–15. M. E. Sharpe.

*Bai, J. (2016). Development and validation of the Acculturative Stress Scale for Chinese College Students in the United States (ASSCS). *Psychol. Assess.*, 28, 443–447. doi: 10.1037/pas0000198

*BenGhasheer, H., and Saub, R. (2020). Relationships of acculturative stress, perceived stress, and social support with oral health-related quality of life among international students in Malaysia: a structural equation modelling. *J. Int. Soc. Prev. Community Dent.*, 10, 520–529. doi: 10.4103/jispcd.JISPCD_192_20

Bernstein, K. S., Park, S. Y., Shin, J., Cho, S., and Park, Y. (2011). Acculturation, discrimination and depressive symptoms among Korean immigrants in New York City. *Community Ment. Health J.* 47, 24–34. doi: 10.1007/s10597-009-9261-0

Berry, J. W. (1997). Immigration, acculturation, and adaptation. *Appl. Psychol.* 46, 5–34. doi: 10.1111/J.1464-0597.1997.TB01087.X

Berry, J. W. (2003). "Conceptual approaches to acculturation" in *Acculturation: advances in theory, measurement and applied research*. eds. K. Chun, P. Balls-Organista and G. Marin (American Psychological Association), 17–37.

Berry, J. W. (2006). "Acculturative stress" in *Handbook of multicultural perspectives on stress and coping*. eds. P. T. P. WongLilian and C. J. Wong (Springer), 287–298.

Berry, J. W. (2013). Research on multiculturalism in Canada. *Int. J. Intercult. Relat.* 37, 663–675. doi: 10.1016/j.ijintrel.2013.09.005

Berry, J. W., Lepshokova, Z.Collaboration, M, and Grigoryev, D. (2022). How shall we all live together? Meta-analytical review of the mutual intercultural relations in plural societies project. *Appl. Psychol.* 71, 1014–1041. doi: 10.1111/apps.12332

Berry, J. W., and Sam, D. L. (1997). "Acculturation and adaptation" in *Handbook of cross-cultural psychology: social behavior and applications*. eds. J. W. Berry, M. H. Segall and C. Kagitcibasi (Needham Heights, MA: Allyn & Bacon), 291–326.

*Bhandari, P. (2012). Stress and health related quality of life of Nepalese students studying in South Korea: a cross sectional study. *Health Qual. Life Outcomes*, 10. doi: 10.1186/1477-7525-10-26:26

Bridges, A. J., Ledesma, R. J., Guzman, L. E., Berman, I. S., and Diaz Benitez, D. E. (2021). A systematic review and meta-analysis of the relation between acculturation and depression in Latinx adults. *J. Latinx Psychol.* 9, 232–257. doi: 10.1037/lat0000189

Bustamante, J. B. (2020). *International student enrollment statistics*. Available at: https://educationdata.org/international-student-enrollment-statistics

*Chayinska, M., and Mari, S. (2014). Paying attention to international students in Italy: the role of acculturative stress in the affective evaluations of cross-cultural transition. *Psicol. Soc.*, 9, 177–201. doi: 10.1482/77475

*Cheung, R. Y. M., Bhowmik, M. K., and Hue, M. T. (2020). Why does acculturative stress elevate depressive symptoms? A longitudinal study with emotion regulation as a mediator. *J. Couns. Psychol.*, 67, 645–652. doi: 10.1037/cou0000412

Cho, Y. J., Jang, Y., Ko, J. E., Lee, S. H., and Moon, S. K. (2018). Acculturation, acculturative stress, and depressive symptoms in international migrants: a study with Vietnamese women in South Korea. *J. Immigr. Minor. Health* 20, 1103–1108. doi: 10.1007/s10903-017-0661-x

Choy, B., Arunachalam, K., S, G., Taylor, M., and Lee, A. (2021). Systematic review: acculturation strategies and their impact on the mental health of migrant populations. *Public Health Pract.* 2:100069. doi: 10.1016/j.puhip.2020.100069

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. 2nd Edn: Routledge.

*Constantine, M. G., Okazaki, S., and Utsey, S. O. (2004). Self-concealment, social self-efficacy, acculturative stress, and depression in African, Asian, and Latin American international college students. *Am. J. Orthopsychiatry*, 74, 230–241. doi: 10.1037/0002-9432.74.3.230

Field, A. P., and Gillett, R. (2010). How to do a meta-analysis. *Br. J. Math. Stat. Psychol.* 63, 665–694. doi: 10.1348/000711010X502733

Forrester, R. L., Slater, H., Jomar, K., Mitzman, S., and Taylor, P. J. (2017). Self-esteem and non-suicidal self-injury in adulthood: a systematic review. *J. Affect. Disord.* 221, 172–183. doi: 10.1016/j.jad.2017.06.027

*Franco, M., Hsiao, Y. S., Gnilka, P. B., and Ashby, J. S. (2019). Acculturative stress, social support, and career outcome expectations among international students. *Int. J. Educ. Vocat. Guid.*, 19, 275–291. doi: 10.1007/s10775-018-9380-7

*Gebregergis, W. T., Huang, F., and Hong, J. (2019). Cultural intelligence, age and prior travel experience as predictors of acculturative stress and depression among international students studying in China. *J. Int. Stud.*, 9, 511–534. doi: 10.32674/jis.v9i2.964

Gebregergis, W. T., Huang, F., and Hong, J. (2020). The* impact of emotional intelligence on depression among international students studying in China: the mediating effect of acculturative stress. *Int. J. Intercult. Relat.* 79, 82–93. doi: 10.1016/j.ijintrel.2020.08.008

Geeraert, N., Demoulin, S., and Demes, K. A. (2014). Choose your (international) contacts wisely: a multilevel analysis on the impact of intergroup contact while living abroad. *Int. J. Intercult. Relat.* 38, 86–96. doi: 10.1016/j.ijintrel.2013.08.001

Gholamrezaei, A. (1995). *Acculturation and self-esteem as predictors of acculturative stress among international students at the University of Wollongong*: University of Wollongong.

Gonzalez-Guarda, R. M., Stafford, A. M., Nagy, G. A., Befus, D. R., and Conklin, J. L. (2021). A systematic review of physical health consequences and acculturation stress among Latinx individuals in the United States. *Biol. Res. Nurs.* 23, 362–374. doi: 10.1177/1099800420968889

*Hamamura, T., and Laird, P. G. (2014). The effect of perfectionism and acculturative stress on levels of depression experienced by east Asian international students. *J. Multicult. Couns. Dev.*, 42, 205–217. doi: 10.1002/j.2161-1912.2014.00055.x

*He, F. X., Lopez, V., and Leigh, M. C. (2012). Perceived acculturative stress and sense of coherence in Chinese nursing students in Australia. *Nurse Educ. Today*, 32, 345–350. doi: 10.1016/j.nedt.2011.05.004

Hirai, R., Frazier, P., and Syed, M. (2015). Psychological and sociocultural adjustment of first-year international students: trajectories and predictors. *J. Couns. Psychol.* 62, 438–452. doi: 10.1037/cou0000085

*Hunt, E. N., Martens, M. P., Wang, K. T., and Yan, G. C. (2017). Acculturative stress as a moderator for international student drinking behaviors and alcohol use consequences. *J. Ethn. Subst. Abus.*, 16, 263–275. doi: 10.1080/15332640.2016.1185656

Kaufmann, L. (2021). Integrating Canadian youth: the state of intergroup contact, belonging, and support for immigration. *J. Ethn. Cult. Stud.* 8, 192–213. doi: 10.29333/ejecs/789

Kilstoff, K., and Baker, J. (2006). International postgraduate nursing students: implications for studying and working within a different culture. *Contemp. Nurse* 22, 7–16. doi: 10.5172/conu.2006.22.1.7

*Kim, Y. K., and Cronley, C. (2018). Acculturative stress and binge drinking among international students in the United States: resilience and vulnerability approaches. *J. Am. Coll. Heal.*, 68 207–218. doi: 10.1080/07448481.2018.1538998

*Kim, S. J., and Yoo, I. Y. (2016). Health promotion behavior of Chinese international students in Korea including acculturation factors: a structural equation model. *Asian Nurs. Res.*, 10, 25–31. doi: 10.1016/j.anr.2015.10.008

Kroon Van Diest, A. M., Tartakovsky, M., Stachon, C., Pettit, J. W., and Perez, M. (2014). The relationship between acculturative stress and eating disorder symptoms: is it unique from general life stress? *J. Behav. Med.* 37, 445–457. doi: 10.1007/s10865-013-9498-5

*Lashari, S. A., Kaur, A., and Awang-Hashim, R. (2018). Home away from home—the role of social support for international students' adjustment. *Malays. J. Learn. Instr.*, 15, 33–54. doi: 10.32890/mjli2018.15.2.2

Learn German. (2020). *Germany international student statistics 2020*. Available at: https://www.studying-in-germany.org/germany-international-student-statistics/#:~:text=Germany

*Lee, Y., and Im, E. O. (2016). A path analysis of stress and premenstrual symptoms in Korean international and Korean domestic students. *J. Adv. Nurs.*, 72, 3045–3059. doi: 10.1111/jan.13061

*Lee, Y., and Im, E. O. (2017). Stress and premenstrual symptoms among Korean women studying in the U.S. and South Korea: a longitudinal web-based study. *Women Health*, 57, 665–684. doi: 10.1080/03630242.2016.1181139

*Lee, J. S., Koeske, G. F., and Sales, E. (2004). Social support buffering of acculturative stress: a study of mental health symptoms among Korean international students. *Int. J. Intercult. Relat.*, 28, 399–414. doi: 10.1016/j.ijintrel.2004.08.005

*Liu, Y., Chen, X., Li, S., Yu, B., Wang, Y., and Yan, H. (2016). Path analysis of acculturative stress components and their relationship with depression among international students in China. *Stress. Health*, 32, 524–532. doi: 10.1002/smi.2658

Luo, X. (2014). Various difficulties for international students in adjusting to a new academic culture when studying abroad. 3rd International Conference on Science and Social Research.

Majzoobi, M. R., and Forstmeier, S. (2022). The relationship between the reminiscence of relationship-defining memories and marital outcomes: a systematic review and meta-analysis. *J. Fam. Theory Rev.* 14, 7–27. doi: 10.1111/jftr.12442

Miller, M. J., Kim, J., and Benet-Martínez, V. (2011). Validating the Riverside acculturation stress inventory with Asian Americans. *Psychol. Assess.* 23, 300–310. doi: 10.1037/a0021589

Oberg, K. (1960). Cultural shock: adjustment to new cultural environments. *Pract. Anthropol.* 7, 177–182. doi: 10.1177/009182966000700405

Okonta, I. (2020). *The failure of leadership in Africa's development*: Lexington Books.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., et al. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Systematic Reviews*, 10, 89. doi: 10.1186/s13643-021-01626-4

*Pan, J. Y., Wong, D. F. K., Joubert, L., and Chan, C. L. W. (2007). Acculturative stressor and meaning of life as predictors of negative affect in acculturation: a cross-cultural comparative study between Chinese international students in Australia and Hong Kong. *Aust. N. Z. J. Psychiatry*, 41, 740–750. doi: 10.1080/00048670701517942

Peterson, R. A., and Brown, S. P. (2005). On the use of beta coefficients in meta-analysis. *J. Appl. Psychol.* 90, 175–181. doi: 10.1037/0021-9010.90.1.175

Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Appl. Psychol. Meas.* 1, 385–401. doi: 10.1177/014662167700100306

Revollo, H.-W., Qureshi, A., Collazos, F., Valero, S., and Casas, M. (2011). Acculturative stress as a risk factor of depression and anxiety in the Latin American immigrant population. *Int. Rev. Psychiatry* 23, 84–92. doi: 10.3109/09540261.2010.545988

*Reynolds, A. L., and Constantine, M. G. (2007). Cultural adjustment difficulties and career development of international college students. *J. Career Assess.*, 15, 338–350. doi: 10.1177/1069072707301218

Sandhu, D. S., and Asrabadi, B. R. (1994). Development of an acculturative stress scale for international students: preliminary findings. *Psychol. Rep.* 75, 435–448. doi: 10.2466/pr0.1994.75.1.435

Schmidt, F. L., Oh, I.-S., and Hayes, T. L. (2009). Fixed- versus random-effects models in meta-analysis: model properties and an empirical comparison of differences in results. *Br. J. Math. Stat. Psychol.* 62, 97–128. doi: 10.1348/000711007X255327

Searle, W., and Ward, C. (1990). The prediction of psychological and sociocultural adjustment during cross-cultural transitions. *Int. J. Intercult. Relat.* 14, 449–464. doi: 10.1016/0147-1767(90)90030-Z

Selye, H. (1956). *The stress of life*: McGraw-Hill, 324.

Study in Australia. (2019). *International student in Australia statistics*. Available at: https://www.studying-in-australia.org/international-student-in-australia-statistics/

Suarez-Morales, L., and Lopez, B. (2009). The impact of acculturative stress and daily hassles on pre-adolescent psychological adjustment: examining anxiety symptoms. *J. Prim. Prev.* 30, 335–349. doi: 10.1007/s10935-009-0175-y

*Taušová, J., Bender, M., Dimitrova, R., and van de Vijver, F. (2019). The role of perceived cultural distance, personal growth initiative, language proficiencies, and tridimensional acculturation orientations for psychological adjustment among international students. *Int. J. Intercult. Relat.*, 69, 11–23. doi: 10.1016/j.ijintrel.2018.11.004

Taylor, P. J., Hutton, P., and Wood, L. (2015). Are people at risk of psychosis also at risk of suicide and self-harm? A systematic review and meta-analysis. *Psychol. Med.* 45, 911–926. doi: 10.1017/S0033291714002074

Toth-Bos, A., Wisse, B., and Farago, K. (2020). The interactive effect of goal attainment and goal importance on acculturation and well-being. *Front. Psychol.* 11:704. doi: 10.3389/fpsyg.2020.00704

Ward, C. (1996). "Acculturation" in *Handbook of intercultural training. 2nd* ed (Sage Publications, Inc), 124–147.

Ward, C. (2008). Culture learning, acculturative stress, and psychopathology: three perspectives on acculturation. *Appl. Psychol.* 46, 58–62. doi: 10.1111/j.1464-0597.1997.tb01094.x

*Wei, M., Heppner, P. P., Mallen, M. J., Ku, T. Y., Liao, K. Y. H., and Wu, T. F. (2007). Acculturative stress, perfectionism, years in the United States, and depression among Chinese international students. *J. Couns. Psychol.*, 54, 385–394. doi: 10.1037/0022-0167.54.4.385

*Wei, M., Liao, K. Y. H., Heppner, P. P., Chao, R. C. L., and Ku, T. Y. (2012a). Forbearance coping, identification with heritage culture, acculturative stress, and psychological distress among Chinese international students. *J. Couns. Psychol.*, 59, 97–106. doi: 10.1037/a0025473

*Wei, M., Tsai, P. C., Chao, R. C. L., Du, Y., and Lin, S. P. (2012b). Advisory working alliance, perceived English proficiency, and acculturative stress. *J. Couns. Psychol.*, 59, 437–448. doi: 10.1037/a0028617

Williams, J. W., Plassman, B. L., Burke, J., and Benjamin, S. (2010). Preventing Alzheimer's disease and cognitive decline. *Evid. Rep. Technol. Assess.* 193, 1–727. doi: 10.7326/0003-4819-154-3-201102010-00016

*Yakunina, E. S., Weigold, I. K., and Weigold, A. (2013a). Personal growth initiative: relations with acculturative stress and international student adjustment. *Int. Perspect. Psychol.: Res. Pract. Consult.*, 2, 62–71. doi: 10.1037/a0030888

*Yakunina, E. S., Weigold, I. K., Weigold, A., Hercegovac, S., and Elsayed, N. (2013b). International students' personal and multicultural strengths: reducing acculturative stress and promoting adjustment. *J. Couns. Dev.*, 91, 216–223. doi: 10.1002/j.1556-6676.2013.00088.x

*Yang, N., Xu, Y., Chen, X., Yu, B., Yan, H., and Li, S. (2018). Acculturative stress, poor mental health and condom-use intention among international students in China. *Health Educ. J.*, 77, 142–155. doi: 10.1177/0017896917739443

Ye, J. (2006). An examination of acculturative stress, interpersonal social support, and use of online ethnic social groups among Chinese international students. *Howard J. Commun.* 17, 1–20. doi: 10.1080/10646170500487764

Yeh, C. J., and Inose, M. (2003). International students' reported English fluency, social support satisfaction, and social connectedness as predictors of acculturative stress. *Couns. Psychol. Q.* 16, 15–28. doi: 10.1080/0951507031000114058

*Zasiekina, L., and Zhuravlova, O. (2019). Acculturating stress, language anxiety and procrastination of international students in the academic settings. *Psycholinguistics*, 26, 126–140. doi: 10.31470/2309-1797-2019-26-1-126-140

Zhou, Y., Jindal-Snape, D., Topping, K., and Todman, J. (2008). Theoretical models of culture shock and adaptation in international students in higher education. *Stud. High. Educ.* 33, 63–75. doi: 10.1080/03075070701794833

The role of parents' beliefs regarding their children's literacy acquisition

Anna Ratka-Pauler [ID][1]*, Lisa Birnbaum [ID][2]* and Stephan Kröner [ID][2]

[1]Leibniz Institute for Educational Trajectories, Bamberg, Germany, [2]Empirical Educational Research, Friedrich-Alexander-Universität Erlangen-Nürnberg, Nürnberg, Germany

Early literacy acquisition is influenced by children's social and cultural background. Several empirical studies have shown that by considering literacy activities at home and providing cultural resources, the correlation between the social and cultural background and the children's literacy achievement can be significantly reduced. This suggests a crucial importance of parents' beliefs and their role as active agents in the acquisition of literacy skills at home. The aim of the present study is therefore to provide an overview of the range of relevant parental attitudes towards joint literacy activities. In an elicitation study based on the theory of planned behavior, the statements of $N = 25$ German parents of pre-preschool and preschool children were recorded. All deductive categories based on the theory of planned behavior were confirmed, furthermore the category system could be differentiated inductively. Thus the parental beliefs about joint literacy activities were comprehensively mapped. It is discussed how the explorative results of this study can be used in further studies, for example, to generate a questionnaire based on the TPB to assess parental beliefs for joint literacy activities.

KEYWORDS

home literacy model, home learning environment, home literacy environment, parents, early childhood, beliefs

Introduction

It has been known since the 2000 Pisa cycle that a significant number of children have insufficient literacy skills (Baumert and Schümer, 2001). This is still an issue, especially among children and adolescents from families with a lower socioeconomic status (SES) or with a migration background (Baumert and Schümer, 2001). As the prerequisites for acquiring literacy skills are received before children enter the formal education system (Lehrl, 2018), early literacy acquisition is significant for children's further educational trajectories (Manu et al., 2021) and the subsequent development of children's literacy skills (Pfost, 2015; Pfost et al., 2019). Much of the current research focuses on the literacy acquisition in educational institutions (e.g., Dahlström et al., 2023). Although there is a growing body of literature on the influence of the family environment, the focus on parents is mostly limited to SES factors and joint activities and does not take into account parents' underlying beliefs (Niklas and Schneider, 2013; Niklas, 2017; Nag et al., 2024). However, children acquire early literacy skills in both school and family settings, and several empirical studies have shown that the family as a place of education may provide joined literacy activities and cultural resources (Niklas and Schneider, 2013; Shen and Del Tufo, 2022). Accordingly, the design of the family learning environment does not directly depend on the education, occupation, or income of the parents;

rather it is related to the parent's ability to provide adequate support for their children and to the associated behavioral, normative, and competency and control beliefs. It can be assumed that parents with positive beliefs about joint literacy activities are more likely to implement these activities with their children (Niklas, 2017). Some studies could show that the children's experiences with the home literacy environment (HLE) are not equally in all families which contributes to the impact of the children's social background on their literacy development (Niklas and Schneider, 2013; Niklas, 2017; Fikrat-Wevers et al., 2021; Shen and Del Tufo, 2022). Additionally, the HLE partly mediates the SES effect on children's literacy acquisition (Niklas and Schneider, 2013; Fikrat-Wevers et al., 2021). These observations led to the development of a wide range of family literacy programs aiming to encourage parents in joint literacy activities (Wasik and van Horn, 2012). As a prerequisite to tailoring interventions for joint literacy activities of parents with their children the aim of this study is to explore (a) the early literacy activities of parents with pre-preschool and preschool children and (b) the beliefs on which joint literacy activities are based. Since previous research focused on the HLE from a children's perspective integrating selected literacy activities (Marinak et al., 2015; Liebers and Heger, 2017; Silinskas et al., 2020), on school-aged children (Schiefele and Schaffner, 2016; Wendt et al., 2016; Birnbaum et al., 2020; Oxley and McGeown, 2023), or on the beliefs of kindergarteners (Takada et al., 2023), the present study considers a wide range of joint literacy activities as well as the parents' beliefs related to these activities.

Influence of the home literacy environment on literacy acquisition

In a strict sense, the term literacy covers a person's reading and writing skills (Sénéchal et al., 2001). A more comprehensive concept of literacy also includes the understanding of written text and the context, experiences with the reading and storytelling culture of the surrounding society, and the use of writing-related media (Ehmig and Reuter, 2013).

As the first instance of socialization and education, families offer great potential to support children's early literacy acquisition (Niklas and Schneider, 2013; Weldemariam, 2022). The HLE "consists of a variety of resources and opportunities available to children, as well as the parental abilities, skills, dispositions and resources that determine the provision of these opportunities to children" (Burgess, 2011, p. 446). This definition emphasizes the active part of the parents in their children's competence acquisition. Along these lines, family literacy programs often aim to empower parents by emphasizing their active role as co-educators (e.g., Swain and Cara, 2019; Weldemariam, 2022).

An established model for structuring the children's exposure to literacy activities is the Home Literacy Model (Sénéchal et al., 1998; Sénéchal and LeFevre, 2002). According to this model, meaning-related and code-related literacy activities may be distinguished. Meaning-related literacy activities include, in particular, reading aloud. Through this activity, children get in touch with writing and letters in everyday situations without focusing on written language. This promotes the children's general language development. On the other hand, code-related literacy activities focus on active engagement with writing and letters (Sénéchal and LeFevre, 2002, 2014). The

Home Literacy Model is often used in research on the influence of the HLE on children's literacy acquisition in preschool and primary education (Sénéchal and LeFevre, 2002, 2014; Silinskas et al., 2012, 2020).

For implementing meaning-related and code-related literacy activities, a wide variety of media can be used. Classically, analog media are used for this purpose (Ehmig and Reuter, 2013; Wendt et al., 2016). This remains relevant in spite of a digital transformation of society, as the number of digital media devices used for joint literacy activities may increase, but is often merely used for consumption (Naab, 2021). Thus, while in principle digital media could be purposefully used for children's literacy acquisition (Marsh, 2016; Danielson et al., 2019; Kumpulainen et al., 2020; Lehrl et al., 2021; Altun, 2022), little is known about the specific content of literacy-enhancing digital media (Danielson et al., 2019). The extent to which parents utilize digital media in joint literacy activities remains largely unexamined.

Previous instruments to survey the determinants of literacy activities

Among the existing research instruments on literacy activities and related beliefs, there are several quantitative instruments on motivational beliefs regarding literacy activities (for an overview see Table 1).

The Motivation for Reading Questionnaire (MRQ) developed by Wigfield and Guthrie (1997), is one of the most popular instruments to survey children's reading motivation. Various studies demonstrated that instrinsic motivation is a strong predictor for the amount of literacy activities (Wigfield and Guthrie, 1997; Pfost et al., 2019). Based on the MRQ, Schiefele and Schaffner (2016) developed the Reading Motivation Questionnaire (RMQ). The RMQ adapts some dimensions of reading motivation from the MRQ and adds two new dimensions (Schiefele and Schaffner, 2016; Table 1). While the MRQ and RMQ are focused on children's motivational beliefs on reading in general, there are also scales that focus specifically on assessing children's beliefs on recreational reading and writing (Schüller, 2014; Schüller et al., 2017; Birnbaum et al., 2019, 2020).

While the instruments mentioned so far aim at assessing the motivation of school-aged children, the questionnaire "Me and My Reading Profile" (MMRP), specifically deals with the reading motivation of kindergarten-aged children (Marinak et al., 2015).

The MRQ, RMQ, and MMRP assess children's motivational beliefs about reading, the questionnaires regarding beliefs for engaging in literacy activities solely address children's motivational beliefs, but they largely neglect the parents' perspective. If parents are involved, then only in regard to their assessment of their children's behavior and literacy skills.

One of the rare instruments that does not largely neglect the parental role is the Home Literacy Environment Questionnaire (HLEQ) by Umek et al. (2005). However, not even the HLEQ captures parents' beliefs about literacy activities, but rather focuses on reading-related parental behavior.

Thus, taken together, there is still a lack of parents' perspectives on the beliefs for engaging in joint literacy activities with their pre-preschool and preschool-aged children, which includes more motivational aspects than the children's literacy development.

TABLE 1 Comparison of different questionnaire scales concerning motivational beliefs on literacy activities from the children's and parents' perspective.

Children's perspective				Parents' perspective
Motivation for Reading Questionnaire (MRQ, Wigfield and Guthrie, 1997)	Reading Motivation Questionnaire (RMQ, Schiefele and Schaffner, 2016)	Beliefs about leisure reading and writing (Schüller, 2014; Schüller et al., 2017; Birnbaum et al., 2019, 2020)	Me and My Reading Profile (MMRP, Marinak et al., 2015)	Home Literacy Environment Questionnaire (HLEQ, Umek et al., 2005)
- Reading Efficacy - Challenge - Curiosity - Reading involvement - Importance - Recognition - Grades - Social - Competition - Compliance - Reading work avoidance	- Curiosity - Involvement - Grades - Competition - Social recognition - Emotional regulation - Relief from boredom	- Beliefs about thematically congruent consequences - Beliefs about thematically incongruent consequences - Intrinsic value - Normative beliefs - Competency beliefs - Control beliefs	- Self-concept as a reader - Value of reading - Literacy out loud	- Stimulation to use language, explanation - Reading books to the child, visiting the library and puppet theatre - Joint activities and conversation - Interactive reading - Zone-of-proximal-development stimulation

Whereas the parents perspective could be of great importance especially for supporting preschool children at their transition to elementary school (Liebers and Heger, 2017; Ebert et al., 2020; Silinskas et al., 2020), there is little research on which beleliefs make parents engage in joint literacy activities (Yeo et al., 2014; Lenhart and Lingel, 2023). This period is of great formative importance for the children's future schooling, including the development of precursor skills for later academic competences (Näger, 2017) – such as phonological awareness, phonological working memory, or naming speed.

Despite the usefulness of the outlined instruments, it is obvious that the issue of activities and beliefs related to literacy activities could be covered more systematically. As a prerequisite, parental beliefs on joint literacy activities should be explored by a qualitative study based on comprehensive theoretical framework – and it should also be explored what activities parents of pre-preschool and preschool-aged children pursue together with their children.

Beliefs about literacy activities and related domain-general categories

To investigate the beliefs underlying the engagement in literacy activities, a broad range of domain-specific behavioral, normative and, competency and control beliefs should be considered, reflecting both personal and environmental aspects (Kröner, 2013). An established theory for this purpose is the theory of planned behavior (TPB), at the core of which are the aforementioned beliefs that explain an individual's intention to engage in a certain behavior (Ajzen, 1991, 2002; for an application in the reading and writing domain, see Birnbaum and Kröner, 2022). The following section presents the various beliefs in further details, in our case beliefs related to joint literacy activities of parents and children.

Based on the TPB (Ajzen, 1991, 2002), parents' engagement in joint literacy activities may be explained by three independent constructs: behavioral beliefs, normative beliefs, and competency

and control beliefs. The behavioral beliefs, underlying positive and negative attitudes towards joint literacy activities, include intrinsic motivation, beliefs concerning thematically congruent, and incongruent consequences (Graham, 2018; Birnbaum et al., 2020). Normative beliefs consist of perceived expectations of significant others (social pressure; Kröner, 2013; Schüller et al., 2017; Birnbaum et al., 2019). Competency beliefs include the self-assessed ability to act (Birnbaum, 2022). Control beliefs comprise external and internal resources such as if time and materials are available to engage in the activities (Ajzen, 2011; Kröner, 2013). Based on this theoretical framework, a wide range of domain-specific beliefs that are pivotal to explain joint literacy activities can be considered.

In literacy research, especially executive functions as domain-general aspects may be relevant as they are a prerequisite for the acquisition of literacy skills (Miyake et al., 2000; Nouwens et al., 2016; Chang, 2020).

Research aim

Regarding parents' perspective, previous research has focused on literacy activities and their impact on children, but not on their underlying beliefs (Umek et al., 2005; Silinskas et al., 2012; Sénéchal and LeFevre, 2014; Lehrl, 2018; Ebert et al., 2020; Silinskas et al., 2020). The purpose of the present study is to explore and categorize a wide spectrum of parental beliefs and to give an overview of the actual joined literacy activities from a parents' perspective.

Method

Sample

Interviews with $N = 25$ ($n = 19$ female, $n = 6$ male) German parents of pre-preschool and preschool children (4–7 years, $M = 5.40$,

SD = 0.71) were conducted via guided interviews. In Germany, children usually start school at the age of six or at the beginning of the seventh year, with preschool being the last year before formal schooling, where school preparation already takes place in day-care centers and pre-preschool includes two years before school entry. Thus, this age range includes children from the end of the fourth to the beginning of the seventh year of life.

A sample size of 25 parents was considered appropriate to ensure theoretical saturation and to capture a comprehensive range of salient beliefs (Curtis et al., 2010). To avoid possible bias due to social, cultural or gender differences, the parents were assigned to a sampling plan (Table 2) including the most commonly spoken language in the families (0 = German; 1 = other language) and the higher education entrance qualification of the parents. Regarding the latter, it was differentiated between parents without a higher education entrance qualification up to General Certificate of Secondary Education (0) and parents with a higher education entrance qualification (1). As Table 2 shows, the sample was selected to include all of the social and cultural background characteristics mentioned, and to ensure that both mothers and fathers were interviewed in all combinations. The aim was to cover as wide a range of parental characteristics as possible. Thus, a comprehensive overview of parents' beliefs towards joint literacy activities is provided, across various social and cultural backgrounds of German parents.

Procedure and instrument

The structure of the interview guide was based on the guidelines of Francis et al. (2004) for TPB-based interview studies. The flexibility provided by the partial standardization meant that the interview was open enough to allow inductive extensions to the deductive categories. In the interviews, a contextual differentiation between meaning-related and code-related literacy activities was applied (Sénéchal et al., 1998; Sénéchal and LeFevre, 2002). The focus was on the meaning-related literacy activities such as reading aloud and related beliefs. This focus was set because 68% of the German parents engage in these activities with their children before the entry into formal schooling (Stiftung Lesen, 2019, 2021). The interview guideline can be found in the Appendix. After the interview, the parents filled in a short questionnaire which included questions regarding their educational level and the most spoken language in the family.

Data analysis

The study was conducted and approved in accordance with the university's institutional requirements. The participants provided their written informed consent to participate in this study. The interviews were transcribed according to Kuckartz (2018) and Kröner et al. (2012). The parents' statements were content analyzed (Mayring, 2016) using MAXQDA 2020 (VERBI Software, 2019). As introduced in the literature review, the deductive part was based on the six categories derived from recent work based on the TPB. It comprised (1) intrinsic motivation, (2) beliefs concerning thematically congruent consequences, (3) beliefs concerning thematically incongruent consequences, (4) normative beliefs, (5) competency beliefs, and (6) control beliefs (Graham, 2018; Birnbaum et al., 2020). In addition, the literacy activities and the media used were set as categories. According to the previous research, the literacy activities were deductively separated into two aspects, the meaning-related and code-related activities (Sénéchal and LeFevre, 2002, 2014). The media used were deductively separated into analogue and digital media (Lehrl et al., 2021; Naab, 2021).

Results

Tables 3–7 shows the resulting refined set of categories and the number of statements that resulted for each category.

Literacy activities and used media

Based on the Home Literacy Model of Sénéchal et al. (1998), both code-related and meaning-related activities could be identified, for example, parents mentioned that they "read picture books and non-fiction books every day" (reading aloud, Interview 4) or that you also "practice writing your own name" (writing exercises, Interview 23). Whereas exercises to promote precursor skills such as phonological recognition were rarely named by the parents.

Furthermore, parents mostly considered analogue media (Table 3), they mainly mentioned books and workbooks or worksheets. The inductive categories "plain papers" (Interview 8), educational games like "letter puzzles" (Interview 14) or "card games" (Interview 25), and "blackboards" (Interview 4 and 18) were named less frequent. Less parents mentioned digital media devices like smartphones, tablets or computers.

Behavioral beliefs

The first set of beliefs contained behavioral beliefs (Table 4). The parents emphasized the importance of intrinsic values for performing literacy activities. The intrinsic value included the categories fun vs. no fun, experience of autonomy, and imagination/creativity. The

TABLE 2 Sampling plan.

	Higher education entrance qualification	No higher education entrance qualification	Σ
German as most spoken language	7 (5 female, 2 male)	6 (5 female, 1 male)	13 (10 female, 3 male)
Other languages as most spoken language	6 (5 female, 1 male)	6 (4 female, 2 male)	12 (9 female, 3 male)
Σ	13 (10 female, 3 male)	12 (9 female, 3 male)	25 (19 female, 6 male)

TABLE 3 Part of the category system representing the literacy activities and the media used.

Category	Number of coded statements	Number of interviews
Literacy activities	148	25
Meaning-related activities	110	44
Writing exercises	60	21
Reading aloud	50	23
Code-related activities	38	23
Letter recognition	33	20
Phonological recognition	5	3
Used media	125	25
Analogue media	112	25
Books	66	23
Workbooks or worksheets	26	17
Plain Papers	8	7
Educational games	7	5
Blackboards	5	4
Digital media	13	9
Smartphones	8	6
Tablets	4	3
Computers	1	1

Multiple responses for a category within an interview were considered separately, resulting in totals that may exceed the number of interviews. The indentation indicates the hierarchy level. The number of statements in a higher hierarchy level is the sum of the statements in the level below.

TABLE 4 Part of the category system representing the behavioral beliefs.

Category	Number of coded statements	Number of interviews
Intrinsic value	114	25
Fun vs. no fun	53	23
Experience of autonomy	48	19
Imagination/creativity	13	10
Beliefs about thematically congruent consequences	96	22
Reading competence	28	14
Language competence	23	10
Writing competence	21	11
Vocabulary	11	9
Precursor skills	8	6
Listening	5	5
Beliefs about thematically incongruent consequences	59	23
Parent–children relationship	15	10
Knowledge acquisition	14	10
Time compatibility	11	8
Children's relaxation	10	8
School readiness	6	6
Value education	3	2

Multiple responses for a category within an interview were considered separately, resulting in totals that may exceed the number of interviews. The indentation indicates the hierarchy level. The number of statements in a higher hierarchy level is the sum of the statements in the level below.

category fun vs. no fun summarized general statements about the intrinsic motivation without giving reasons: "[…] we notice that he enjoys it [reading aloud] and that this is mutually dependent, then it also gives us a lot of pleasure" (Interview 12). Here it was shown that the behavioral beliefs are not solely related to the parents themselves, but also to the children. Being intrinsically motivated includes perceived autonomy, which parents reported to open up to their children by, for example, letting them choose books. The stimulation of children's imagination and creativity was another aspect of intrinsic value. Some parents mentioned that they experienced their children as emotionally involved in the story being read aloud.

The parents mentioned that the thematically congruent consequences are a common concern for performing literacy activities. The parents declared that they perform literacy activities purely because of the direct effect of activity performance on their children (Table 4). The parents highlighted the children's competence acquisition, for example, parents mentioned that their child asks: "what does this word mean" (Interview 23) or that the child "already tries to write words" (Interview 13). In addition, parents with a non-German mother language described that literacy activities help their children to learn how to speak and pronounce words – "because [the child] can talk better, speak better and communicate better"

(Interview 2). Most of the parents perceived literacy activities as beneficial for children's vocabulary acquisition and some named beneficial effects on school precursor skills.

Besides beliefs about thematically congruent consequences, parents mentioned various other consequences that were not thematically related to literacy activities (Table 4). On an affective level, parents highlighted the positive parent–children relationship during joint literacy activities and children's relaxation as a common concern for performing literacy activities: Parents described reading aloud as a ritual after a stressful day or to end the day with a sense of affection and belonging: "This togetherness that we need, even if the day was stressful or we often argued during the day or I scolded a lot" (Interview 8). The parents also emphasized the knowledge acquisition of their children through literacy activities. However, only some parents mentioned the school readiness of their children as a motivational belief for joint literacy activities. For parents, their personal priorities and the importance of literacy activities bother them from enjoying literacy activities: "[…] also leisure time stress – that you have to go to gymnastics on Tuesday, then you come home

TABLE 5 Part of the category system representing the normative beliefs.

Category	Number of coded statements	Number of interviews
Inside the family	51	15
Other relatives	41	13
Other parent	7	7
Children (siblings of the child)	3	2
Outside the family	39	17
Other adults	37	17
Kindergarten teacher	2	2

Multiple responses for a category within an interview were considered separately, resulting in totals that may exceed the number of interviews. The indentation indicates the hierarchy level. The number of statements in a higher hierarchy level is the sum of the statements in the level below.

TABLE 6 Part of the category system representing the competency and control beliefs.

Category	Number of coded statements	Number of interviews
Competency beliefs	35	16
General competences	22	12
Literacy competences	13	7
Control beliefs	98	24
Environmental conditions	40	18
Parent–child interaction	22	15
Availability of time	19	12
Selection/content of the book	9	6
Support from outsiders	8	3

Multiple responses for a category within an interview were considered separately, resulting in totals that may exceed the number of interviews. The indentation indicates the hierarchy level. The number of statements in a higher hierarchy level is the sum of the statements in the level below.

TABLE 7 Part of the category system representing the executive functions.

Category	Number of mentions	Number of interviews
Executive functions	59	22
Concentration	23	14
Attention	18	14
Working memory	18	12

Multiple responses for a category within an interview were considered separately, resulting in totals that may exceed the number of interviews. The indentation indicates the hierarchy level. The number of statements in a higher hierarchy level is the sum of the statements in the level below.

later, then everyone is somehow stressed and rushed, although it's supposed to be fun. It's also fun, but you are still somehow more stressed on such a day, if you also have something else to do"

(Interview 19). But time compatibility as a reason to perform or not perform literacy activities is only mentioned by a few parents. In addition to these deductive categories, parents were found to associate literacy activities with their children's learning about values, for example, one parent describes: "Without reading, you cannot understand whether stranger persons are good or bad, […], just recognize the world" (Interview 13).

Normative beliefs

Normative beliefs comprise how the parents perceive their social environment (Francis et al., 2004). The social environment was deductive divided into people inside and outside the family (Table 5).

Within the family, the parents highlighted the injunctive norms of other relatives. However, significant others outside the family were also to be found. Parents commented that they exchange ideas about joint literacy activities with "friends" (Interview 10), "daycare acquaintance" (Interview 23) and other parents "on the playground" (Interview 15).

Competency and control beliefs

Regarding competency beliefs, parents highlighted that they belief their general and literacy competencies affect joint literacy activities (Table 6). "The most important factor [for joint literacy activities] is the caregiver, […] the inner resources, the readiness [of the parent]" (Interview 10). In Interview 6 also the parent's literacy competences were mentioned: "If I do not know what does this word mean and then I cannot read aloud".

Additional, control beliefs could be differentiated into five sub-categories (Table 6). The parents emphasized environmental conditions as aspects that facilitate or hinder literacy activities. From the parents' perspective, having a silent, welcoming, and peaceful space is an important aspect of control beliefs. Furthermore, parents' limited time availability due to unavoidable commitments, like work ("first and foremost the work," Interview 19) or school ("my study tasks," Interview 3), hinders their engagement in literacy activities. The shortage of time may be exacerbated, in case of single parenthood by the accomplishment of the increased everyday tasks ("I am a single parent and I have a lot to do.," Interview 20). This differs from time compatibility in behavioral beliefs, where parents can affect the factors causing their time constraints.

In the category selection/content of the book, parents pointed out that "books must fit for the children and [the] age of the children" (Interview 4). Besides the connection to the children's interests, the parents describe that reading aloud is easier for them if the books are also personally appealing to them: "[…] for example, I really like reading books with stories. With a story that has something behind it, and less like non-fiction books" (Interview 19).

Furthermore, three parents emphasized that themselves and their children get help for literacy activities, thus the category regarding support from outsiders was subsequently added to the category system.

Executive functions

In addition to the deductive categories based on the TPB, the children's executive functions were inductively derived as a domain-general aspect related to joint literacy activities. Based on Miyake et al. (2000), the executive functions could be deductively divided into the categories of concentration, attention, and working memory (Table 7).

It is remarkable that all three categories could be assigned based on the parents' statements. In the interviews, it was mentioned that it is necessary that the children may focus on the activity ("concentrate, then read, then understand all thing," Interview 1) and is attentive ("But when we are dealing with it [the story] intensively, we first look at the pictures, then read it aloud and then I ask him: "[…] 'Explain to me briefly what the story is about?'. Simply so that I notice how attentive he is and how he listens.," Interview 8). Furthermore, parents mentioned that it is relevant for them that children remember, for instance, the content of yesterday's reading ("There are also stories that are much longer, which are divided into several parts anyway, where I say: 'What was it like yesterday, can you still remember?', 'Can you tell me again what happened?' and then we practically pick up where we left off" Interview 21).

Discussion

Main results

The aim of the present study was to elicit and categorize the parents' beliefs about joint literacy activities and to capture these activities from a parents' perspective. Parental beliefs can provide important insights into how joint literacy activities are implemented in the HLE. Therefore, it is of great importance to collect a comprehensive set of parental beliefs and to design a systematic questionnaire to identify aspects that are particularly relevant to parents, as well as aspects that are not yet anchored in parents' minds or that are wrongly motivated. The present study summarizes the parents' beliefs about joint literacy activities, which can now be further processed and used to design a questionnaire. Thus, the potential of the HLE can be harnessed to counter an inequality of opportunities in literacy acquisition caused by factors of social and cultural background (Niklas, 2017; Lehrl, 2018). Therefore, it is of great importance to support parents in gaining confidence to perform literacy activities on a regular basis.

Joint literacy activities in the home literacy environment

The present study showed that all interviewed parents used analog media for performing literacy activities. As assumed due to previous studies, a comparingly small number of parents use digital media for joint literacy activities (Ehmig and Reuter, 2013; Wendt et al., 2016; Kucirkova and Flewitt, 2022). It should also be emphasized that the deductive categories for recording the use of digital media were sufficient. Obviously, interactive picture books and interactive audio pens such as TipToi are not widespread enough to be relevant in our sample (e.g., Pfost et al., 2018; Pfost and Freund, 2018). Thus, related items in questionnaires would probably cause floor effects. However,

in today's society, digital media are gaining importance. In terms of the HLE, the availability and manner of digital media use is changing (Marsh et al., 2005). Parents must be aware of the potential of digital tools and their role model function in the use of media, so they can use them specifically for joint literacy activities (Brito et al., 2017; Kucirkova and Flewitt, 2022). At the same time, digital tools do not replace the printed book.

Further, quantitative studies should examine whether the use of digital media for performing literacy activities is actually not very common. In addition, possible factors for the apparently rare use of digital media should be analyzed to counteract or compensate them. Previous research provides clues to explain the seemingly low use of digital media for literacy activities: possible aspects are the parents' lack of media competence (Brito et al., 2017; Kucirkova and Flewitt, 2022) and the fact that children before school entry use digital media mainly for consumption (Naab, 2021).

Parental beliefs on joint literacy activities

Behavioral beliefs

This study revealed the assumption that the perceived benefits of reading aloud for the children's development are the main motivation of parents for engaging in joint literacy activities (Ehmig and Reuter, 2013). As expected, the intrinsic value is the most prevalent aspect of behavioral beliefs (Durik et al., 2006; Schüller et al., 2017; Birnbaum et al., 2019).

The beliefs about thematically congruent consequences included a variety of subcategories that describe children's competence development through joint literacy activities. Based on previous theoretical knowledge, joint literacy activities are expected to promote language, reading, and writing skills as well as other school precursor skills (Näger, 2017). The children's competence development, in particular, is considered relevant by the interviewed parents. However, school precursor skills like phonological awareness, phonological working memory, and naming speed were rarely mentioned or not at all. Basically, the competence development of their children seems to play an important role for parents for performing literacy activities. This suggests that the HLE offers potential for compensating inequality of opportunity in literacy acquisition (Niklas, 2017; Lehrl, 2018).

Nearly all parents provided information about thematically incongruent consequences. Especially meaning-related literacy activities were often part of a ritual that strengthens the parent–child relationship (Eisenwort et al., 2018). The children's literacy acquisition is not the focus of these activities (Stiftung Lesen, 2012). Rather, the impression is that home literacy activities also have a social character in addition to that. It is therefore important to understand every kind of literacy activity as a social interaction (Graham, 2018; Gavora, 2022).

Normative beliefs

The parents stated that the expectations and opinions of people outside the family are important to them. Previous studies pointed out that parents adapt to socially desirable behaviors and to the expectations of others (Umek et al., 2005). Thus, according to the ecological approach of Bronfenbrenner (1979), there is a relationship between educational institutions, such as day-care centers, work and how parents interact with their children (Melhuish et al., 2008; Anders

et al., 2012). Further qualitative studies should clarify what role the day-care centers actual play in the area of home literacy and how parents can be supported in joint literacy activities by suggestions from the educational institution (Becker-Stoll, 2015; Betz et al., 2017; Stiftung Lesen, 2021).

In addition, this study indicated that future literacy research should investigate the relationship between parental beliefs and the parents' personal networks. Based on the parents' recorded statements, it may be assumed that their network effects their beliefs regarding joint literacy activities. It became apparent that especially the normative beliefs of non-family members seem to play a large role. This assumption fits with Umek et al. (2005) findings that parents want to conform to social norms. Thus, future research should expand the study of relationships between parents and day-care centers to include the perspective of parents among themselves.

Competency and control beliefs

The survey of the parents' competency beliefs is based on the theoretical concept of Marsh (1990). The self-concept is intentionally preferred to the self-efficacy, due to prior studies indicating that self-concept correlates higher with the performed literacy activities (Marsh et al., 2019; Birnbaum, 2022). It should be quantitatively examined whether a positive literacy self-concept actually has a positive effect on the quality and frequency of joint literacy activities (Marsh, 1990).

As assumed disruptive variables caused by the environment, such as loudness and distraction are relevant to the parents in addition to the available material resources (Schüller, 2014; Birnbaum et al., 2019). For example, in the parent–child interaction category, the statements of a parent who described that her child does not want to stay seated when they read aloud are particularly noticeable. This raises the question what influences cause the child to react in this way (e.g., Gavora, 2022). Based on the parents' statements, it also seems to be particularly relevant for families with a non-German mother language how external persons support the parents in implementing joint literacy activities.

Executive functions and domain-general variables

In addition to the aforementioned domain-specific beliefs, parents also mentioned children's executive functions. They are domain-general aspects, i.e., related to children's general cognitive abilities (Miyake et al., 2000). The perceived importance of executive functions by parents goes hand in hand with recent studies indicating that executive functions can predict children's literacy skills (Nouwens et al., 2016; Chang, 2020).

Overall, the present qualitative study was conducted to identify a wide range of parental beliefs about joint literacy activities. The categories of beliefs were developed from the data material and validated against existing theories. They may inform further questionnaire development.

Limitations and avenues for further research

Regarding limitations of the present study, first, it must be taken into account that the data collection took place in Germany. In Germany, preschool is not mandatory to the same extent as in other countries and it not as closely related to formal education. Consequently, in contrast to other countries, it can be assumed that in Germany, parental competency beliefs may be less salient in the context of home literacy activities. Due to this difference in the educational system, social and cultural perceptions of the importance of joint literacy activities may also differ from country to country. It would therefore be desirable to conduct the present study again in another country with the same questions targeting beliefs about literacy activities. Previous studies from other countries usually had a stronger focus on the effect of the HLE on the children's literacy learning (Umek et al., 2005; Silinskas et al., 2012; Sénéchal and LeFevre, 2014; Silinskas et al., 2020; Weldemariam, 2022).

Second, the qualitative research design of the present study aimed at capturing a broad range of parental beliefs rather than at discovering geographic differences in these beliefs. Along these lines, in our sample plan we focused on the language spoken and the educational level of the subjects rather than on their geographical distribution. While it may be of interest for future quantitative studies whether the beliefs are regionally more or less pronounced, they are not expected to differ qualitatively. In addition, the question arises to what extent the gender, SES, or migration background of the interviewed parent influence the parents' beliefs about joint literacy activities. According to Kröner (2013), their effect on activities should be mediated by the domain-specific beliefs. To capture as many of parental beliefs as possible, including those based in part on domain-general variables, we used a sampling plan to select our sample. However, the extent to which parents' native language, for example, influences their literacy self-concept needs to be investigated quantitatively.

Third, a comprehensive questionnaire can be generated based on the collected and systematized parents' beliefs. This draft questionnaire could be validated in future, quantitative studies and explain the assumed correlations between parental beliefs and joint literacy activities. The knowledge of parents' beliefs for joint literacy activities can be used as a starting point for developing interventions that link to the HLE and support parents in creating a stimulating learning environment. Thus, children's literacy development can be sustainably.

Conclusion

The findings of the present study revealed that parents have very diverse beliefs about literacy activities with their pre-preschool and preschool children. Contrary to previous studies, beyond more commonly studied constructs such as literacy skills and intrinsic value, other beliefs emerged. These included beliefs regarding the importance of concurrent activities (such as work or stronger appreciation of other leisure activities) or regarding the parents literacy competencies (e.g., Krijnen et al., 2021; Tsirmpa et al., 2021). In addition, we chose a sampling procedure that provided us with beliefs of parents from a broad range of educational and social backgrounds. We conclude that it is important to address a wide range of parents' beliefs in order to develop a questionnaire of parental beliefs about joint literacy that can be used to identify a broad range of parental beliefs. Such a questionnaire can be used as an instrument to measure the impact of interventions aimed at empowering parents to support their children through joined literacy activities in the HLE (Yeo et al., 2014). As a next

step, we suggest the categorization of parental beliefs can be used to generate scales for the recording of parent's beliefs and literacy activities. These instruments are needed to investigate effects of experiments and interventions aiming at strengthening joint literacy activities in the HLE and the related parental beliefs.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding authors.

Ethics statement

Ethical approval was not required for the studies involving humans because this study was conducted and approved in accordance with the university's institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AR-P: Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. LB: Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing. SK: Conceptualization, Methodology, Supervision, Writing – review & editing.

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.

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2024.1330091/full#supplementary-material

References

Ajzen, I. (1991). The theory of planned behavior. *Organ. Behav. Hum. Decis. Process.* 50, 179–211. doi: 10.1016/0749-5978(91)90020-T

Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *J. Appl. Soc. Psychol.* 32, 665–683. doi: 10.1111/j.1559-1816.2002.tb00236.x

Ajzen, I. (2011). The theory of planned behaviour: Reactions and reflections. *Psychol. Health* 26, 1113–1127. doi: 10.1080/08870446.2011.613995

Altun, D. (2022). The effects of E-stories on preschoolers' narrative comprehension, retelling and Reading attitudes among poor and good Comprehenders. *J. Early Child. Lit.* 24, 471–504. doi: 10.1177/14687984221079010

Anders, Y., Rossbach, H.-G., Weinert, S., Ebert, S., Kuger, S., Lehrl, S., et al. (2012). Home and preschool learning environments and their relations to the development of early numeracy skills. *Early Child. Res. Q.* 27, 231–244. doi: 10.1016/j.ecresq.2011.08.003

Baumert, J., and Schümer, G. (2001). ""Familiäre Lebensverhältnisse, Bildungsbeteiligung und Kompetenzerwerb." [family living conditions, educational participation, and skill acquisition]" in PISA 2000: Basiskompetenzen von Schülerinnen und Schülern im internationalen Vergleich. eds. J. Baumert, E. Klieme, M. Neubrand, M. Prenzel, U. Schiefele and W. Schneideret al. (Opladen: Leske, Budrich), 323–407.

Becker-Stoll, F. (2015). "Bildung, Erziehung und Betreuung Von Kleinkindern in Kindertageseinrichtungen Aus Entwicklungs-Psychologischer Sicht." [education, upbringing and care of young children in day-care centers from a developmental psychological perspective]. *Systeme* 29, 144–164.

Betz, T., Bischoff-Pabst, S., Eunicke, N., Kayser, L. B., and Zink, K. (2017). Partner auf Augenhöhe? Forschungsbefunde zur Zusammenarbeit von Familien, Kitas und Schulen mit Blick auf Bildungschancen [partners at eye level? Research findings on the cooperation of families, day-care centers and schools with regard to educational opportunities]. Gütersloh: Bertelsmann Stiftung.

Birnbaum, L. (2022). Freizeitliches Schreiben und Lesen von Kindern im Grundschulalter: Bereichsspezifische Überzeugungen, Geschlecht und Bildungshintergrund als Determinanten. [Leisure-time writing and reading of elementary school children domain-specific beliefs, gender, and educational background as determinants]. Dissertation. (Accessed June 07, 2024). https://open.fau.de/server/api/core/bitstreams/b465dfff-70f8-43f8-8da3-ee4074589356/content

Birnbaum, L., and Kröner, S. (2022). A review on antecedents and consequences of leisure reading and writing in children. *SAGE Open* 12:215824402211138. doi: 10.1177/21582440221113823

Birnbaum, L., Schüller, E. M., and Kröner, S. (2019). "Überzeugungen Zum Freizeitlichen Schreiben Bei Grundschulkindern." [Beliefs about leisure time writing of elementary school children]. *J. Educ. Res. Online* 11, 5–36. doi: 10.25656/01:18001

Birnbaum, L., Schüller, E. M., and Kröner, S. (2020). Who likes to engage in writing? – the role of Children's beliefs and intrinsic value regarding leisure writing. *Educ. Psychol.* 40, 856–874. doi: 10.1080/01443410.2020.1777941

Brito, R., Francisco, R., Dias, P., and Chaudron, S. (2017). Family dynamics in digital homes: the role played by parental mediation in young Children's digital practices around 14 European countries. *Contemp. Fam. Ther.* 39, 271–280. doi: 10.1007/s10591-017-9431-0

Bronfenbrenner, U. (1979). Contexts of child rearing: Problems and prospects 34. Available at: https://content.apa.org/record/1980-09341-001.

Burgess, S. R. (2011). Home literacy environments (HLEs) provided to very young children. *Early Child Dev. Care* 181, 445–462. doi: 10.1080/03004430903450384

Chang, I. (2020). Influences of executive function, language comprehension, and fluency on young Children's Reading comprehension. *J. Early Child. Res.* 18, 44–57. doi: 10.1177/1476718X19875768

Curtis, J., Ham, S. H., and Weiler, B. (2010). Identifying beliefs underlying visitor behaviour: a comparative elicitation study based on the theory of planned behaviour. *Ann. Leisure Res.* 13, 564–589. doi: 10.1080/11745398.2010.9686865

Dahlström, H., Damber, U., and Rasmusson, M. (2023). Prerequisites for emergent literacy in Swedish preschools. *Early Child Dev. Care* 193, 1417–1433. doi: 10.1080/03004430.2023.2248417

Danielson, K., Wong, K. M., and Neuman, S. B. (2019). Vocabulary in educational Media for Preschoolers: a content analysis of word selection and screen-based pedagogical supports. *J. Child. Media* 13, 345–362. doi: 10.1080/17482798.2019.1585892

Durik, A. M., Vida, M., and Eccles, J. S. (2006). Task values and ability beliefs as predictors of high school literacy choices: a developmental analysis. *J. Educ. Psychol.* 98, 382–393. doi: 10.1037/0022-0663.98.2.382

Ebert, S., Lehrl, S., and Weinert, S. (2020). Differential effects of the home language and literacy environment on child language and theory of mind and their relation to socioeconomic background. *Front. Psychol.* 11:555654. doi: 10.3389/fpsyg.2020.555654

Ehmig, S. E., and Reuter, T. (2013). Vorlesen Im Kinderalltag: Bedeutung des Vorlesens Für die Entwicklung Von Kindern und Jugendlichen und Vorlesepraxis in Den Familien [Reading aloud in children's everyday lives: The importance of reading aloud for the development of children and adolescents and the practice of reading aloud in families]. Mainz: Stiftung Lesen.

Eisenwort, B., Aslan, H., Yesilyurt, S. N., Till, B., and Klier, C. M. (2018). "Sprachentwicklung bei Kindern mit Migrationshintergrund und elterliches Vorlesen." [language development in children with migration background and parental reading to children]. *Zeitschrift für Kinder-und Jugendpsychiatrie und Psychotherapie* 46, 99–106. doi: 10.1024/1422-4917/a000500

Fikrat-Wevers, S., van Steensel, R., and Arends, L. (2021). Effects of family literacy programs on the emergent literacy skills of children from low-SES families: a Meta-analysis. *Rev. Educ. Res.* 91, 577–613. doi: 10.3102/0034654321998075

Francis, J. J., Eccles, M. P., Johnston, M., Walker, A., Grimshaw, J., Foy, R., et al. (2004). Constructing questionnaires based on the theory of planned behaviour: a manual for health services researchers. Newcastle upon Tyne: Centre for Health Services Research, University of Newcastle.

Gavora, P. (2022). Preschool-aged Children's Agency in Shared Book Reading: the relation to the literacy environment in Czech families. *Early Child Dev. Care* 192, 2128–2148. doi: 10.1080/03004430.2021.1990905

Graham, S. (2018). A revised writer(S)-within-community model of writing. *Educ. Psychol.* 53, 258–279. doi: 10.1080/00461520.2018.1481406

Krijnen, E., van Steensel, R., Meeuwisse, M., and Severiens, S. (2021). Measuring parental literacy beliefs in a socio-economically, linguistically and ethnically diverse sample. *Early Educ. Dev.* 32, 608–635. doi: 10.1080/10409289.2020.1785227

Kröner, S. (2013). Kulturelle Partizipation bei Jugendlichen als Feld der Person-Umwelt-Transaktion. *Z Erziehungswiss* 16, 233–256. doi: 10.1007/s11618-013-0432-y

Kröner, S., Schüller, E. M., Penthin, M., Fritzsche, E. S., Friedrich, M. C. G., and Krol, M. M. (2012). "Elternvertreter mit Migrationshintergrund an allgemeinbildenden Schulen: Eine qualitative Interviewstudie zu ihren Beweggründen für und gegen ein engagement." [parents with migration background at general-education schools: a qualitative interview study on their motivations for and against school engagement]. *Z Erziehungswiss* 15, 707–726. doi: 10.1007/s11618-012-0331-7

Kucirkova, N., and Flewitt, R. (2022). Understanding parents' conflicting beliefs about Children's digital book Reading. *J. Early Child. Lit.* 22, 157–181. doi: 10.1177/1468798420930361

Kuckartz, U. (2018). Qualitative Inhaltsanalyse. Methoden, praxis, Computerunterstützung [qualitative content analysis. Methods, practice, computer support]. 4., überarbeitete Aufl. Grundlagentexte Methoden. Beltz: Weinheim.

Kumpulainen, K., Sairanen, H., and Nordström, A. (2020). Young Children's digital literacy practices in the sociocultural contexts of their homes. *J. Early Child. Lit.* 20, 472–499. doi: 10.1177/1468798420925116

Lehrl, S. (2018). Qualität Häuslicher Lernumwelten Im Vorschulalter [quality of home learning environments at preschool age]. Wiesbaden: Springer VS.

Lehrl, S., Linberg, A., Niklas, F., and Kuger, S. (2021). The home learning environment in the digital age-associations between self-reported "analog" and "digital" home learning environment and Children's socio-emotional and academic outcomes. *Front. Psychol.* 12:592513. doi: 10.3389/fpsyg.2021.592513

Lenhart, J., and Lingel, K. (2023). My child lags behind: parents' perceptions of children's needs for language support, their home-literacy practices, and children's language skills. *Early Child. Res. Q.* 64, 119–128. doi: 10.1016/j.ecresq.2023.02.008

Liebers, K., and Heger, B. (2017). "Erwerb Früher Literalität Im Übergang Von Der Kita in die Grundschule." [acquisition of early literacy in the transition from kindergarten to primary school: findings of a longitudinal study with a focus on gender differences]. *Frühe Bildung* 6, 191–198. doi: 10.1026/2191-9186/a000345

Manu, M., Torppa, M., Eklund, K., Poikkeus, A.-M., Lerkkanen, M.-K., and Niemi, P. (2021). Kindergarten pre-Reading skills predict grade 9 Reading comprehension (PISA Reading) but fail to explain gender difference. *Read. Writ.* 34, 753–771. doi: 10.1007/s11145-020-10090-w

Marinak, B. A., Malloy, J. B., Gambrell, L. B., and Mazzoni, S. A. (2015). Me and my Reading profile. *Read. Teach.* 69, 51–62. doi: 10.1002/trtr.1362

Marsh, H. W. (1990). The structure of academic self-concept: the Marsh/Shavelson model. *J. Educ. Psychol.* 82, 623–636. doi: 10.1037/0022-0663.82.4.623

Marsh, J. (2016). The digital literacy skills and competences of children of pre-school age. *Media Education* 7, 197–214. doi: 10.14605/MED721603

Marsh, J., Brooks, G., Hughes, J., Ritchie, L., Roberts, S., and Wright, K. (2005). Digital beginnings: young children's use of popular culture, media and new technologies. Sheffield: University of Sheffield.

Marsh, H. W., Pekrun, R., Parker, P. D., Murayama, K., Guo, J., Dicke, T., et al. (2019). The murky distinction between self-concept and self-efficacy: Beware of lurking jingle-jangle fallacies. *J. Educ. Psychol.* 111, 331–353. doi: 10.1037/edu0000281

Mayring, P. (2016). Einführung in die qualitative Sozialforschung [introduction to qualitative research]. *6th* Edn. Weinheim: Beltz.

Melhuish, E. C., Phan, M. B., Sylva, K., Sammons, P., Siraj-Blatchford, I., and Taggart, B. (2008). Effects of the home learning environment and preschool center experience upon literacy and numeracy development in early primary school. *J. Soc. Issues* 64, 95–114. doi: 10.1111/j.1540-4560.2008.00550.x

Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., and Wager, T. D. (2000). The Unity and Diversity of executive functions and their contributions to complex "frontal lobe" tasks: a latent variable analysis. *Cogn. Psychol.* 41, 49–100. doi: 10.1006/cogp.1999.0734

Naab, T. (2021). ""Zwischen Einschränkung und gemeinsamer Nutzung: Mediennutzung und Medienerziehung von Kindern im Alter von bis zu elf Jahren." [Between restriction and joint use: media use and media education of children aged up to eleven years]" in Aufwachsen in Deutschland 2019: Alltagswelten von Kindern, Jugendlichen und Familien. eds. S. Walper, S. Kuger and T. Rauschenbach (Bielefeld: WBV), 57–63.

Nag, S., Vagh, S. B., Dulay, K. M., Snowling, M., Donolato, E., and Melby-Lervåg, M. (2024). Home learning environments and children's language and literacy skills: a meta-analytic review of studies conducted in low-and middle-income countries. *Psychol. Bull.* 150, 132–153. doi: 10.1037/bul0000417

Näger, S. (2017). Literacy: Kinder entdecken Buch-, Erzähl-und Schriftkultur [literacy: Children discover the culture of books, storytelling and writing]. Freiburg im Breisgau: Herder.

Niklas, F. (2017). Frühe Förderung Innerhalb Der Familie: Das Kindliche Lernen in Der Familiären Lernumwelt: Ein Überblick [early support within the family: Children's learning in the family learning environment: An overview]. Wiesbaden: Springer.

Niklas, F., and Schneider, W. (2013). Home literacy environment and the beginning of Reading and spelling. *Contemp. Educ. Psychol.* 38, 40–50. doi: 10.1016/j.cedpsych.2012.10.001

Nouwens, S., Groen, M. A., and Verhoeven, L. (2016). How storage and executive functions contribute to Children's Reading comprehension. *Learn. Individ. Differ.* 47, 96–102. doi: 10.1016/j.lindif.2015.12.008

Oxley, E., and McGeown, S. (2023). Reading for pleasure practices in school: Children's perspectives and experiences. *Educ. Res.* 65, 375–391. doi: 10.1080/00131881.2023.2236123

Pfost, M. (2015). Children's phonological awareness as a predictor of Reading and spelling. *Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie* 47, 123–138. doi: 10.1026/0049-8637/a000141

Pfost, M., Blatter, K., Artelt, C., Stanat, P., and Schneider, W. (2019). Effects of training phonological awareness on Children's Reading skills. *J. Appl. Dev. Psychol.* 65:101067. doi: 10.1016/j.appdev.2019.101067

Pfost, M., and Freund, J. G. (2018). "Interactive audio pens, home literacy activities and emergent literacy skills." Diskurs Kindheits-und Jugendforschung/discourse. *J. Childh. Adolesc. Res.* 13. Available at: https://budrich-journals.de/index.php/diskurs/article/view/32002

Pfost, M., Freund, J. G., and Becker, S. (2018). "Aspekte Der Nutzung Digitaler Lesemedien Im Vorschulalter." [electronic storybooks and interactive audio pens: facets of use]. *Frühe Bildung* 7, 40–47. doi: 10.1026/2191-9186/a000358

Schiefele, U., and Schaffner, E. (2016). Factorial and construct validity of a new instrument for the assessment of Reading motivation. *Read. Res. Q.* 51, 221–237. doi: 10.1002/rrq.134

Schüller, E. M. (2014). Lesen Als Freizeitbeschäftigung Von Grundschulkindern: Entwicklung Von Skalen auf Grundlage Der Theorie des Geplanten Verhaltens [Reading as leisure time activity of primary school students: development of scales based on the theory of planned behavior]. Dissertation. (Accessed January 10, 2022). https://opus4.kobv.de/opus4-fau/frontdoor/index/index/docId/5488

Schüller, E. M., Birnbaum, L., and Kröner, S. (2017). What makes elementary school students read in their leisure time? Development of a comprehensive questionnaire. *Read. Res. Q.* 52, 161–175. doi: 10.1002/rrq.164

Sénéchal, M., LeFevre, J.-A., Thomas, E., and Daley, K. (1998). Differential effects of home literacy experiences on the development of Oral and written language. *Read. Res. Q.* 33, 96–116. doi: 10.1598/RRQ.33.1.5

Sénéchal, M., and LeFevre, J.-A. (2002). Parental involvement in the development of Children's Reading skill: a five-year longitudinal study. *Child Dev.* 73, 445–460. doi: 10.1111/1467-8624.00417

Sénéchal, M., and LeFevre, J.-A. (2014). Continuity and change in the home literacy environment as predictors of growth in vocabulary and Reading. *Child Dev.* 85, 1552–1568. doi: 10.1111/cdev.12222

Sénéchal, M., LeFevre, J.-A., Smith-Chant, B. L., and Colton, K. V. (2001). On refining theoretical models of emergent literacy the role of empirical evidence. *J. Sch. Psychol.* 39, 439–460. doi: 10.1016/S0022-4405(01)00081-4

Shen, Y., and Del Tufo, S. N. (2022). Parent-child shared book Reading mediates the impact of socioeconomic status on heritage language learners' emergent literacy. *Early Child. Res. Q.* 59, 254–264. doi: 10.1016/j.ecresq.2021.12.003

Silinskas, G., Lerkkanen, M.-K., Tolvanen, A., Niemi, P, Poikkeus, A.-M., and Nurmi, J.-E. (2012). The frequency of parents' Reading-related activities at home and Children's Reading skills during kindergarten and grade 1. *J. Appl. Dev. Psychol.* 33, 302–310. doi: 10.1016/j.appdev.2012.07.004

Silinskas, G., Sénéchal, M., Torppa, M., and Lerkkanen, M.-K. (2020). Home literacy activities and Children's Reading skills, independent Reading, and interest in literacy activities from kindergarten to grade 2. *Front. Psychol.* 11:1508. doi: 10.3389/fpsyg.2020.01508

VERBI Software (2019). MAXQDA 2020: Software Für qualitative Datenanalyse. Berlin: Sozialforschung GmbH.

Stiftung Lesen. (2012). "Vorlesestudie 2012: Digitale Angebote – Neue Anreize Für das Vorlesen?" (Vorlesestudie 2012: Digital offers—new incentives for reading aloud? Representative survey of parents with children aged 2 to 8 years). Repräsentative Befragung von Eltern mit Kindern im Alter von 2 bis 8 Jahren.

Stiftung Lesen. (2019). "Vorlesen: Mehr Als Vor-Lesen! Vorlesestudie 2019— Vorlesepraxis Durch Sprachanregende Aktivitäten in Familien Vorbereiten und Unterstützen." [Vorlesestudie 2019—preparing and supporting reading aloud practice through language-stimulating activities in families. Representative survey of parents with children aged 2 to 8 years]. Repräsentative Befragung von Eltern mit Kindern im Alter von 2 bis 8 Jahre.

Stiftung Lesen. (2021). "Kitas Als Schlüsselakteure in Der Leseförderung: Vorlesestudie 2021." [day-care centers as key actors in reading promotion: Vorlesestudie 2021. Representative survey of professionals in day-care centers]. Repräsentative Befragung von Fachkräften in Kitas.

Swain, J. M., and Cara, O. (2019). Changing the home literacy environment through participation in family literacy Programmes. *J. Early Child. Lit.* 19, 431–458. doi: 10.1177/1468798417745118

Takada, M. E., Lemons, C. J., Balasubramanian, L., Hallman, B. T., Al Otaiba, S., and Puranik, C. S. (2023). Measuring kindergarteners' motivational beliefs about writing: a mixed-methods exploration of alternate assessment formats. *Front. Psychol.* 14:1217085. doi: 10.3389/fpsyg.2023.1217085

Tsirmpa, C., Stellakis, N., and Lavidas, K. (2021). Beliefs of parents of preschool children about literacy: facilitative and conventional approaches. *Eur. Early Child. Educ. Res. J.* 29, 519–532. doi: 10.1080/1350293X.2021.1941169

Umek, M. L., Podlesek, A., and Fekonja, U. (2005). Assessing the home literacy environment. *Eur. J. Psychol. Assess.* 21, 271–281. doi: 10.1027/1015-5759.21.4.271

Wasik, B. H., and van Horn, B. (2012). "The role of family literacy in society" in Handbook of family literacy. ed. B. H. Wasik. *2nd* ed (New York: Routledge).

Weldemariam, K. (2022). The home literacy environment as a venue for fostering bilingualism and Biliteracy: the case of an Ethio-Norwegian bilingual family in Oslo, Norway. *J. Early Child. Lit.* doi: 10.1177/14687984221109415

Wendt, H., Bos, W., Tarelli, I., Vaskova, A., and Hussmann, A. (Eds.) (2016). IGLU & TIMSS 2011: Skalenhandbuch zur Dokumentation der Erhebungsinstrumente und Arbeit mit den Datensätzen [IGLU & TIMSS 2011. Scale manual for documenting the survey instruments and working with the data sets]. Münster, New York: Waxmann.

Wigfield, A., and Guthrie, J. T. (1997). Relations of Children's motivation for Reading to the amount and breadth or their Reading. *J. Educ. Psychol.* 89, 420–432. doi: 10.1037/0022-0663.89.3.420

Yeo, L. S., Ong, W. W., and Charis, M. N. (2014). The home literacy environment and preschool Children's Reading skills and interest. *Early Educ. Dev.* 25, 791–814. doi: 10.1080/10409289.2014.862147

Predictors of academic engagement of high school students: academic socialization and motivational beliefs

Getachew Tassew Woreta*

Department of Psychology, Wollo University, Dessie, Ethiopia

The potential of academic engagement to enhance academic outcomes and well-being has been empirically supported, yet studies addressing its predictors are too limited. Hence, the current study collected self-report cross-sectional data from randomly selected 614 (male = 323) high school students in Ethiopia and examined the relations of academic socialization (parental and peer), self-efficacy, and outcome expectations in explaining variance in academic engagement, guided by an integrative model of engagement. Structural equation modeling with the maximum likelihood method indicated that (a) the hypothesized model fit the data well, (b) direct paths from parental and peer academic socialization to self-efficacy, outcome expectations, and academic engagement were positive and significant, (c) the relationships of the constructs in the model explained a significant portion of the variance in academic engagement, and (d) self-efficacy and outcome expectations significantly and positively but partially mediated the pathway from academic socialization to academic engagement. The findings' implications for boosting student academic engagement were forwarded.

Introduction

Researchers in education and educational psychology have given due attention to student engagement scholarship because it has been recognized mainly for the roles it plays in enhancing students' learning (Skinner, 2016), persistence in education (Fredricks et al., 2004), academic achievement (Zumbrunn et al., 2014), school completion (Fall and Roberts, 2012), and better well-being (Wang et al., 2015; Moreira et al., 2019). Despite these and other well-noticed and duly acknowledged contributions that student engagement has, little has been done about what factors contribute to its development. This condition actually calls for a study aimed at identifying the potential antecedents of engagement and suggesting possible evidence-based interventions. Furthermore, the construct is highly responsive to changes in the environment (Wang et al., 2016) and malleable. Therefore, the purpose of the present study was to examine some contextual and personal antecedents of academic engagement among Ethiopian high school students. In this pursuit, an academic engagement model, which has been formulated based on a development-in-sociocultural context perspective (Wang et al.,

2019, 2020) and prior empirical evidence, was tested with data collected from Ethiopian high school students.

Positive outcomes of academic engagement

Literature on student engagement suggests that a substantial variation exists in how engagement has been defined and conceptualized and this has resulted in (a) the inclusion of multiple variables associated with student success in school, such as students' school-related conduct (Fredricks et al., 2004; Wang et al., 2019), school belongingness (Finn and Zimmer, 2012), self-regulation (Greene, 2015), and future aspirations and goals (Appleton et al., 2006), (b) measuring student engagement via different tools, (c) inclusion of two, three, or four dimensions (Fredricks et al., 2004; Reeve and Tseng, 2011; Wang et al., 2016), (d) confusion about the facilitators and the indicators of engagement (Lam et al., 2014), and (e) using the same items to measure different aspects of engagement (Eccles and Wang, 2012) which finally caused difficulty in comparing the reported findings.

Nevertheless, despite the discrepancies in conceptualization and measurement of student engagement, studies provided adequate empirical support for the positive effect of engagement on students' academic performance at all educational levels (Wang and Holcombe, 2010; Dotterer and Lowe, 2011; Li and Lerner, 2011; Finn and Zimmer, 2012; Reeve and Lee, 2014; Dogan, 2017; Fung et al., 2018). The existing empirical works have witnessed the roles of student engagement in enhancing academic success and school completion (e.g., Archambault et al., 2009) and decreasing the risk of school dropout and delinquency (Fall and Roberts, 2012; Henry et al., 2012; Wang and Peck, 2013; Wang and Fredricks, 2014). Student engagement also has long-term effects on emotional well-being and adjustment. The research found that student engagement was positively associated with adjustment (Simons-Morton and Crump, 2003), use of practical coping skills (Reschly et al., 2008), less depressive symptoms (Li and Lerner, 2011), and well-being (Reschly et al., 2008; Salmela-Aro et al., 2009; Cadime et al., 2016; Boulton et al., 2019). Students with positive pathways of engagement are less likely to show problem behaviors (i.e., less likely to be involved in delinquency, serious offenses, and problem substance use) during adolescence and early adulthood (Hirschfield and Gasper, 2011; Li and Lerner, 2011; Henry et al., 2012). Findings from data spanning 40 years of life, taking into account many individual difference variables, also showed that adolescent school engagement had a positive impact on adult educational and employment outcomes (Symonds et al., 2023).

Given that academic engagement plays multifaceted roles in the life of students and it is malleable (Bresó et al., 2011; Wang and Eccles, 2012), more effort has to be invested in identifying what factors positively contribute to its development. In this regard, Alrashidi et al. (2016) noted that "it is important for researchers and educators to consider factors that might help heighten and foster students' engagement in school and academic-related activities which, eventually, enhance students' performance outcomes" (p. 47). Although few researchers have recently begun to respond to this call (e.g., Jang et al., 2010; Johnson and Sinatra, 2013; Zhen et al., 2018), more research focusing on what factors shape student engagement in the learning process needs to be conducted to identify appropriate areas of interventions promoting students' academic engagement. The facilitators of student engagement can be broadly grouped into self-system (personal) and social system (contextual), although they can also be further separated into other classes of variables (Wang and Holcombe, 2010; Bresó et al., 2011; Wang and Eccles, 2012, 2013; Phan and Ngu, 2014; Reeve and Lee, 2014). In this study, academic socialization (parent & peer) represents contextual factors, while self-efficacy and outcome expectations belong to the class of personal factors.

Theoretical framework

The structural relationships among the constructs included in the study were guided by an integrative theoretical model of engagement, also called a development-in-sociocultural context perspective (Wang et al., 2019, 2020). An integrative theoretical model of engagement was developed in an attempt to respond to scholars' accentuated need for "a synthetic, coherent framework that simultaneously integrates extant literature and clarifies the conceptualization of engagement, identifies its facilitators and consequences, and proffers a theoretical model that elaborates on how engagement functions" (Wang et al., 2019, p. 1087). In response to such need for a theoretically sound, integrative model among the scholarly community, Wang and his colleagues synthesized extant research and integrated relevant concepts from self-system theory (Skinner et al., 2009), expectancy-value theory (Eccles, 2009), and mindset theory (Dweck, 2006) to illuminate the motivational processes underlying engagement. This recent and integrative theoretical perspective accounts for how student academic engagement develops over time and provides a theoretical framework for organizing the predictors and outcomes of student engagement, depicting the structural relations between social context, 'self,' engagement, and outcomes (Figure 1 depicts aspects of development-in-sociocultural context model related to the present study). As to the structural relationships between contexts, self, and engagement, the integrative theoretical perspective posits multiple direct and indirect (mediated by self-related variables) causal pathways from social contexts to academic engagement. The integrative theoretical model for children's engagement in learning is a complex developmental system that incorporates many categories of contextual and personal factors. The present study, however, examined only the structural relations of four constructs (parental academic socialization, peer academic socialization, academic self-efficacy, and educational outcome expectations) with students' academic engagement. For example, the model posits that motivational beliefs (e.g., self-efficacy and outcome expectancy) partially mediate the causal path from social context to student engagement. According to the integrative model, students' socialization experiences in family and peer contexts determine their self-efficacy and outcome expectations; in turn, the level of academic self-efficacy and outcome expectations influence the level of students' academic engagement. That is, the academic socialization that children experience at home and in peer contexts over time accumulates to shape their academic self-efficacy and outcome expectations for learning, which in turn influences their engagement in learning. While the development-in-sociocultural context model suggests causal links from left to right (social context → self → engagement → outcomes), it acknowledges the possibility of intricate feedback cycles or bidirectional processes in certain
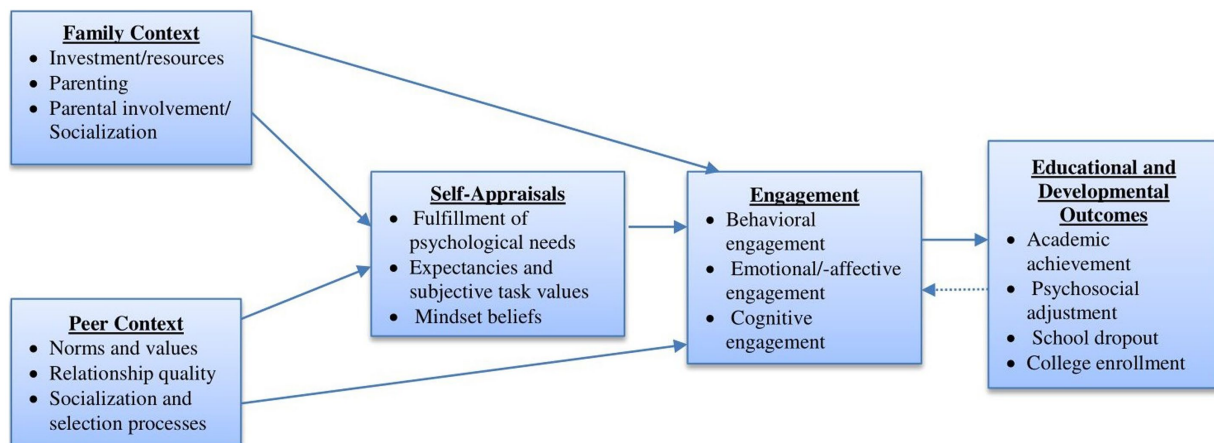
FIGURE 1
Some aspects of development-in-sociocultural context model of engagement (Wang et al., 2019).

instances. For example, high-quality academic engagement could reinforce children's emerging self-appraisals and competencies and determine the level of support from adults and the peer selection process. However, variable specific evidence is needed, instead of broad categories of constructs, to consider specific paths in opposite directions.

Academic socialization and student academic engagement

Parental involvement is vital for their children's school engagement and success (Melby et al., 2008; Murray, 2009; Fan and Williams, 2010; Fan et al., 2012; Wilder, 2014), although the impact of each form of involvement may vary depending on the developmental stage. Among other states of parental involvement (e.g., attending school events, helping with homework), parental academic socialization (socializing messages) like relating education to future success (Wang et al., 2014), is a vital aspect of the family context for understanding how parents influence their children's schooling and educational success during the period of adolescence (Hill and Tyson, 2009; Wang et al., 2014; Bæck, 2017).

Nowadays, academic-focused messages that parents convey to their children are considered an important aspect of parental involvement practices in influencing children's academic outcomes (Hoover-Dempsey and Sandler, 1997; Bempechat et al., 1999; Suizzo and Soon, 2006; Hill and Tyson, 2009) and such form of parental involvement represents parental academic socialization. Academic socialization is a verbal form of parental involvement that denotes academic-related messages exchanged between the parents and adolescent students rather than direct behavioral (e.g., social control & monitoring) or instrumental involvements (e.g., assisting with schoolwork, supplying educational resources). The most common academic messages from parents, representing academic socialization, relate to the value of education, the importance of effort, the pressure to meet parental expectations, and the shame of not meeting academic standards (Bempechat et al., 1999; Suizzo and Soon, 2006). In this study, parental academic socialization included messages aimed at socializing children about the importance of academic effort, the

values of education or the value of educational success, and educational expectations. Effort socialization represents those parental messages conveying the value of being effortful and hard-working, as well as associating failure in academic performance and career development with a lack of effort. It denotes inspiring the need to put forth the best academic effort for better academic and career development. Evidence indicates that effort socialization was related to motivational outcomes such as locus of control and classroom engagement (Suizzo et al., 2012, 2016). Parents also socialize their children by conveying their expectations for educational attainment. Educational expectations refer to the anticipation of accomplishment at school or university (Mello, 2008). Parents' expectations about their children's future achievement can be expressed in course grades, the highest level of schooling attained, or college/university attendance (Goldenberg et al., 2001; Glick and White, 2004). Research shows that children with high expectations from their parents do better academically, perform better on standardized tests, and stay in school longer than children with low expectations from their parents (Davis-Kean, 2005; Pearce, 2006; Vartanian et al., 2007). Meta-analyses studies also indicated that parental educational expectations are the strongest family-level predictor of student academic outcomes relative to other parental beliefs and behaviors (Jeynes, 2005, 2007). Therefore, educational expectations, values of education, and the importance of effort that parents convey to their children define parental academic socialization and are assumed to influence students' academic engagement.

During the adolescence period, peer context also becomes the most crucial aspect of the social system in socializing academic behaviors of adolescent students positively (Altermatt and Pomerantz, 2003; Kindermann, 2007; Rodkin and Ryan, 2012). Peer socialization is the process by which individuals learn many things from their peers, particularly from friends with whom they spend much of their time (Ryan, 2000; Kindermann and Gest, 2009). The context of the peer group determines the degree of an individual student's engagement in academic tasks, either by promoting or discouraging academic attitudes, values, and behaviors (Wang et al., 2018). Hanging out with peers who are academically motivated and committed increases one's motivation and commitment over time, although the opposite is also true. Evidence from longitudinal data indicated that friends and peers

do socialize with each other over time in their academic motivation, engagement, and achievement (Ryan, 2001; Altermatt and Pomerantz, 2003; Kindermann, 2007).

Observation of other peer members changes one's cognition, behavior, or emotions (Ryan et al., 2019). The behaviors, beliefs, attitudes, values, and other characteristics reflected and demonstrated by the peers can introduce a student to new behaviors, thoughts, perspectives, and feelings either through the process of modeling, the exchange of persuasive messages, or social reinforcement (encouragement or discouragement by peers). Research has indicated that friends are similar in their effortful behavior toward their schoolwork, interest, and enjoyment in their schoolwork (Ryan, 2001; Shin and Ryan, 2014), and preference for challenges (Altermatt and Pomerantz, 2003). These similarities among friends suggest how peers matter in socializing students' behavioral, affective, and cognitive engagement (Ryan et al., 2019). Adolescent peers interact regularly and spend more time together; hence, they have more opportunities to model and influence each other's academic behaviors (Wentzel, 2009). However, the attention given to peers matters for students' academic engagement is not as much as it deserves (Steenberghs et al., 2021). Specifically, peer influence through academic socialization did not receive the attention of the researchers in student engagement research.

Therefore, this study approached peer influence from an academic socialization perspective that includes three components: peers' educational aspirations, peers' efforts, and peers' academic norms. The extent to which students in a peer group exhibit positive academic behaviors (e.g., completing homework, attending class, valuing high grades, etc.) represents the academic norms of peers (McCormick and Cappella, 2014). The academic norms prevailing in the peer group are assumed to be imperative in determining high school student academic engagement. Friends and classmates were found to contribute to the development of individual student's behavioral and emotional engagement and disengagement (Steenberghs et al., 2021). Wang et al. (2018) also, using the peer nomination approach, found that over time students became more similar to the peers they nominated in their engagement. It is also important to note that in the early years of high school, students begin to think about their future education and careers; hence, they often discuss their views and aspirations with their peers (Eccles et al., 2004; Kiuru et al., 2007). Therefore, the aspirations of other students in the peer groups may be another way in which peers socialize students' educational aspirations and academic engagement. Adolescents tend to demonstrate similar levels of school-related adjustment to others in their peer group (Ryan, 2001; Chen et al., 2003). In a collectivist society like Ethiopia, the likelihood of being influenced by the perceived views of others in the peer group is believed to be high. Accordingly, the construct of peer academic socialization included peers' educational aspirations based on findings from other settings and the culture of current participants.

In this study, the peer/friendship group consists of individuals from different schools and classrooms but from the same grade level because a student in a collective society could have friends who are not in the same school but in the same residential area. In the context of Ethiopia, beyond the time spent in the classroom, students walk a long distance in a group from home to school or vis-versa which allows them to exchange more information and influence each other's behavior. In addition to walking a long distance in a group, students

from different schools could meet regularly at home or in areas around their homes to do schoolwork and study for tests together, allowing for more discussions and information exchange about school lessons. As a result, feelings, behaviors, and thoughts regarding learning and school might be shared repeatedly among peer members and influence what students feel, think, and do in school. In Ethiopia, the probability of a student's academic motivation and behavior being determined by a peer group is higher than the peer context of the Western world, which is dominantly individualistic in life. However, the attention given to the effect of peers on students' academic matters is not as it deserves, and almost none in the context of Ethiopian high school students.

Motivational beliefs and student academic engagement

In addition to contextual factors, personal or individual-level factors play a vital role in shaping student engagement in academic affairs. Outcome expectations and self-efficacy are the most important cognitive-motivational factors that positively influence learning engagement, according to social cognitive theory (Bandura, 1997). Academic self-efficacy refers to belief in one's ability to accomplish academic tasks (Bandura, 1997). As self-efficacy beliefs importantly determine one's effort expenditure, emotional responses, and sense of persistence in carrying out challenging academic tasks, students who have high academic self-efficacy beliefs tend to show greater academic engagement (Martin and Rimm-Kaufman, 2015; Rimm-Kaufman et al., 2015; Liu et al., 2018; Granziera and Perera, 2019; Navarro et al., 2019). It was found that higher self-efficacy beliefs were associated with greater engagement among fifth graders (Rimm-Kaufman et al., 2015) and university students (Wilson et al., 2015). However, self-efficacy alone does not motivate students to engage in academic activities (Wang and Degol, 2014) because outcome expectations for being engaged in the tasks also determine students' initiation and the decision to engage in the tasks. Outcome expectations uniquely account for motivated actions over and above self-efficacy beliefs (Fouad and Guillen, 2006). Outcome expectations represent the probable outcomes an individual expects for engaging in a particular course of action. They stand for the question, "If I do this, what are the consequences?" (Lent et al., 1994, p. 83). Educational outcome expectations, specifically, denote the probable outcomes a student expects for engaging in academic or educational activities. The role of outcome expectations has been well recognized in career development theories and research, especially in predicting career outcomes, such as interests, goals, persistence, and performance (Lent et al., 1994; Byars-Winston et al., 2010; Lent et al., 2013; Flores et al., 2014; Lent et al., 2016), though less attention is given to be incorporated into student engagement research. If an individual expects more positive outcomes for performing a particular task, the likelihood of being engaged in that task is greater (Bandura, 1997; Fouad and Guillen, 2006). Task values are positively related to engagement (Fan and Williams, 2010; Fan, 2011; Wang and Eccles, 2013) and the intention to continue studying at school or beyond (Fan and Wolters, 2014). Despite a shortage of studies addressing the relationship between outcome expectations and indices of academic engagement, Navarro et al. (2019) reported a positive and unique contribution of engineering outcome expectations to engineering academic

engagement based on data collected from undergraduate engineering students. Hence, in the present study, beliefs in one's academic ability and the expected outcomes are posited to influence the degree of students' academic engagement. Self-efficacy and outcome expectations are assumed to be the functions of equivalent learning experiences or contexts, so incorporating them simultaneously in a model that incorporates social context as their antecedents and academic engagement as outcomes seems to be sensible.

The current study

Although the role of student engagement in fostering learning outcomes has a substantial amount of empirical support regardless of the level of schooling, studies that examined what factors and how they determine the development of high school students' academic engagement were too limited. More research is needed to understand the dynamics through which contextual and personal factors shape student engagement and to improve the level and quality of students' academic engagement and, in turn, to increase their academic success. Therefore, the purpose of the current study was to examine the contextual and personal antecedents that could contribute a substantial amount of variance in the academic engagement of high school students. Based on the integrative theoretical perspective on engagement (Wang et al., 2019, 2020) and prior empirical works, academic socialization experiences from peers and parents, academic self-efficacy, and educational outcome expectations were assumed to explain a substantial amount of variance in high school students' academic engagement. Hence, this study examined the relations of parental and peer academic socialization with student academic engagement, treating self-efficacy and outcome expectations as mediators to indicate how parents and peers shape students' academic engagement. The model proposed for the present study (Figure 2) depicts the direct links posited between academic socialization and academic engagement as well as indirect pathways (via academic self-efficacy and outcome expectations) through which the socialization process shapes student engagement in learning. The primary hypothesis is that if students experience positive parental and peer

academic socialization, feel efficacious in their academic capability, and expect that their academic pursuit will result in significant outcomes, they will demonstrate greater academic engagement. For instance, parental messages that stress the need to exert academic efforts, convey positive values of education, and communicate high expectations to their children would have both direct and indirect links (via academic self-efficacy and educational outcome expectations) to the academic engagement of high school students.

The constructs included in the model and the presumed structural relations with academic engagement were found to be considerable because no studies have investigated these antecedents simultaneously within one conceptual framework using SEM. Specifically, the proposed model was not addressed by prior studies. Moreover, in this study: (1) the conceptualization of academic socialization and associated indices, which carefully considered the existing literature so far, was different from previous studies, and (2) the way academic engagement was defined and measured is unique because it was guided by the most recently proposed perspective on student engagement (Wong and Liem, 2022). The current study defined academic engagement as "students' psychological state of activity that affords them to feel activated, exert effort, and be absorbed during learning activities" (Wong and Liem, 2022, p. 120), with emotional, behavioral, and cognitive dimensions. Within this conceptualization, emotional engagement represents the level of activation that students experience during learning activities and is indicated by positive feelings, such as vigor, interest, enjoyment, and alertness. Feelings of attachment to the school and its community, unlike most of the prior studies, were not included in emotional engagement because they represent school engagement rather than learning engagement. Feelings of being connected to school (reflected by school attachment, belonging, bonding, and identification) and feelings of connection, closeness, and supportive relationships with teachers and classmates are not indicators of but rather potential antecedents of engagement (Skinner, 2016). Behavioral engagement represents the extent of students' deliberate effort they exert during learning activities and can be measured by a self-report tool that includes items tapping the students' effort and persistence during learning activities (Wong and Liem, 2022). Cognitive engagement, the third dimension, denotes the
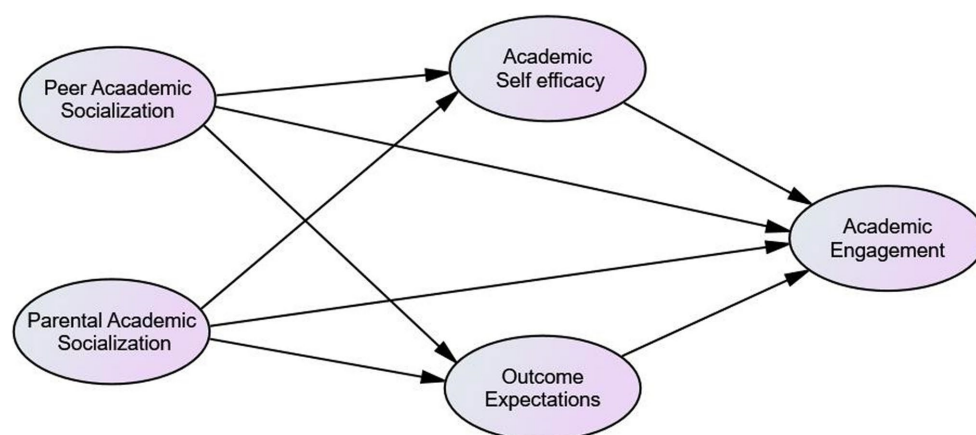

FIGURE 2
Proposed structural model of academic socialization, motivational beliefs and academic engagement.

level of student absorption during learning activities, being marked by (a) high-level concentration and task-relevant thoughts and (b) a decline in awareness of irrelevant external events (Wong and Liem, 2022). Scholars (e.g., Ben-Eliyahu et al., 2018; Wong and Liem, 2022) note that cognitive engagement represents the general cognitive processes like absorption instead of the specific learning strategies that students use during learning. Accordingly, Wong and Liem (2022) suggest that researchers can use self-reports of absorption during learning activities (Salmela-Aro and Upadaya, 2012) to assess student cognitive engagement. Unlike most of the prior studies, variables such as attendance, positive conduct, connection with the school and its community, and use of self-regulated learning strategies were not included in the present conceptualization of academic engagement because, most perhaps, they are antecedents or prerequisites of engagement instead of indicators.

The uniqueness of this study is not only in the simultaneous inclusion of the stated constructs in a single model, the order of placement within the model, and the way some of the constructs were conceptualized and measured but also in the context in which the study was conducted. It may be worth assuming that the contributions of social and psychological variables could differ across populations. Some studies that attempted to examine the predictors of student engagement were in the Western culture, and the extent to which the results can be applicable to non-Western contexts, specifically in the context of Ethiopia, is unseen.

It is important to note that there are many variations between the Western and Ethiopian contexts. The context in Ethiopia is different from the Western context, mainly in terms of culture and socio-economic factors. Western countries endorse individualism and individuals seek to maintain personal autonomy by attending to the self, while Ethiopia advocates collectivism in which the relatedness of individuals to each other and community values are more valued (Markus and Kitayama, 1991). This variation, as noted by Markus and Kitayama, has important effects on cognition, emotion, and motivation. In terms of the level of economic development and technological advancement, Western society is generally higher than that of Ethiopia. Ethiopia is still considered a developing country with a less diversified economy. Such difference also results in variations in the lifestyle, education, and opportunities available to people in these contexts. However, many scientific theories and hypotheses have been developed and tested primarily in Western contexts. Henrich et al. (2010) highlighted the fact that a significant portion of the psychological literature is built on studies conducted within Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies. This raises questions of generalizability to other cultures and societies around the world, highlighting the need for greater diversity and inclusivity in psychological research. Therefore, testing hypotheses generated based on Western contexts in Ethiopia can be plausible because cultural and socioeconomic contexts can greatly affect the applicability of these hypotheses in other parts of the world, particularly in developing countries like Ethiopia. Ethiopia may provide a context that is different enough from Western contexts to test the extent to which Western-based theories and hypotheses can be generalized across cultures and to establish the external validity of findings from Western populations. Evidence indicated that (e.g., Klassen, 2004; Ahn et al., 2016), students from individualistic and collectivistic cultural backgrounds evaluated

and interpreted socially conveyed sources of motivational beliefs (e.g., vicarious experience and social persuasion) differently in which for students with collectivistic cultural backgrounds socially conveyed messages were the most important sources for academic self-efficacy formation. Given that Ethiopia's cultural, social, and economic contexts, as well as its education system significantly differ from those of other countries where theoretical hypotheses are generated and previous studies have been conducted, and considering the substantial influence of cultural contexts, the motive behind the current study seems convincing.

Findings from this study would (a) strengthen the understanding of what factors positively shape student academic engagement across cultures. (b) provide empirical support for the cross-cultural validity of a development-in-sociocultural context theoretical framework, (c) suggest interventions to be initiated and implemented to improve the academic performance of students through augmenting academic engagement, and (d) in general help to expand our understanding of human behavior and psychology beyond the Western contexts. This study has particular importance in the context of Ethiopia, where high school students are becoming lower and lower in their academic motivation, engagement, and achievement to a great extent. For example, among grade 12 students who took Ethiopia's 2022 national school-leaving examination, only 3.3% of them were able to score 50% and above to qualify for tertiary education.

Method

Participants

The participants were 614 (323 males and 291 females) randomly selected high school students in grades 9 ($n = 329$) and 10 ($n = 285$). They were from six randomly chosen public high schools located in six different districts of South Wollo Administrative Zone, Amhara Regional State, Ethiopia. From the six schools, one to three classes of each target grade were selected randomly, and finally, each participant was chosen with a simple random sampling technique. The number of participants across schools ranges from 60 to 145, based on the total number of students in each sample school. The sample had a mean age of 16.1 years (SD = 0.66), ranging from 15 to 17 years of age. All the participants attend regular high school education programs in public schools. Ethnically, participants were Amhara except that 13 students identified as other ethnicities and three students did not indicate.

Procedures

Following receipt of ethical approval from the ethics committee of the Institute of Teachers Education and Behavioural Science, Wollo University, the school principals and teaching staff at each school were approached, and their permission to collect the data was obtained. School teachers administered the questionnaire to participants during the school days, with no time limits and close supervision of the researcher. Students provided their informed consent (dealing with their parents) by singing on the consent forms prepared for such purpose. However, participants were not requested to write a name or other personal identifying variables to ensure the anonymity of data.

Measures

Academic engagement

The academic engagement measure included 16 items. For behavioral and emotional dimensions, the engagement subscales of the Engagement Versus Disaffection with Learning measure (Skinner et al., 2009) were used except for the two items added to the behavioral subscale from Wang et al. (2016). The behavioral engagement scale comprised six items tapping students' effort and persistence while participating in learning activities. The emotional engagement subscale included five items tapping positive emotions during learning activities. The cognitive engagement was assessed by five items, which included the three-item absorption subscale of the schoolwork engagement inventory (Salmela-Aro and Upadaya, 2012) and two items from the cognitive engagement scale designed by Ben-Eliyahu et al. (2018). This was done to be consistent with the way cognitive engagement has been conceptualized and the recommendation forwarded by Wong and Liem (2022). Moreover, items addressing learning engagement at home were included. Sample items include: "I try hard to do well in school" (behavioral engagement), "Class is fun for me" (emotional engagement), and "Time flies when I am studying" (cognitive engagement). Participants rated the items using a 5-point Likert-type scale, with the options of 'not at all true for me' (1) to 'very true for me' (5). Previous studies have disclosed adequate reliability estimates for the original items of each dimension (Skinner et al., 2008; Salmela-Aro and Upadaya, 2012; Xiong et al., 2021). The present data disclosed acceptable Cronbach's alpha values (0.92 for behavioral, 0.89 for emotional, 0.90 for cognitive, and 0.89 for the full engagement scale). Confirmatory factor analysis (CFA) was conducted to assess each item's factor loading and factor structure of the constructs included in this study. Within this paper, model fit was evaluated using five indices: the relative chi-square test (χ^2/df), the Tucker–Lewis index (TLI), the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root-mean-square residual (SRMR). Because of much controversy on appropriateness and interpretation of the model-fit criteria, Schumacker and Lomax (2016) recommend reporting more than one model-fit index stating that if "a majority of the fit indices on your list indicate an acceptable model, then your theoretical model is supported by the data" (p. 119). As the chi-square statistic (χ^2) is affected by the sample size, it mostly rejects the model when the sample size increases (if $N > 200$) (Bentler and Bonett, 1980; Schumacker and Lomax, 2016). As a result, a relative chi-square statistic (χ^2/df) was used instead of it in this study (Wheaton et al., 1977). If CFI and TLI ≥ 0.95, and RMSEA and SRMR ≤ 0.06 (Hu and Bentler, 1999), a model adequately fits the data. A relative chi-square test with a value below 3 is considered an acceptable fit (Kline, 2011). For the academic engagement measure, CFA suggested that the three-factor model fit the data well (χ^2 /df = 3.2, CFI = 0.96, TLI = 0.95, SRMR = 0.036, RMSEA = 0.06, 90% CI = 0.053, 0.067). Factor loadings reached statistical significance and their standardized estimates ranged from 0.749 to 0.85.

Parental academic socialization

The parental academic socialization (PAS) scale has 17 items and assesses parents' messages of effort socialization (4 items), educational expectations (5 items), and value of education (8 items). Participants indicated the extent to which they have been experiencing such

parental messages from 1 (not at all) to 5 (always). Effort socialization items were from the effort subscale of the Educational Socialization Scale (Bempechat et al., 1999). A sample item from the effort subscale includes, "My parents say you can get smarter and smarter as long as you try hard." For parental educational expectations, five items were adapted from the perceived parental academic support scale (Chen, 2005; Cross et al., 2019). This scale included items such as "I feel pressured by my parents to do well in school." The value or importance of education sub-scale consisted of the five-item Benefits of Education subscale of the Economic Benefits and Limitations of Education scale (Murdock et al., 2000) and three items created for the present study to assess the non-economic value of education. A sample item includes: "My parents say if I do well in school, I will get a good job," Higher scores in each dimension of parental academic socialization reflect a greater frequency of the PAS messages. Previous studies have disclosed adequate reliability estimates for the original items of each dimension (Murdock et al., 2000; Mroczkowski and Sanchez, 2015; Cross et al., 2019). In the present study, the data disclosed Cronbach's alpha coefficient of 0.86, 0.92, 0.84, and 0.89 for effort, the value of education, educational expectations, and full scale, respectively. CFA also suggested that the three-factor PAS model fit the data well (χ^2 / df = 2.85, CFI = 0.96, TLI = 0.95, SRMR = 0.04, RMSEA = 0.055, 90% CI = 0.048, 0.062). Factor loadings reached statistical significance and their standardized estimates ranged from 0.72 to 0.82.

Peer academic socialization

Participants were asked to list a group of friends with whom they spend more time and do many things together, without limit to the number of friends to be listed. They were informed that members of the friendship group they list are limited to their grade level, but they can be from other classrooms and schools. What matters in the selection process is the time spent together and feelings of connectedness to do things together and exchange information. Participants were reminded that the members of this group were referred to as "your friends or friendship group" throughout the items included to assess the context of their peer group. The purpose of the list of friends is to make a focused and pertinent judgment about the context of the peer group.

The measure of peer academic socialization consisted of 16 items and included three subscales. The effort socialization subscale has four items tapping the peer group's stress on effort and was adapted from the effort subscale of the Educational Socialization Scale (Bempechat et al., 1999). A sample is, "My friends say we could do better in school if we worked harder." Measures addressing peers' academic norms and educational aspirations were adapted from the Peers' Academic Support and Aspirations Scale (Murdock, 1999; Murdock et al., 2000). With regard to assessing peer academic norms, each participant was presented with the seven-item peers' academic norm scale and asked to rate to what extent most of the members of his/her friendship group had the potential to do a variety of academic tasks and demonstrate positive academic behaviors relevant to high school education. A sample item used to assess the academic norms of the peer group includes: "Most of my friends try to do well in school." Peers' educational aspirations had five items to assess students' perceptions that their friends would complete high school and continue with their education (peers' aspirations for their academic future). This scale included items such as "Most of my friends plan to go to college/university." The current study revealed good internal consistency for the peers' effort subscale (Cronbach's alpha = 0.77), educational aspirations subscale (Cronbach's alpha = 0.82), academic

norm subscale (Cronbach's alpha = 0.84), and full academic socialization scale (Cronbach's alpha = 0.87). CFA also demonstrated an excellent model-data fit for three-factor structure of peer academic socialization scale (χ^2/df = 2.1, CFI = 0.97, TLI = 0.96, SRMR = 0.038, RMSEA = 0.043, 90% CI = 0.035, 0.051). Factor loadings reached statistical significance and their standardized estimates ranged from 0.62 to 0.73.

Academic self-efficacy

Academic self-efficacy was assessed by the academic self-efficacy subscale of the self-efficacy questionnaire for children (SEQ-C; Muris, 2001), which has eight items to tap students' feelings about their ability to be successful in school and demonstrate appropriate academic behaviors. The participants rated their feeling of efficacy using a four-Likert-type scale (1 = not at all confident to 4 = very confident). The scale included items like "How confident are you that you could study when there are other interesting things to do?" An SEQ-C drew greatly on the concept of self-efficacy, and it has been acknowledged in many of its features, such as it was developed with youth, is simple in terms of format, is domain-specific, and is fairly brief (Minter and Pritzker, 2017). The exploratory factor analysis result indicated that all items of the scale "hung together" to form a one-dimensional scale. CFA also supported the unidimensionalty of the measure (χ^2/df = 2.3, CFI = 0.99, TLI = 0.99, SRMR = 0.018, RMSEA = 0.046, 90% CI = 0.028, 0.064). Factor loadings reached statistical significance and their standardized estimates ranged from 0.75 to 0.79. The scale demonstrated a strong internal consistency in previous research (e.g., Landon et al., 2007; Suldo and Shaffer, 2007; Minter and Pritzker, 2017), which also appeared to be good for the current participants (Cronbach's alpha = 0.92).

Educational outcome expectations

The outcome expectations measure consisted of 14 items taken from the College Outcome Expectations questionnaire (Flores et al., 2008). The items were adapted to the study population by replacing the stem: "A college education will..." with "secondary and post-secondary education will ..." The original scale has 19 items, but for the present study, four items related to social affairs (i.e., leaving enough time for family and friends, making several friends, meeting new people, and causing problems in the family) and one item related to college courses, totally five items, were excluded as they are found not applicable for the present participants. Participants rated each item (e.g., "Secondary and post-secondary education will allow me to obtain a well-paying job") on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). High scores represent a high level of positive academic outcome expectations. The output of exploratory factor analysis suggested that all items of the scale "hung together" to form a one-dimensional scale. CFA also supported the unidimensionalty of the measure (χ^2/df = 3.2, CFI = 0.97, TLI = 0.96, SRMR = 0.028, RMSEA = 0.06, 90% CI = 0.051, 0.069). Factor loadings reached statistical significance and their standardized estimates ranged from 0.70 to 0.81. In the present study, Cronbach's alpha value was 0.94.

Results

Preliminary analyses

During data screening, a closer examination of the data revealed that 21 cases were missing more than 20% of the items and were deleted from the data set (Schlomer et al., 2010; Navarro et al., 2019).

The deletion has reduced the data set to 614. In testing the measurement model, three latent variables were represented by their corresponding subscales. Accordingly, parental academic socialization consisted of educational expectations, effort socialization, and value of education; peer academic socialization included peers' educational aspiration, peers' effort, and peers' academic norms; and academic engagement comprised behavioral, emotional, and cognitive dimensions. Self-efficacy and outcome expectations were each indexed by three item parcels formed by random algorithm (Matsunaga, 2008). The number of items in the parcels of academic self-efficacy was from 2 to 3 (ASE1 includes items 1, 2, and 4, ASE2 includes items 3, 6, and 8, and ASE3 includes items 5 and 7), whereas, in outcome expectations, it was from four to five items (OE1 includes items 1, 2, 4, 5, and 7, OE2 includes items 3, 6, 8, 11, and 14, and OE3 includes items 9, 10, 12, and 13). In total, the model included 15 indicator-level variables. The purpose of the present study is to examine the relationships among constructs included in the proposed model rather than focusing on the relationships among individual items, therefore, "parceling is more strongly warranted"(Little et al., 2002, p. 169).

The data was checked for outliers and normality issues at indicator-level variables. The numerical standard deviates method, $|z| < 3.0$ (Kline, 2023), and the graphic techniques (e.g., box plots) did not display scores further away from the rest of the distribution; hence, there is no issue of univariate outliers in the dataset. Mahalonbis distance, D^2, also did not indicate evidence for multivariate outliers (i.e., a small value of D^2 and lowest p-value, 0.001). The data was found to be univariate normal as all of the absolute values of the skewness (range: −0.43 to 0.345) and kurtosis (range: −0.783 to −0.218) indices were less than 2 and 7, respectively (Finney and DiStefano, 2013; Kline, 2023). Marida's normalized estimate of multivariate kurtosis for the model was 4.45 (< 5), indicating no violation of multivariate normality (Byrne, 2016). None of the correlations among indicator variables after parceling (range 0.24 to 0.83) and among predictor latent constructs (range 0.35 to 0.66) surpassed 0.90, suggesting that multicollinearity was not a problem (Abu-Bader, 2010; Kline, 2023). Therefore, the final data set maintained responses from 614 participants.

The descriptive statistics and correlations among the study's observable variables are presented in Table 1. The relations among the variables were significant. The standardized loadings of indicator variables on respective factors range from 0.76 to 0.92 (Figure 2).

Primary analysis

Measurement model

Structural equation modeling with a maximum likelihood estimation method was used to estimate the parameters (via AMOS Version 26). As the first step of testing the hypothesized structural model, the fitness of the measurement model was examined to confirm that all latent variables were acceptably represented by their parcels. In doing this, five latent factors were allowed to covary with no specified structural relations among them. All item parcels loaded significantly (p < 0.001) onto their respective factors, with standardized loadings ranging from 0.79 to 0.84 on outcome expectations, from 0.85 to 0.92 on academic engagement, from 0.76 to 0.83 on self-efficacy, from 0.76 to 0.79 on peer academic socialization and from 0.79 to 0.83 on parental academic socialization. Each of the fit indices suggested that the measurement model fits sample data very well (χ^2/df = 2, RMSEA = 0.04

TABLE 1 Descriptive statistics and correlations among the study's observable variables.

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Peer educational aspiration	–														
2	Peer academic norm	0.58**	–													
3	Peer effort socialization	0.62**	0.61**	–												
4	Outcome expectations 1	0.40**	0.36**	0.43**	–											
5	Outcome expectations 2	0.37**	0.32**	0.38**	0.70**	–										
6	Outcome expectations 3	0.36**	0.35**	0.39**	0.64**	0.67**	–									
7	PAS – educational expectations	0.44**	0.43**	0.40**	0.45**	0.44**	0.41**	–								
8	PAS – effort	0.40**	0.42**	0.39**	0.40**	0.41**	0.45**	0.69**	–							
9	PAS – value of education	0.41**	0.42**	0.43**	0.50**	0.46**	0.42**	0.64**	0.61**	–						
10	Cognitive engagement	0.47**	0.44**	0.43**	0.47**	0.46**	0.45**	0.49**	0.51**	0.51**	–					
11	Behavioral engagement	0.48**	0.44**	0.45**	0.49**	0.47**	0.44**	0.53**	0.49**	0.48**	0.85**	–				
12	Emotional engagement	0.52**	0.44**	0.46**	0.44**	0.46**	0.42**	0.51**	0.50**	0.48**	0.78**	0.77**	–			
13	Academic self-efficacy 1	0.29**	0.37**	0.30**	0.22**	0.21**	0.16**	0.33**	0.34**	0.34**	0.36**	0.43**	0.38**	–		
14	Academic self-efficacy 2	0.32**	0.33**	0.30**	0.17**	0.18**	0.16**	0.35**	0.34**	0.29**	0.31**	0.33**	0.34**	0.59**	–	
15	Academic self-efficacy 3	0.28**	0.32**	0.26**	0.17**	0.15**	0.11**	0.28**	0.29**	0.29**	0.31**	0.33**	0.31**	0.64**	0.67**	–
	Mean	3.53	3.35	3.47	3.69	3.72	3.71	3.58	3.68	3.38	3.45	3.51	3.36	2.25	2.58	2.47
	Standard deviation	0.75	0.81	0.78	0.73	0.76	0.72	0.74	0.83	0.76	0.84	0.87	0.86	0.7	0.7	0.68
	Skewness	−0.41	−0.06	−0.15	−0.24	−0.42	−0.43	−0.43	−0.4	−0.01	−0.13	−0.05	−0.14	0.35	−0.2	0.12
	Kurtosis	−0.29	−0.4	−0.51	−0.42	−0.41	−0.33	−0.21	−0.59	−0.48	−0.73	−0.78	−0.46	−0.31	−0.52	−0.57

$**p < 0.01$, $N = 614$.

[90% CI = 0.031,0.049], CFI = 0.97, TLI = 0.98 and SRMR = 0.027). Hence, the results of the measurement model supported that the indicators adequately measured their underlying latent factors.

Structural model

As the measurement model fit the data well, the analysis proceeded to test the hypothesized structural model depicting the relations of the contextual and cognitive-person factors in explaining high school student academic engagement using the maximum likelihood estimation method. The result indicated an excellent model fit to the data (χ^2/df = 2.1, CFI = 0.98, TLI = 98, RMSEA = 0.042 [90% CI = 0.033,0.051], and SRMR = 0.032). Also. the standardized residual correlation matrix supports the model as almost all values were within acceptable range. That is, the structural model fits the observed data well. All the hypothesized paths of the model were statistically significant, and they were in the predicted directions. The standardized direct effects are shown in Figure 3. Parental academic socialization was positively associated with students' academic self-efficacy ($\beta = 0.28$, $p < 0.001$), outcome expectations ($\beta = 0.48$, $p < 0.001$), and academic engagement ($\beta = 0.29$, $p < 0.001$). Peer academic socialization was also positively associated with students' academic self-efficacy ($\beta = 0.30$, $p < 0.001$), outcome expectations ($\beta = 0.27$, $p < 0.001$), and academic engagement ($\beta = 0.24$, $p < 0.001$). The cognitive-person factors, academic self-efficacy ($\beta = 0.15$, $p < 0.001$), and outcome expectations ($\beta = 0.25$, $p < 0.001$) were positively linked to academic engagement. Together, parental and peer socialization explained a significant amount of variance in academic self-efficacy (27.5%) and educational outcome expectations (46.4%). The four constructs in the model, as a whole, accounted for 58.4% of the variance in academic engagement of high school students.

Mediated effects

Bootstrap analysis, a more preferred method for testing mediation, was utilized to test the significance of indirect effects with the recommended 5,000 bootstrap samples (Fairchild and McQuillin, 2010; Collier, 2020) drawn with replacement. In this analysis, the indirect effects of peer academic socialization and parental academic socialization on student academic engagement through self-efficacy and outcome expectation were tested. The mediating effect is statistically significant if the confidence interval does not cross zero (Shrout and Bolger, 2002). Hence, the specific indirect effects of parental academic socialization on academic engagement of high school students through academic self-efficacy ($b = 0.054$, BC 95% CI = 0.02, 0.10, $p < 0.001$) and through outcome expectations ($b = 0.156$, BC 95% CI [0.090, 0.236], $p < 0.001$) were significant. Peer academic socialization had a significant indirect relation with academic engagement through self-efficacy ($b = 0.059$, BC 95% CI [0.026, 0.111], $p < 0.001$) and outcome expectations ($b = 0.088$, BC 95% CI [0.04, 0.155], $p < 0.001$). These findings indicate that cognitive-person variables partially mediated the relations between the social context and academic engagement of high school students.

Discussion

The current study examined the structural relations among contextual (parental & peer academic socialization) and person-cognitive (self-efficacy and outcome expectations) factors in shaping the academic engagement of high school students in Ethiopia. As hypothesized, based on the integrative model of engagement and previous empirical evidence, the results showed that the posited model adequately fit the data, all paths were positive and significant, and the variables within the model accounted for a substantial amount of variance (58.4%) in the academic engagement of high school students. Also, the two exogenous factors of the model explained an adequate amount of variance in self-efficacy and outcome expectations. Parental academic socialization and peer academic socialization, together, accounted for 28% and 46% of the variance in self-efficacy and outcome expectations, respectively. Hence, the findings of the current study, from a sample of Ethiopian high school students, provided empirical support for the hypotheses posited in the development-in-sociocultural context model of engagement in learning (Wang et al., 2019, 2020).

Role of parental academic socialization

As hypothesized, based on the integrative model of engagement and previous findings, high school students who perceived more positive academic socialization from parents endorsed greater self-efficacy to perform academic-related tasks and had stronger convictions that education would result in meaningful outcomes. Students who perceived parent-provided academic socialization messages as positive and encouraging had greater confidence in their abilities to perform academic tasks, associated positive outcomes with engagement in education, and were more likely engaged in academic affairs. Beyond being converged to the integrative model of engagement (Wang et al., 2020), these findings provide support for the perspective that parents are significant sources of self-efficacy and outcome expectations for children through social persuasion mechanisms (Bandura, 1997). When parents frequently convey messages to their children about high academic expectations, the value of education, and the importance of effort, they persuade their children that they are capable and expect positive outcomes in the future. In this way, parents bolster their children's academic self-efficacy and positive outcome expectations for learning, which are considered the most important motivational beliefs in the academic domain. The finding that parental academic socialization significantly predicted academic self-efficacy corroborates the results of previous studies (e.g., Suizzo et al., 2016) and the conclusion that parents' messages strongly influence children's self-efficacy (Usher and Pajares, 2006). There was evidence that parental aspiration for their children's postsecondary education, which was one aspect of parental academic socialization in this study, positively predicted students' self-efficacy (Fan and Williams, 2010). Parental academic socialization was also related to high school students' academic engagement both directly and indirectly through academic self-efficacy and outcome expectations. Hence, findings lead to the conclusion that parental academic socialization represented via three dimensions positively linked to students' engagement in academic activities. The result was consistent with previous studies (Melby et al., 2008; Murray, 2009; Wilder, 2014) that suggested parental involvement in education matters for children's engagement. Parents may socialize their children academically through multiple processes, such as the academic values they endorse, the expectations for academic success they set, and the experiences they share. The result of this study provides new evidence that parental involvement in the form of communicating beliefs about and expectations for their children's success, linking education to
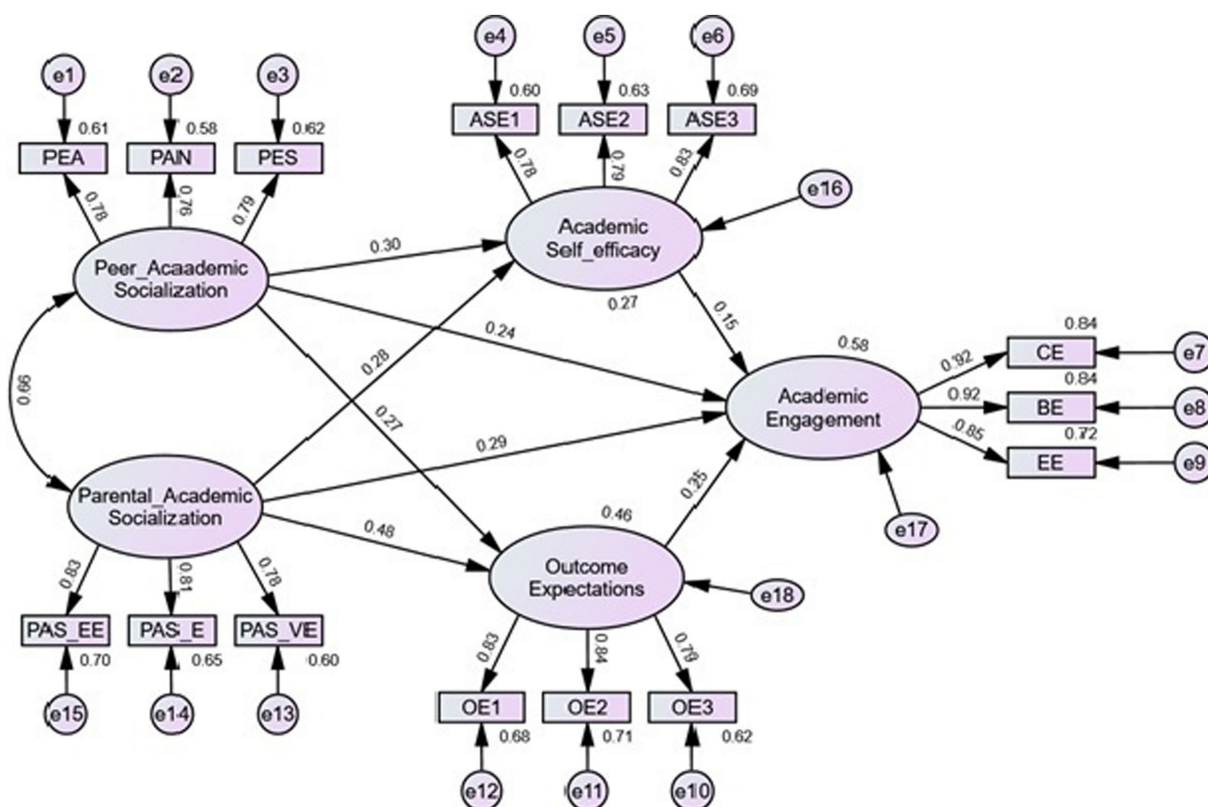
FIGURE 3
Tested structural model of academic socialization, motivational beliefs and academic engagement. PEA, Peer educational aspiration; PAN, peer academic norm; PES, peer effort socialization; PAS_EE, parental academic socialization -educational expectations; PAS_EE, parental academic socialization −effort; PAS_VE, parental academic socialization-value of education; CE, cognitive engagement; BE, behavioral engagement; EE, emotional engagement; ASE1, academic self-efficacy parcel 1; ASE2, academic self-efficacy parcel 2; ASE3, academic self-efficacy parcel 3; OE1, outcome expectations parcel 1; OE2, outcome expectations parcel 2; OE3, outcome expectations parcel 3. All $p < 0.001$.

future success, and stressing the reimbursement of exerting effort is an essential factor in fostering children's academic engagement. The present finding suggests that academic socialization appears to be a fundamental substrate for student academic engagement. It has been reported that academic socialization has the strongest positive link with engagement during adolescence (Hill and Tyson, 2009; Wang et al., 2014). Fan and Williams (2010) also found that parental aspiration for their children's postsecondary education, one aspect of parental academic socialization, positively predicted student engagement. As academic socialization is more likely to correspond with the developmental tasks of adolescents, such as achieving competence and accomplishment, its effect on high school student academic engagement seems to be acceptable.

Hence, the findings of the current study suggest that parental academic socialization matters for students to build higher academic self-efficacy, have positive outcome expectations for education, and be actively engaged in academic tasks. Students from parents who (a) recognized the utility of schooling, (b) had high expectations for their academic success, and (c) stressed the benefits of effort were likely to feel confident about their academic abilities, develop positive outcome expectations, and show a greater degree of academic engagement. It means that parents' values for education, educational expectations, and beliefs in an effort which are conveyed and communicated through the process of academic socialization importantly determine their children's motivational factors (i.e., self-efficacy, outcome expectations, and engagement) essential to achieve better academically.

Role of peer academic socialization

In this study, high school students who perceived more positive academic socialization from peers endorsed greater self-efficacy to perform academic-related tasks and had stronger beliefs that education would result in important outcomes. Peer academic socialization was also related to high school students' academic engagement both directly and indirectly through academic self-efficacy and outcome expectations. This finding supports that peers provide an important developmental context for adolescents (Furrer, 2010), and classmates and friends have a significant effect on students' academic motivation and engagement (Wentzel, 2009). The effects of peer academic socialization observed in this study support the theories of peer group influence that have postulated peer effects may be conveyed directly through socialization processes that include peer pressure, modeling, reinforcement, and encouragement to follow group norms (Altermatt and Pomerantz, 2003; Lynch et al., 2013) as well as findings that members of adolescent peer groups are similar in many school-related adjustments such as in their learning motivation (Ryan, 2001), effortful behavior toward schoolwork, intrinsic value, interest, and enjoyment in schoolwork (Ryan, 2001; Shin and Ryan, 2014), and preference for challenge (Altermatt and Pomerantz, 2003). Therefore, the findings of this study are consistent with previous empirical evidence and provide support for the theoretical suppositions that peers have a greater potential to socialize the academic engagement of member students and basically, peers matter

for individual student involvement in his/her education. Specifically, the finding that peer academic socialization predicts educational outcome expectations strengthens the thought that peers form a natural context for thinking about the future (Nurmi, 2004) and they are an essential source of future-related information for adolescents (Malmberg, 1996).

The findings that peer academic socialization shapes student engagement through multiple pathways suggest that peer groups have potential importance to the development of students' engagement. The role peer academic socialization played in shaping student academic engagement could have different possible explanations. For example, peer group members: (a) share similar expectations about their future education (Kiuru et al., 2007), (b) are important sources of future-related information (Malmberg, 1996), (c) act as role models for each other in peer groups, (d) have a propensity for adhering to peer group norms and desire to fit in with those peers (Wang and Eccles, 2012), and (e) typically modify their levels of engagement to those of their peer group (Wang et al., 2018); and hence, all these are likely the mechanisms through which peers socialize individual student academic engagement. Together with previous evidence, the present study provides credence that peer context is an important substrate for the development of high school students' engagement profiles. Students who belong to peer groups in which academic behaviors are normative are more likely to report a high level of engagement than students with less academically inclined peers.

The roles of self-efficacy and outcome expectations as mediators

An integrative model of engagement has posited that self-appraisals or motivational beliefs are pathways through which a variety of external (e.g., academic socialization) assets influence learning engagement, and this was supported in the present study. The result supports the positive roles of self-efficacy and outcome expectations in predicting academic engagement, as students who have greater confidence in their abilities to do academic activities and stronger beliefs that being educated would lead to positive outcomes demonstrated a greater degree of academic engagement. These findings are consistent with the self-system motivational perspective, which posits that more positive self-beliefs are related to a greater level of engagement (Connell and Wellborn, 1991) and social cognitive theories that assert students with higher levels of academic self-efficacy and outcome expectations will engage in their learning more fully (Lent et al., 1994, 2000; Bandura, 1997). The positive relationship between academic self-efficacy and engagement also converges with evidence obtained in previous research (Linnenbrink and Pintrich, 2003; Martin and Rimm-Kaufman, 2015; Rimm-Kaufman et al., 2015; Liu et al., 2018; Navarro et al., 2019; Olivier et al., 2019). The relationship between outcome expectations and measures of academic engagement is consistent with the finding of Navarro et al. (2019) that found engineering outcome expectations positively predicted engineering academic engagement in undergraduate engineering students and Miller et al. (2021) who reported that students with higher math outcome expectations had a much higher likelihood of belonging to the 'Moderately-to-Highly Engaged' profile as compared to the 'Minimally Engaged' profile. Other studies also reported that task values are positively related to behavioral engagement (Fan, 2011; Wang and Eccles, 2013), intention to continue studying at school or

beyond (Fan and Wolters, 2014), and positive classroom affect (Jiang et al., 2018) which support the present finding.

Self-efficacy and outcome expectations partially mediated the relations of academic socialization to student engagement. This result supports the integrative model that posits youth's self-appraisals mediate the link between engagement and social context (Wang et al., 2020) and the social-cognitive perspective (Lent et al., 1994, 2000; Bandura, 1997) that states social environment operates through motivational self-beliefs to produce the required outcomes like academic engagement. According to the findings of this study, academic socialization facilitates academic engagement by enhancing self-efficacy and outcome expectations. With academic self-efficacy as a mediator of the relation between academic socialization and academic engagement, it was found that students whose parents and peers practice and forward encouraging socialization messages had higher academic self-efficacy, which in turn predicted better academic engagement. With the role of mediating the relation between academic socialization and academic engagement, outcome expectations of high school students whose parents and peers practice and convey positive academic socialization messages were higher, and it, in turn, predicted better academic engagement.

To sum up, the results revealed initial evidence for the utility of the integrated model of student engagement to predict the academic engagement of Ethiopian high school students who grew up and live within the collectivistic culture. Precisely, the findings that parental and peer academic socialization predicted academic engagement, both directly and indirectly through students' academic self-efficacy and outcome expectations, suggest how family and peer contexts matter to foster student engagement in learning, particularly in the context where collectivism is more valued. These findings extend and support prior research on predicting student engagement from contextual and personal factors and shed light on how contextual and person-cognitive variables might contribute to the academic engagement of high school students. The result further suggests that self-efficacy and outcome expectations develop through comparable learning experiences, and they have comparable motivating effects to outcome variables (Lent et al., 1994; Bandura, 1997).

Limitations and future research

Although this study has notable strengths, such as a large sample size, randomly drawn participants from different districts and schools, and being conducted in a country where almost all previous research on the issue has not been conducted, it has a number of limitations that should be considered while interpreting findings.

The first limitation is associated with the inclusion of variables. This study examined the influence of social systems on academic engagement by incorporating multiple aspects of family and peer contexts; however, there are other social agents (e.g., teachers) that could have been contributing factors to the outcome variable. Previous research has demonstrated that teachers' messages strongly influence students' self-efficacy (Usher and Pajares, 2006) and likewise may influence expected outcomes and, eventually, engagement in learning. The included psychological variables are also limited to self-efficacy and outcome expectations. Therefore, future research should consider teacher-related factors (e.g., psychological needs support, academic socialization) and other psychological constructs, especially those included in the integrative engagement model.

Second, the findings were based on cross-sectional design data. Hence, although (1) the proposed model was guided by previously developed theoretical frameworks and reported empirical findings, (2) SEM analysis provides important information about the possible direction of the relationships, and (3) results corroborate previous findings and theoretical predictions, cross-sectional study designs do not lead to firm conclusions regarding the causal ordering among the variables included. Third, the data was based on self-report measures. Self-perceptions are possibly best captured with self-reports, but for some constructs (e.g., academic engagement and parental academic socializations), data only from self-report measures may produce social desirability biases and narrow interpretations. Therefore, future researchers are encouraged to test the model using longitudinal designs and data from multiple sources to address these concerns. Fourth, it's critical to remember that psychological study does not allow for the precise prediction of what will occur in a new setting based on past experiences. Hence, I encourage researchers to examine the model tested in this study in a way that addresses such concerns and see what the results would be. Finally, the other limitation of the current study may be associated with the influence of confounding variables and/or covariates. While prior studies have not explicitly suggested potential confounders to be considered in the context of the present study, there remains the possibility that unaccounted variables could impact the findings. Therefore, it is essential to interpret the findings while acknowledging these possibilities. Researchers interested in the predictors of student academic engagement should take this concern into account for future investigations. For instance, in the current study, it was assumed that there may not be significant variation in socioeconomic status (SES) within the target population to the extent that it would affect the outcome variable, hence SES was not included as a covariate in the model. However, future studies could benefit from the inclusion of status-based covariates, such as SES as highlighted by Wang et al. (2019), especially in populations where SES differences are more pronounced.

Implications

This study, despite the limitations mentioned above, offers important contributions to theoretical understanding and practice regarding student academic engagement. The study demonstrated evidence for the theoretical model combining variables derived from contextual and personal domains, highlighting the role of person-cognitive factors as mechanisms explaining the relationship between contextual factors and student academic engagement. So, the findings provide substantial theoretical and empirical contributions to broaden knowledge on antecedents and the means of how they contribute to the academic engagement of high school students and suggest researchers in education and educational psychology pay more attention to the contextual and psychological constructs in the scholarship of student engagement. It would also provide support for the applicability of psychological constructs and models derived from theories fundamentally developed in Western cultures to Ethiopian culture. This is related to the issue of whether perspectives commonly supported in one culture (e.g., individualism) could be replicated among participants of other cultures (e.g., collectivism).

The current results, which come from participants with collectivistic cultural values and a different socio-economic background, make a significant contribution to the existing body of knowledge on student engagement which fundamentally represents a limited segment of the globe. They are particularly important in filling gaps in the understanding of student engagement across cultures as most of the previous research has been conducted in the Western contexts. This could be an attempt to address the concern in the field that concepts, practice, and empirical findings of psychology are mostly limited to Western countries but missing from African and other societies (Henrich et al., 2010; Berry, 2013).

Parallel with extending theoretical knowledge, the interrelations among constructs included in the present study suggest student academic engagement be increased and maintained through interventions targeting contextual and individual-level assets. According to the results, interventions targeting social contexts (e.g., academic socialization) may be associated with enrichments of all other variables. That is, promoting a positive academic socialization process appears to be a central component of intervention efforts in bolstering students' self-efficacy, outcome expectations, and engagement in learning. Self-efficacy beliefs and outcome expectations are malleable enough and can be developed through targeted interventions. Interventions that focus on enhancing self-appraisals (e.g., self-efficacy and outcome expectancy), such as social persuasion and vicarious learning (Bandura, 1986), are helpful to improve student engagement in education, given that academic self-efficacy and outcome expectations are significantly related to student engagement. Furthermore, it would behoove parents, teachers, and school psychologists to focus on strengthening motivational beliefs as a way of enhancing academic engagement. Parents need to communicate to their children the positive outcomes of engaging in education, high academic expectations, and the consequence of lack of effort to promote positive self-efficacy beliefs and outcome expectations in the academic domain, which, in turn, craft motivated engagement in learning. School counselors or psychologists may design psychoeducational interventions that would bolster high school student's academic efficacy and understanding of what they can gain from pursuing their education.

This study is also indicative of the need to pay due attention to how peer or friendship groups matter in determining the academic behaviors and success of children. The aspirations of others, academic norms, and beliefs in effort within adolescents' peer and friendship groups were found to be ways by which peers may influence academic engagement. Adolescents tend to show similar levels of school-related beliefs, attitudes, and behaviors to others in their peer group, including school performance and academic self-perception (Ryan, 2001; Chen et al., 2003). Hence, as conformity to peer groups comes into prominence during adolescence, an intervention targeting peer and friendship groups would have a better effect in boosting students' motivational beliefs and engagement in learning.

In conclusion, the findings were in line with theoretical predictions and earlier results and underscored the importance of parental and peer academic socialization for fostering students' academic engagement. The substantial role of academic socialization and motivational beliefs (self-efficacy and outcome expectations) in explaining variance in academic engagement, which, in turn, leads to positive learning outcomes, suggests that educational policies and practices should be designed in a way that offers positive socialization experiences and boost motivational beliefs among students. The

primary implication of the current findings is that interventions aimed at improving student self-efficacy, outcome expectations, and engagement, particularly for students who grew up and live within a collectivistic culture like Ethiopia, should take into account and integrate the most significant socializing agents in the academic domain (e.g., parents and peer groups). This study tends to encourage schools to plan and practice peer tutoring sessions, collaborative learning activities, and peer-based study groups to cultivate positive academic socialization among students.

The findings also offer an excellent opportunity for parents and teachers to be optimistic that they can cultivate children's self-efficacy beliefs and outcome expectations as one means for fostering academic engagement, given that they have a strong desire for more active involvement of students in learning. Supported by the prior evidence that students with collectivistic value orientations benefit more from other or group-related sources such as vicarious experiences, and verbal and social persuasion as compared to students from countries with predominantly individualistic cultures (Klassen, 2004; Ahn et al., 2016), the present study suggests the need to paying due attention to social context in boosting Ethiopian students' motivational beliefs and academic engagement.

Data availability statement

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

Ethics statement

The studies involving humans were approved by the Ethics Committee of Institute of Teachers Education and Behavioral Science, Wollo University. The studies were conducted in accordance with the local legislation and institutional requirements.

The participants provided their written informed consent to participate in this study.

Author contributions

GW: Writing – original draft, Writing – review & editing.

Funding

Conflict of interest

The author declares 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

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2024.1347163/full#supplementary-material

References

Abu-Bader, S. H. (2010). Advanced and multivariate statistical methods for social science research. New York, NY: Oxford University Press.

Ahn, H. S., Usher, E. L., Butz, A., and Bong, M. (2016). Cultural differences in the understanding of modelling and feedback as sources of self-efficacy information. *Br. J. Educ. Psychol.* 86, 112–136. doi: 10.1111/bjep.12093

Alrashidi, O., Phan, H. P., and Ngu, B. H. (2016). Academic engagement: an overview of its definitions, dimensions, and major conceptualisations. *Int. Educ. Stud.* 9:41. doi: 10.5539/ies.v9n12p41

Altermatt, E. R., and Pomerantz, E. M. (2003). The development of competence-related and motivational beliefs: an investigation of similarity and influence among friends. *J. Educ. Psychol.* 95, 111–123. doi: 10.1037/0022-0663.95.1.111

Appleton, J. J., Christenson, S. L., Kim, D., and Reschly, A. L. (2006). Measuring cognitive and psychological engagement: validation of the student engagement instrument. *J. Sch. Psychol.* 44, 427–445. doi: 10.1016/j.jsp.2006.04.002

Archambault, I., Janosz, M., Morizot, J., and Pagani, L. (2009). Adolescent behavioral, affective, and cognitive engagement in school: relationship to dropout. *J. Sch. Health* 79, 408–415. doi: 10.1111/j.1746-1561.2009.00428.x

Bæck, U.-D. K. (2017). It is the air that we breathe. Academic socialization as a key component for understanding how parents influence children's schooling. *Nordic J. Stud. Educ. Policy* 3, 123–132. doi: 10.1080/20020317.2017.1372008

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1997). Self-efficacy: the exercise of control. New York, NY: W H Freeman/Times Books/ Henry Holt & Co.

Bempechat, J., Graham, S. E., and Jimenez, N. V. (1999). The socialization of achievement in poor and minority students: a comparative study. *J. Cross-Cult. Psychol.* 30, 139–158. doi: 10.1177/0022022199030002001

Ben-Eliyahu, A., Moore, D., Dorph, R., and Schunn, C. D. (2018). Investigating the multidimensionality of engagement: affective, behavioral, and cognitive engagement across science activities and contexts. *Contemp. Educ. Psychol.* 53, 87–105. doi: 10.1016/j.cedpsych.2018.01.002

Bentler, P. M., and Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychol. Bull.* 88, 588–606. doi: 10.1037/0033-2909.88.3.588

Berry, J. W. (2013). Achieving a global psychology. *Can. Psychol.* 54, 55–61. doi: 10.1037/a0031246

Boulton, C. A., Hughes, E., Kent, C., Smith, J. R., and Williams, H. T. P. (2019). Student engagement and wellbeing over time at a higher education institution. *PLoS One* 14, e0225770–e0225720. doi: 10.1371/journal.pone.0225770

Bresó, E., Schaufeli, W. B., and Salanova, M. (2011). Can a self-efficacy-based intervention decrease burnout, increase engagement, and enhance performance? A quasi-experimental study. *High. Educ.* 61, 339–355. doi: 10.1007/s10734-010-9334-6

Byars-Winston, A., Estrada, Y., Howard, C., Davis, D., and Zalapa, J. (2010). Influence of social cognitive and ethnic variables on academic goals of underrepresented students in science and engineering: a multiple-groups analysis. *J. Couns. Psychol.* 57, 205–218. doi: 10.1037/a0018608

Byrne, B. M. (2016). Structural equation modeling with AMOS: basic concepts, applications, and programming. New York, NY: Routledge.

Cadime, I., Pinto, A. M., Lima, S., Rego, S., Pereira, J., and Ribeiro, I. (2016). Well-being and academic achievement in secondary school pupils: the unique effects of burnout and engagement. *J. Adolesc.* 53, 169–179. doi: 10.1016/j.adolescence.2016.10.003

Chen, J. J. (2005). Relation of academic support from parents, teachers, and peers to Hong Kong adolescents' academic achievement: the mediating role of academic engagement. *Genet. Soc. Gen. Psychol. Monogr.* 131, 77–127. doi: 10.3200/MONO.131.2.77-127

Chen, X., Chang, L., and He, Y. (2003). The peer group as a context: mediating and moderating effects on relations between academic achievement and social functioning in Chinese children. *Child Dev.* 74, 710–727. doi: 10.1111/1467-8624.00564

Collier, J. E. (2020). Applied structural equation modeling using AMOS: Basic to advanced techniques. New York, NY: Routledge.

Connell, J. P., and Wellborn, J. G. (1991). "Competence, autonomy, and relatedness: a motivational analysis of self-system processes" in *Self processes and development*. eds. M. R. Gunnar and L. A. Sroufe (Hillsdale, NJ: Lawrence Erlbaum Associates, Inc), 43–77.

Cross, F. L., Marchand, A. D., Medina, M., Villafuerte, A., and Rivas-Drake, D. (2019). Academic socialization, parental educational expectations, and academic self-efficacy among Latino adolescents. *Psychol. Sch.* 56, 483–496. doi: 10.1002/pits.22239

Davis-Kean, P. E. (2005). The influence of parent education and family income on child achievement: the indirect role of parental expectations and the home environment. *J. Fam. Psychol.* 19, 294–304. doi: 10.1037/0893-3200.19.2.294

Dogan, U. (2017). Student engagement, academic self-efficacy, and academic motivation as predictors of academic performance. *Anthropologist* 20, 553–561. doi: 10.1080/09720073.2015.11891759

Dotterer, A., and Lowe, K. (2011). Classroom context, school engagement, and academic achievement in early adolescence. *J. Youth Adolesc.* 40, 1649–1660. doi: 10.1007/s10964-011-9647-5

Dweck, C. S. (2006). Mindset: the new psychology of success. *1st* Edn. New York, NY: Random House.

Eccles, J. (2009). Who am I and what am I going to do with my life? Personal and collective identities as motivators of action. *Educ. Psychol.* 44, 78–89. doi: 10.1080/00461520902832368

Eccles, J. S., Vida, M. N., and Barber, B. (2004). The relation of early Adolescents' College plans and both academic ability and task-value beliefs to subsequent college enrollment. *J. Early Adolesc.* 24, 63–77. doi: 10.1177/0272431603260919

Eccles, J., and Wang, M.-T. (2012). "Part I commentary: so what is student engagement anyway?" in Handbook of research on student engagement. eds. S. L. Christenson, A. L. Reschly and C. Wylie (New York, NY: Springer), 133–145.

Fairchild, A. J., and McQuillin, S. D. (2010). Evaluating mediation and moderation effects in school psychology: a presentation of methods and review of current practice. *J. Sch. Psychol.* 48, 53–84. doi: 10.1016/j.jsp.2009.09.001

Fall, A.-M., and Roberts, G. (2012). High school dropouts: interactions between social context, self-perceptions, school engagement, and student dropout. *J. Adolesc.* 35, 787–798. doi: 10.1016/j.adolescence.2011.11.004

Fan, W. (2011). Social influences, school motivation and gender differences: an application of the expectancy-value theory. *Educ. Psychol.* 31, 157–175. doi: 10.1080/01443410.2010.536525

Fan, W., and Williams, C. M. (2010). The effects of parental involvement on Students' academic self-efficacy, engagement and intrinsic motivation. *Educ. Psychol.* 30, 53–74. doi: 10.1080/01443410903353302

Fan, W., Williams, C. M., and Wolters, C. A. (2012). Parental involvement in predicting school engagement: similar and differential effects across ethnic groups. *J. Educ. Res.* 105, 21–35. doi: 10.1080/00220671.2010.515625

Fan, W., and Wolters, C. A. (2014). School motivation and high school dropout: the mediating role of educational expectation. *Br. J. Educ. Psychol.* 84, 22–39. doi: 10.1111/bjep.12002

Finn, J. D., and Zimmer, K. S. (2012). Student engagement: What is it? Why does it matter? in *Handbook Res. Student Engag.* eds. S. L. Christenson, A. L. Reschly and C. Wylie (New York: Springer) 97–131.

Finney, S. J., and DiStefano, C. (2013). "Nonnormal and categorical data in structural equation modeling" in Structural equation modeling: a second course. *2nd* ed. eds. G. R. Hancock and R. O. Mueller (Charlotte, NC: IAP Information Age Publishing), 439–492.

Flores, L. Y., Navarro, R. L., and DeWitz, S. J. (2008). Mexican American high school Students' postsecondary educational goals applying social cognitive career theory. *J. Career Assess.* 16, 489–501. doi: 10.1177/1069072708318905

Flores, L. Y., Navarro, R. L., Hang Shim, L., Addae, D. A., Gonzalez, R., Luna, L. L., et al. (2014). Academic satisfaction among Latino/a and White men and women engineering students. *J. Couns. Psychol.* 61, 81–92. doi: 10.1037/a0034577

Fouad, N. A., and Guillen, A. (2006). Outcome expectations: looking to the past and potential future. *J. Career Assess.* 14, 130–142. doi: 10.1177/1069072705281370

Fredricks, J. A., Blumenfeld, P. C., and Paris, A. H. (2004). School engagement: potential of the concept, state of the evidence. *Rev. Educ. Res.* 74, 59–109. doi: 10.3102/00346543074001059

Fung, F., Tan, C. Y., and Chen, G. (2018). Student engagement and mathematics achievement: unraveling main and interactive effects. *Psychol. Sch.* 55, 815–831. doi: 10.1002/pits.22139

Furrer, C. J. (2010). Capturing the friendship context with a collective property: friendship group engagement vs. disaffection. *J. Adolesc.* 33, 853–867. doi: 10.1016/j.adolescence.2010.07.003

Glick, J. E., and White, M. J. (2004). Post-secondary school participation of immigrant and native youth: the role of familial resources and educational expectations. *Soc. Sci. Res.* 33, 272–299. doi: 10.1016/j.ssresearch.2003.06.001

Goldenberg, C., Gallimore, R., Reese, L., and Garnier, H. (2001). Cause or effect? A longitudinal study of immigrant Latino Parents' aspirations and expectations, and their Children's school performance. *Am. Educ. Res. J.* 38, 547–582. doi: 10.3102/00028312038003547

Granziera, H., and Perera, H. N. (2019). Relations among teachers' self-efficacy beliefs, engagement, and work satisfaction: a social cognitive view. *Contemp. Educ. Psychol.* 58, 75–84. doi: 10.1016/j.cedpsych.2019.02.003

Greene, B. A. (2015). Measuring cognitive engagement with self-report scales: reflections from over 20 years of research. *Educ. Psychol.* 50, 14–30. doi: 10.1080/00461520.2014.989230

Henrich, J., Heine, S. J., and Norenzayan, A. (2010). Most people are not WEIRD. *Nature* 466:29. doi: 10.1038/466029a

Henry, K. L., Knight, K. E., and Thornberry, T. P. (2012). School disengagement as a predictor of dropout, delinquency, and problem substance use during adolescence and early adulthood. *J. Youth Adolesc.* 41, 156–166. doi: 10.1007/s10964-011-9665-3

Hill, N. E., and Tyson, D. F. (2009). Parental involvement in middle school: a meta-analytic assessment of the strategies that promote achievement. *Dev. Psychol.* 45, 740–763. doi: 10.1037/a0015362

Hirschfield, P. J., and Gasper, J. (2011). The relationship between school engagement and delinquency in late childhood and early adolescence. *J. Youth Adolesc.* 40, 3–22. doi: 10.1007/s10964-010-9579-5

Hoover-Dempsey, K. V., and Sandler, H. M. (1997). Why do parents become involved in their children's education? *Rev. Educ. Res.* 67, 3–42. doi: 10.3102/00346543067001003

Hu, L. T., and Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct. Equ. Model: Multidiscip. J.* 6, 1–55. doi: 10.1080/10705519909540118

Jang, H., Reeve, J., and Deci, E. L. (2010). Engaging students in learning activities: it is not autonomy support or structure but autonomy support and structure. *J. Educ. Psychol.* 102, 588–600. doi: 10.1037/a0019682

Jeynes, W. H. (2005). A Meta-analysis of the relation of parental involvement to urban elementary school student academic achievement. *Urban Educ.* 40, 237–269. doi: 10.1177/0042085905274540

Jeynes, W. H. (2007). The relationship between parental involvement and urban secondary school student academic achievement: a meta-analysis. *Urban Educ.* 42, 82–110. doi: 10.1177/0042085906293818

Jiang, Y., Rosenzweig, E. Q., and Gaspard, H. (2018). An expectancy-value-cost approach in predicting adolescent students' academic motivation and achievement. doi: 10.1016/j.cedpsych.2018.06.005

Johnson, M. L., and Sinatra, G. M. (2013). Use of task-value instructional inductions for facilitating engagement and conceptual change. *Contemp. Educ. Psychol.* 38, 51–63. doi: 10.1016/j.cedpsych.2012.09.003

Kindermann, T. A. (2007). Effects of naturally existing peer groups on changes in academic engagement in a cohort of sixth graders. *Child Dev.* 78, 1186–1203. doi: 10.1111/j.1467-8624.2007.01060.x

Kindermann, T. A., and Gest, S. D. (2009). "Assessment of the peer group: Identifying naturally occurring social networks and capturing their effects" in *Handbook of peer interactions, relationships, and groups*. eds. J. F. Dovidio, P. Glick and L. A. Rudman (Malden, MA: Blackwell) 100–117.

Kiuru, N., Aunola, K., Vuori, J., and Nurmi, J.-E. (2007). The role of peer groups in adolescents' educational expectations and adjustment. *J. Youth Adolesc.* 36, 995–1009. doi: 10.1007/s10964-006-9118-6

Klassen, R. M. (2004). A Cross-cultural investigation of the efficacy beliefs of south Asian immigrant and Anglo Canadian nonimmigrant early adolescents. *J. Educ. Psychol.* 96, 731–742. doi: 10.1037/0022-0663.96.4.731

Kline, R. B. (2011). Principles and practice of structural equation modeling. *3rd* ed. New York, NY: Guilford Publications.

Kline, R. B. (2023). Principles and practice of structural equation modeling. New York, NY: Guilford Publications.

Lam, S. F., Jimerson, S., Wong, B. P. H., Kikas, E., Shin, H., Veiga, F. H., et al. (2014). Understanding and measuring student engagement in school: the results of an international study from 12 countries. *Sch. Psychol. Q.* 29, 213–232. doi: 10.1037/spq0000057

Landon, T. M., Ehrenreich, J. T., and Pincus, D. B. (2007). Self-efficacy: a comparison between clinically anxious and non-referred youth. *Child Psychiatry Hum. Dev.* 38, 31–45. doi: 10.1007/s10578-006-0038-1

Lent, R. W., Brown, S. D., and Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *J. Vocat. Behav.* 45, 79–122. doi: 10.1006/jvbe.1994.1027

Lent, R. W., Brown, S. D., and Hackett, G. (2000). Contextual supports and barriers to career choice: a social cognitive analysis. *J. Couns. Psychol.* 47, 36–49. doi: 10.1037/0022-0167.47.1.36

Lent, R. W., Miller, M. J., Smith, P. E., Watford, B. A., Lim, R. H., and Hui, K. (2016). Social cognitive predictors of academic persistence and performance in engineering: applicability across gender and race/ethnicity. *J. Vocat. Behav.* 94, 79–88. doi: 10.1016/j.jvb.2016.02.012

Lent, R. W., Miller, M. J., Smith, P. E., Watford, B. A., Lim, R. H., Hui, K., et al. (2013). Social cognitive predictors of adjustment to engineering majors across gender and race/ethnicity. *J. Vocat. Behav.* 83, 22–30. doi: 10.1016/j.jvb.2013.02.006

Li, Y., and Lerner, R. M. (2011). Trajectories of school engagement during adolescence: implications for grades, depression, delinquency, and substance use. *Dev. Psychol.* 47, 233–247. doi: 10.1037/a0021307

Linnenbrink, E. A., and Pintrich, P. R. (2003). The role of self-efficacy beliefs in student engagement and learning in the classroom. *Read. Writ. Q.* 19, 119–137. doi: 10.1080/10573560308223

Little, T. D., Cunningham, W. A., Shahar, G., and Widaman, K. F. (2002). To parcel or not to parcel: exploring the question, Weighing the Merits. *Struct. Eq. Model.* 9, 151–173. doi: 10.1207/S15328007SEM0902_1

Liu, R. D., Zhen, R., Liu, Y., Wang, J., Jiang, R., Xu, L., et al. (2018). Teacher support and math engagement: roles of academic self-efficacy and positive emotions. *Educ. Psychol.* 38, 3–16. doi: 10.1080/01443410.2017.1359238

Lynch, A. D., Lerner, R. M., and Leventhal, T. (2013). Adolescent academic achievement and school engagement: an examination of the role of school-wide peer culture. *J. Youth Adolesc.* 42, 6–19. doi: 10.1007/s10964-012-9833-0

Malmberg, L.-E. (1996). How do Finnish students prepare for their future in three school types? The relation between content of plans, information gathering and self-evaluations. *Br. J. Educ. Psychol.* 66, 457–469. doi: 10.1111/j.2044-8279.1996.tb01212.x

Markus, H. R., and Kitayama, S. (1991). Culture and the self: implications for cognition, emotion, and motivation. *Psychol. Rev.* 98, 224–253. doi: 10.1037/0033-295X.98.2.224

Martin, D. P., and Rimm-Kaufman, S. E. (2015). Do student self-efficacy and teacher-student interaction quality contribute to emotional and social engagement in fifth grade math? *J. Sch. Psychol.* 53, 359–373. doi: 10.1016/j.jsp.2015.07.001

Matsunaga, M. (2008). Item parceling in structural equation modeling: a primer. *Commun. Methods Meas.* 2, 260–293. doi: 10.1080/19312450802458935

McCormick, M. P., and Cappella, E. (2014). Conceptualizing academic norms in middle school. *J. Early Adolesc.* 35, 441–466. doi: 10.1177/0272431614535093

Melby, J. N., Shu-Ann, F., Wickrama, K. A. S., Conger, R. D., and Conger, K. J. (2008). Adolescent family experiences and educational attainment during early adulthood. *Dev. Psychol.* 44, 1519–1536. doi: 10.1037/a0013352

Mello, Z. R. (2008). Gender variation in developmental trajectories of educational and occupational expectations and attainment from adolescence to adulthood. *Dev. Psychol.* 44, 1069–1080. doi: 10.1037/0012-1649.44.4.1069

Miller, C. J., Perera, H. N., and Maghsoudlou, A. (2021). Students' multidimensional profiles of math engagement: predictors and outcomes from a self-system motivational perspective. *Br. J. Educ. Psychol.* 91, 261–285. doi: 10.1111/bjep.12358

Minter, A., and Pritzker, S. (2017). Measuring adolescent social and academic self-efficacy:Cross-ethnic validity of the SEQ-C. *Res. Soc. Work. Pract.* 27, 818–826. doi: 10.1177/1049731515615677

Moreira, P., Cunha, D., and Inman, R. A. (2019). An integration of multiple student engagement dimensions into a single measure and validity-based studies. *J. Psychoeduc. Assess.* 38, 564–580. doi: 10.1177/0734282919870973

Mroczkowski, A. L., and Sanchez, B. (2015). The role of racial discrimination in the economic value of education among urban, low-income Latina/o youth: ethnic identity and gender as moderators. *Am. J. Community Psychol.* 56, 1–11. doi: 10.1007/s10464-015-9728-9

Murdock, T. B. (1999). The social context of risk: status and motivational predictors of alienation in middle school. *J. Educ. Psychol.* 91, 62–75. doi: 10.1037/0022-0663.91.1.62

Murdock, T. B., Anderman, L. H., and Hodge, S. A. (2000). Middle-grade predictors of students' motivation and behavior in high school. *J. Adolesc. Res.* 15, 327–351. doi: 10.1177/0743558400153002

Muris, P. (2001). A brief questionnaire for measuring self-efficacy in youths. *J. Psychopathol. Behav. Assess.* 23, 145–149. doi: 10.1023/A:1010961119608

Murray, C. (2009). Parent and teacher relationships as predictors of school engagement and functioning among low-income urban youth. *J. Early Adolesc.* 29, 376–404. doi: 10.1177/0272431608322940

Navarro, R. L., Flores, L. Y., Legerski, J. P., Brionez, J., May, S. F., Suh, H. N., et al. (2019). Social cognitive predictors of engineering students' academic persistence

intentions, satisfaction, and engagement. *J. Couns. Psychol.* 66, 170–183. doi: 10.1037/cou0000319

Nurmi, J. E. (2004). "Socialization and self-development: channeling, selection, adjustment, and reflection", in *Handbook Adolescent Psychol*. eds. R. M. Lerner and L. D. Steinberg (NJ: John Wiley & Sons). 85–124. doi: 10.1002/9780471726746.ch4

Olivier, E., Archambault, C., de Clercq, M., and Galand, B. (2019). Student self-efficacy, classroom engagement, and academic achievement: comparing three theoretical frameworks. *J. Youth Adolesc.* 48, 326–340. doi: 10.1007/s10964-018-0952-0

Pearce, R. R. (2006). Effects of cultural and social structural factors on the achievement of White and Chinese American students at school transition points. *Am. Educ. Res. J.* 43, 75–101. doi: 10.3102/00028312043001075

Phan, H. P., and Ngu, B. H. (2014). Longitudinal examination of personal self-efficacy and engagement-related attributes: how do they relate? *Am. J. Appl. Psychol.* 3:80. doi: 10.11648/j.ajap.20140304.11

Reeve, J., and Lee, W. (2014). Students' classroom engagement produces longitudinal changes in classroom motivation. *J. Educ. Psychol.* 106, 527–540. doi: 10.1037/a0034934

Reeve, J., and Tseng, C.-M. (2011). Agency as a fourth aspect of students' engagement during learning activities. *Contemp. Educ. Psychol.* 36, 257–267. doi: 10.1016/j.cedpsych.2011.05.002

Reschly, A. L., Huebner, E. S., Appleton, J. J., and Antaramian, S. (2008). Engagement as flourishing: the contribution of positive emotions and coping to adolescents' engagement at school and with learning. *Psychol. Sch.* 45, 419–431. doi: 10.1002/pits.20306

Rimm-Kaufman, S. E., Baroody, A. E., Larsen, R. A. A., Curby, T. W., and Abry, T. (2015). To what extent do teacher-student interaction quality and student gender contribute to fifth graders' engagement in mathematics learning? *J. Educ. Psychol.* 107, 170–185. doi: 10.1037/a0037252

Rodkin, P. C., and Ryan, A. M. (2012). "Child and adolescent peer relations in educational context" in APA educational psychology handbook, Vol 2: Individual differences and cultural and contextual factors. eds. K. R. Harris, S. Graham, T. Urdan, S. Graham, J. M. Royer and M. Zeidner (Washington, DC: American Psychological Association), 363–389.

Ryan, A. M. (2000). Peer groups as a context for the socialization of Adolescents' motivation, engagement, and achievement in school. *Educ. Psychol.* 35, 101–111. doi: 10.1207/S15326985EP3502_4

Ryan, A. M. (2001). The peer group as a context for the development of young adolescent motivation and achievement. *Child Dev.* 72, 1135–1150. doi: 10.1111/1467-8624.00338

Ryan, A. M., North, E. A., and Ferguson, S. (2019). "Peers and Engagement", in *Handbook of student engagement interventions*. eds. J. A. Fredricks, A. L. Reschly and S. L. Christenson (London, United Kingdom: Academic Press). 73–85.

Salmela-Aro, K., Savolainen, H., and Holopainen, L. (2009). Depressive symptoms and school burnout during adolescence: evidence from two Cross-lagged longitudinal studies. *J. Youth Adolesc.* 38, 1316–1327. doi: 10.1007/s10964-008-9334-3

Salmela-Aro, K., and Upadaya, K. (2012). The schoolwork engagement inventory: energy, dedication, and absorption (EDA). *Eur. J. Psychol. Assess.* 28, 60–67. doi: 10.1027/1015-5759/a000091

Schlomer, G. L., Bauman, S., and Card, N. A. (2010). Best practices for missing data Management in Counseling Psychology. *J. Couns. Psychol.* 57, 1–10. doi: 10.1037/a0018082

Schumacker, R. E., and Lomax, R. G. (2016). A Beginner's guide to structural equation modeling. New York, NY: Routledge.

Shin, H., and Ryan, A. M. (2014). Early adolescent friendships and academic adjustment: examining selection and influence processes with longitudinal social network analysis. *Dev. Psychol.* 50, 2462–2472. doi: 10.1037/a0037922

Shrout, P. E., and Bolger, N. (2002). Mediation in experimental and nonexperimental studies: new procedures and recommendations. *Psychol. Methods* 7, 422–445. doi: 10.1037/1082-989X.7.4.422

Simons-Morton, B. G., and Crump, A. D. (2003). Association of Parental Involvement and Social Competence with school adjustment and engagement among sixth graders. *J. Sch. Health* 73, 121–126. doi: 10.1111/j.1746-1561.2003.tb03586.x

Skinner, E. A. (2016). "Engagement and disaffection as central to processes of motivational resilience and development" in *Handbook of motivation at school*. eds. K. R. Wentzel and A. Wigfield (New York, NY: Routledge), 145–168.

Skinner, E., Furrer, C., Marchand, G., and Kindermann, T. (2008). Engagement and disaffection in the classroom: part of a larger motivational dynamic? *J. Educ. Psychol.* 100, 765–781. doi: 10.1037/a0012840

Skinner, E. A., Kindermann, T. A., and Furrer, C. J. (2009). A motivational perspective on engagement and disaffection: conceptualization and assessment of Children's behavioral and emotional participation in academic activities in the classroom. *Educ. Psychol. Measurement* 69, 493–525. doi: 10.1177/0013164408323233

Steenberghs, N., Lavrijsen, J., Soenens, B., and Verschueren, K. (2021). Peer effects on engagement and disengagement: differential contributions from friends, popular peers, and the entire class. *Front. Psychol.* 12:726815. doi: 10.3389/fpsyg.2021.726815

Suizzo, M.-A., Pahlke, E., Chapman-Hilliard, C., and Harvey, K. E. (2016). African American and Mexican American youths' college adjustment and perceptions of parental academic socialization: interactions between ethnicity and parental education. *Res. Hum. Dev.* 13, 241–257. doi: 10.1080/15427609.2016.1194709

Suizzo, M.-A., Pahlke, E., Yarnell, L., Chen, K.-Y., and Romero, S. (2012). Home-based parental involvement in young Children's learning across U.S. ethnic groups. *J. Fam. Issues* 35, 254–287. doi: 10.1177/0192513x12465730

Suizzo, M. A., and Soon, K. (2006). Parental academic socialization: effects of home-based parental involvement on locus of control across U.S. ethnic groups. *Educ. Psychol.* 26, 827–846. doi: 10.1080/01443410600941961

Suldo, S. M., and Shaffer, E. J. (2007). Evaluation of the self-efficacy questionnaire for children in two samples of American adolescents. *J. Psychoeduc. Assess.* 25, 341–355. doi: 10.1177/0734282907300636

Symonds, J. E., D'Urso, G., and Schoon, I. (2023). The long-term benefits of adolescent school engagement for adult educational and employment outcomes. *Dev. Psychol.* 59, 503–514. doi: 10.1037/dev0001458

Usher, E. L., and Pajares, F. (2006). Sources of academic and self-regulatory efficacy beliefs of entering middle school students. *Contemp. Educ. Psychol.* 31, 125–141. doi: 10.1016/j.cedpsych.2005.03.002

Vartanian, T. P., Karen, D., Buck, P. W., and Cadge, W. (2007). Early factors leading to college graduation for ASIANS and non-ASIANS in the UNITED STATES. *Sociol. Q.* 48, 165–197. doi: 10.1111/j.1533-8525.2007.00075.x

Wang, M.-T., Chow, A., Hofkens, T., and Salmela-Aro, K. (2015). The trajectories of student emotional engagement and school burnout with academic and psychological development: findings from Finnish adolescents. *Learn. Instruct.* 36, 57–65. doi: 10.1016/j.learninstruc.2014.11.004

Wang, M. T., and Degol, J. (2014). Staying engaged: knowledge and research needs in student engagement. *Child Dev. Perspect.* 8, 137–143. doi: 10.1111/cdep.12073

Wang, M. T., Degol, J. L., and Henry, D. A. (2019). An integrative development-in-sociocultural-context model for children's engagement in learning. *Am. Psychol.* 74, 1086–1102. doi: 10.1037/amp0000522

Wang, M. T., and Eccles, J. S. (2012). Social support matters: longitudinal effects of social support on three dimensions of school engagement from middle to high school. *Child Dev.* 83, 877–895. doi: 10.1111/j.1467-8624.2012.01745.x

Wang, M.-T., and Eccles, J. S. (2013). School context, achievement motivation, and academic engagement: a longitudinal study of school engagement using a multidimensional perspective. *Learn. Instr.* 28, 12–23. doi: 10.1016/j.learninstruc.2013.04.002

Wang, M. T., and Fredricks, J. A. (2014). The reciprocal links between school engagement, youth problem behaviors, and school dropout during adolescence. *Child Dev.* 85, 722–737. doi: 10.1111/cdev.12138

Wang, M.-T., Fredricks, J. A., Ye, F., Hofkens, T. L., and Linn, J. S. (2016). The math and science engagement scales: scale development, validation, and psychometric properties. *Learn. Instr.* 43, 16–26. doi: 10.1016/j.learninstruc.2016.01.008

Wang, M.-T., Henry, D. A., and Degol, J. L. (2020). "A development-in-sociocultural-context perspective on the multiple pathways to youth's engagement in learning" in Advances in motivation science. (San Diego, CA: Elsevier Academic Press), 113–160.

Wang, M. T., Hill, N. E., and Hofkens, T. (2014). Parental involvement and African American and European American Adolescents' academic, behavioral, and emotional development in secondary school. *Child Dev.* 85, 2151–2168. doi: 10.1111/cdev.12284

Wang, M.-T., and Holcombe, R. (2010). Adolescents' perceptions of school environment, engagement, and academic achievement in middle school. *Am. Educ. Res. J.* 47, 633–662. doi: 10.3102/0002831209361209

Wang, M.-T., Kiuru, N., Degol, J. L., and Salmela-Aro, K. (2018). Friends, academic achievement, and school engagement during adolescence: a social network approach to peer influence and selection effects. *Learn. Instruct.* 58, 148–160. doi: 10.1016/j.learninstruc.2018.06.003

Wang, M. T., and Peck, S. C. (2013). Adolescent educational success and mental health vary across school engagement profiles. *Dev. Psychol.* 49, 1266–1276. doi: 10.1037/a0030028

Wentzel, K. R. (2009). "Peers and academic functioning at school" in Handbook of peer interactions, relationships, and groups. (New York, NY: The Guilford Press), 531–547.

Wheaton, B., Muthén, B., Alwin, D. F., and Summers, G. F. (1977). Assessing reliability and stability in panel models. *Sociol. Methodol.* 8, 84–136. doi: 10.2307/270754

Wilder, S. (2014). Effects of parental involvement on academic achievement: a meta-synthesis. *Educ. Rev.* 66, 377–397. doi: 10.1080/00131911.2013.780009

Wilson, D., Jones, D., Bocell, F., Crawford, J., Kim, M. J., Veilleux, N., et al. (2015). Belonging and academic engagement among undergraduate STEM students: a multi-institutional study. *Res. High. Educ.* 56, 750–776. doi: 10.1007/s11162-015-9367-x

Wong, Z. Y., and Liem, G. A. D. (2022). Student engagement: current state of the construct, conceptual refinement, and future research directions. *Educ. Psychol. Rev.* 34, 107–138. doi: 10.1007/s10648-021-09628-3

Xiong, Y., Qin, X., Wang, Q., and Ren, P. (2021). Parental involvement in Adolescents' learning and academic achievement: Cross-lagged effect and mediation of academic engagement. *J. Youth Adolesc.* 50, 1811–1823. doi: 10.1007/s10964-021-01460-w

Zhen, R., Liu, R. D., Ding, Y., Liu, Y., Wang, J., and Xu, L. (2018). The moderating role of intrinsic value in the relation between psychological needs support and academic engagement in mathematics among Chinese adolescent students. *Int. J. Psychol.* 53, 313–320. doi: 10.1002/ijop.12374

Zumbrunn, S., McKim, C., Buhs, E., and Hawley, L. R. (2014). Support, belonging, motivation, and engagement in the college classroom: a mixed method study. *Instr. Sci.* 42, 661–684. doi: 10.1007/s11251-014-9310-0

Factors influencing the generation of teachers' emotions

Lihua Lai[1,2], Wenjiang Shi[2]*, Yi Xie[1]* and Jin Zhao[1]

[1]School of Education, Guangzhou University, Guangzhou, China, [2]Shenzhen Polytechnic University, Shenzhen, China

Background and aim: The teaching profession plays an important role in shaping individuals' lives, with teachers performing complex emotional labour. The management of emotions is an integral part of teachers' professional work, and it is essential to clarify their emotional experiences and the generating of their emotions within a specific cultural context.

Methods: Based on a phenomenological approach and the use of anecdotal texts, this study examined six common emotional states among teachers, including happiness, guilt, worry, fear, annoyance, and anger, along with the emotional experiences of two specialised categories of teachers, class supervisors, and pre-service teachers. The factors influencing teachers' emotions and their generative mechanisms were analysed.

Results and discussion: This investigation found that key influences on teachers' emotions stem from factors within the teachers' themselves, the contextual nature of their work, and sociocultural dynamics. Drawing on the analytical frameworks of emotional geography theory, ecological theory of human development, and the ecosystem model of teachers' emotional interactions, the study constructs a model highlighting the generative mechanisms of teachers' emotions, and in which three systems are reflected.

Conclusion: Teachers' personal attributes are in the direct area of the model and directly govern the formation of their emotions, while their work context consists of a transitional area in emotion formation and the sociocultural system acts as the latent band influencing emotion development. The mechanism model helps us to understand and recognise teachers' emotions and to explore their pedagogical implications.

1 Introduction

Education constitutes a complex system (Jacobson et al., 2019) that is essential to the holistic development of an individual throughout their life. The profession places important demands on teachers, and this line of work calls for significant emotional labour (Isenbarger and Zembylas, 2006; Evans et al., 2019; De Ruiter et al., 2021). Emotional labour is a pervasive aspect of teacher's professional practice (Burić, 2019). Teachers' emotions impact both their practice and the quality of education students receive. They often encapsulate and reflect the educator's views on the teaching profession and life in general. The work of teachers is extremely complex, as they need to engage with diverse students as well as navigate intricate educational practices (Keller et al., 2014; De Ruiter et al., 2021). The unique attributes of the profession present many opportunities and challenges but also subject teachers to considerable

work-related pressure and emotional issues, which are exacerbated by anxiety in the current educational environment (Chen, 2016). Therefore, the distinct nature of the teaching profession continually tests the emotional intelligence of teachers.

The management of emotions is an important aspect of the teaching profession. It affects the development of educational reform. While some studies establish a relationship between teachers' emotions and teaching effectiveness (Van Veen and Lasky, 2005; Hodgen and Askew, 2007; Zembylas, 2007; Chen, 2019), little consideration is given to the layers of emotions experienced in the pursuit of school objectives (Van Veen et al., 2005; Chen, 2016). Educators' emotions affect their teaching and learning practices as well as the achievement of school goals. The identification, appropriate expression, and management of teachers' emotions not only contribute to the achievement of school goals, but also affect teachers' well-being, beliefs, behavior, and various facets of their lives (Mevarech and Maskit, 2015).

Teachers' emotions are not arbitrary; rather, they result from the interactions between many factors that are easily overlooked. Although several studies have investigated teachers' emotions concerning their work (Nias, 1996; Hargreaves, 2001), a systematic understanding of factors influencing teachers' emotions is still lacking (Van Veen and Sleegers, 2006). Moreover, although there have been relevant studies on the generation of teachers' emotions, such as Hargreaves (2001)' emotional geography framework, the existing frameworks may not fully accommodate the emotional experiences of teachers within the Chinese context. Therefore, it is essential to construct a model to understand the generating of teachers' emotions tailored to the Chinese context. The objective of this study is to construct a model that elucidates the mechanisms of teachers' emotional generation. The discussion above motivates this study to address the following questions:

1. What are the key factors affecting teachers' emotions?
2. How do these factors interact and collaborate to shape emotional responses?

An in-depth analysis of the influences on teachers' emotions and the underlying mechanisms governing their genesis will facilitate a deeper understanding of teachers and the teaching profession.

2 Literature review

2.1 The pivotal influence of teachers' emotions

Teachers' emotions are a pivotal factor influencing their teaching practices and professional growth, often undervalued in educational reform discourse (Reio, 2011). As a crucial agent in the implementation of educational reform, teachers navigate a multitude of complexities throughout the reform process. The emotional dimension of teaching is integral to its quality, significantly impacting teachers' self-efficacy and pedagogical strategies (Coppola et al., 2012). Saunders (2013) highlighted the spectrum of emotional responses teachers experience during educational reform, particularly during professional development, and how these emotions could influence the integration of innovative instructional methods. Educational reform is a collaborative and systemic endeavor involving interaction with various

stakeholders, such as administrators, colleagues, students, and parents. Teachers' emotions can serve as a critical lens for understanding educational reform. Teachers' emotional experiences are closely linked to their daily work and life contexts. Qualitative research evidence provides valuable insights into understanding teachers' emotions. Di Martino and Sabena (2011) highlighted the relationship between teachers' emotions and professional development by analyzing the relationship between pre-service teachers' subject affiliation (as students) and their emotional attitudes toward teaching the subject. Teachers' emotional experience can affect their teaching methods, class management, and interactions with students, which in turn can influence learning attitudes and academic performance. Coppola et al. (2013) argued that teachers' emotions can either facilitate or hinder their adaptation to and engagement with reform initiatives. Therefore, educational reform strategies should address the emotional well-being of teachers and aim to reduce negative emotional impacts to foster teachers' growth as exemplary educators. Despite recent efforts to explore teachers' emotions, a coherent and comprehensive framework for understanding teachers' emotions during educational reform is still needed (Sutton and Wheatley, 2003). It is necessary to gain a deeper understanding of how the context in which teachers operate influences their emotions, which would promote the enhancement of teaching practices and the professional growth of teachers.

2.2 Framework for analysing factors influencing teachers' emotions

Hargreaves (2005) proposed the theory of emotional geography as a framework to examine the relationship between teachers' emotions and educational change. This theory comprises five dimensions: sociocultural geography, moral geography, professional geography, political geography, and physical geography. To ensure the effectiveness of educational changes and policies, administrators need to consider the emotional factors impacting teachers (Hargreaves, 2005). Teachers' emotional geography is affected by personal, school-related, and sociocultural factors (Hargreaves, 2005). The theory provides a good classification framework for the analysis of teachers' emotions. Wang and Cheng (2011) further categorised these factors into three levels. First, personal factors include aspects such as personal beliefs, career stage, age, perceptions of one's abilities, identity, and continuous learning ability. The second level involves school factors, including school culture, micro-politics, leadership style of the headmaster, professional learning opportunities, students' responses, parental involvement, material support, teacher workload, and time. The third level pertains to socio-economic and cultural factors, encompassing the socio-economic and parental backgrounds, local education policies, curriculum reforms, globalisation, and localized competition. Hargreaves' "emotional geography" theory provides an analytical framework for clarifying and examining the factors influencing teachers' emotions. This framework helps in understanding and recognising teachers' emotions, facilitating the correct handling of their emotional roles in curriculum reforms and pedagogical changes, and ultimately, the enhancement of education quality.

Bronfenbrenner (1979) put forward an ecological theory of human development, where people and the meso-environment in which they live are referred to as a system. He classified this system into five levels, ranging from small to large and from inside to outside, including microsystems, meso-systems, exosystems, macrosystems,

and the chronosystem, which is consistent throughout (Cross and Hong, 2012). Sun and Lee (2014) adopted a human ecology perspective to analyse the formation mechanism of teachers' emotions. They emphasised the crucial role of interactive influence in the process of teachers' emotion formation, arguing that emotional experiences evolve through the interaction between the individual and their environment. They stressed that this interaction is not only influenced by personality but is also inseparable from the external environment's impact. The environment includes physical space as well as interpersonal, cultural, organisational, and institutional aspects. Emotions result from the interaction of the individual with the environment, and teachers' professional practice encompasses the emotional dimension (Van Veen and Sleegers, 2009). Thus, teachers tend to invest themselves in their work, integrating their personal and professional identities. As a result, teaching becomes a pivotal factor for their self-esteem and self-actualisation. The specific nature of the teaching profession determines the inherently emotional labour-intensive nature of teachers' work (Isenbarger and Zembylas, 2006), which is then closely related to both the development and well-being of children and teachers. Therefore, a comprehensive understanding of teachers' emotions requires an in-depth exploration and analysis of teachers' pedagogical practices.

Scholars have conducted comprehensive research on the factors influencing teachers' emotions, which primarily focuses on individual constraints and human-environment interaction. In terms of individual factors, it is mainly believed that gender, work seniority, work experience, self-efficacy, and beliefs significantly impact teachers' emotions (Bascia and Hargreaves, 2000; Jiang et al., 2019; Burić et al., 2020). Concerning interactions between people and their environment, it is widely accepted that teachers' emotions arise from their interactions with teaching or classroom events, as well as their interpersonal relationships (Cross and Hong, 2012; Mevarech and Maskit, 2015). Scholars have studied teachers' emotions in terms of their generation, with notable frameworks including Hargreaves (2001)' emotional geography framework, Van Veen and Sleegers (2009)' socio-cognitive framework, and Pekrun and Linnenbrink-Garcia's model for analysing the causal cycle of teachers' emotions (Reinhard and Lisa, 2014). While these analytical frameworks are important references for elucidating the influence of teachers' emotions and their generative mechanisms, the Chinese context, characterised by locally nuanced teacher roles such as class supervisors and pre-service teachers, necessitates a more appropriate framework for analysis. Therefore, constructing a local framework for analysing teachers' affective factors becomes essential to address the appropriateness of existing frameworks in the local context.

2.3 Interactive analysis of teachers' emotions in a phenomenological perspective

Research on teachers' emotions can be typically divided into three dimensions based on the characteristics of the research focus. In the first dimension, researchers frame teachers' emotions as internal psychological characteristics of individual educators, and they primarily aim to establish the value of teachers' emotions in education (Nias, 1996). In the second dimension, researchers shift their focus to teachers' emotions within the realm of social relations,

actively paying attention to the relationship between social dynamics, policy changes, and teachers' emotional experiences (e.g., Isenbarger and Zembylas, 2006). In the third dimension, investigations encompass the sociocultural dimensions of teachers' emotions, focusing on the shaping, transformation, and resistance of emotions within the context of power dynamics and emotional norms (Schutz and Zembylas, 2009). Given the complex and interactive nature of educational activities, which combine rationality and emotion, attention must be paid to the intricate relationship between teachers' emotions and educational practices. Canadian scholar Van Manen (1982), adopting a phenomenological approach to pedagogy, extensively studied the emotional experiences of teachers and students, providing very useful research on pedagogy.

Van Manen (1982) outlined a phenomenological approach to assessing pedagogical practice. Phenomenological research involves grasping the nature of phenomena directly through intuitive exploration while suspending foresight (Smeyers, 2018). Teachers' emotions can be understood as an educational phenomenon, characterized by interaction, process, and complexity. The study of teachers' emotions necessitates delving into the specific context of teachers' lives, focusing on the emotional experience of pivotal moments. By conducting an ethnographic study of lived experience, collecting anecdotal writing, and recording experiences through anecdotes, a deeper understanding of teachers' lives and professional experiences can be attained. A nuanced examination of the variety of experiences in teachers' professional practice activities allows for a more comprehensive understanding of teachers' emotions.

Phenomenology serves as an important method for studying teachers' emotions by immersing into the context where these emotions occur. This approach helps the understanding of the complexity of the factors involved, allowing for the exploration of the causes influencing the generation of emotions and the logic of their interactions. Factors affecting teachers' emotions exist both explicitly and implicitly within the interaction between individuals and society. Studies ranging from microsystems to macro-contexts, and from individual teachers to sociocultural changes, conducted with a phenomenological path, provide important insights for constructing a localised framework to analyse the interactions of teachers' emotions in a specific context.

3 Methodology

This research adopts a qualitative research orientation, and the choice of research method is determined by the research question (Hammarberg et al., 2016). Qualitative research is concerned with exploring the world through meaning and understanding rather than relying solely on numerical data, thereby providing a more in-depth response to questions of "what," "how," and "why" (Lakshman et al., 2000). The choice to adopt a qualitative research approach in this study is primarily attributed to the complexity and implicit nature of teachers' emotions, necessitating a research method capable of delving into and comprehending the emotional experiences of teachers in the workplace. Qualitative research permits investigators to understand the life experiences of participants from their perspectives (Strauss and Corbin, 1998), a method characterized by its high degree of flexibility and adaptability.

The phenomenological approach is a specific technique within qualitative research methods. This study utilizes a phenomenological approach by collecting personal narratives from teachers regarding their teaching practices to capture the essence of teachers' emotions. Written data allows respondents to remain anonymous, which is essential for safeguarding their freedom of expression without the apprehension of fulfilling the researcher's expectations or biases (Di Martino and Sabena, 2011). This method aids in revealing the underlying structures and personal significance of teachers' emotions, thus offering a more enriched and nuanced perspective for understanding the factors that influence teachers' emotional experiences.

3.1 Research program

To construct a model elucidating the mechanisms of teachers' emotional generation, it is essential to conduct an in-depth exploration of the key influencing factors of teachers' emotions. This research primarily utilizes interviews and written anecdotal texts to collect data. Initially, participants voluntarily engaged in the study with the understanding that they may withdraw at any time. Subsequently, participants are requested to write anecdotal texts or respond to the researcher's questions, such as describing their experiences of happiness, guilt, and other emotional states during the process of teaching practice, detailing the sequence of events, and articulating their feelings. These questions aim to provide a comprehensive account of the participants' emotional states. Upon obtaining the texts, a phenomenological approach is applied for a line-by-line reflection to further understand the true nature of teachers' emotions. Finally, an inductive analysis method is employed for data analysis.

3.2 Data collection

The focus of this study is on the six common emotional states of teachers, including happiness, guilt, worry, fear, annoyance, and anger, as well as the general emotional experiences of class supervisors and pre-service teachers. These six categories relate to common feelings and experiences, typically encountered in teachers' daily educational activities. Class supervisors were specifically chosen as participants due to their unique role in the Chinese educational context. Given that teachers, in general, are complex emotional labourers, class supervisors are the most intricate in managing emotions within educational settings. Studying the emotional experiences of pre-service teachers serves as a useful tool for understanding the pathways of teachers' professional development from the early stages onward.

In this study, over 30 teachers were invited to participate in interviews and write textual anecdotes. It was primary and secondary school teachers who volunteered to participate in the study. The participants were asked to recall experiences involving the six emotional states, recounting the events as they happened and offering detailed descriptions how they felt at the time. Qualitative data for this study was mainly collected between 2020 and 2022, resulting in a total of 108 anecdotal texts capturing teachers'

emotional experiences. The focus of this study is the analysis of these texts.

3.3 Data analysis

A clear and detailed data analysis process is essential for conducting rigorous and credible qualitative research (Bingham, 2023). Inductive analysis is a feature and advantage of qualitative research. Based on the collected textual data, this study has employed the inductive analysis method. It adopts a theoretical and practical approach to construct a mechanism for the generation of teachers' emotions.

The data processing and coding analysis of the data in this study unfolded in three main steps:

1. Phenomenological questioning involves an examination of the data through a sentence-by-sentence reflective analysis, which enabled the understanding of the reality of the pattern of teachers' emotional experiences. For example, we summarised the text numbered "XF-2-1″ in Table 1 as "inner satisfaction: experiencing student growth." This was followed by open coding to determine sub-themes related to impact factors, e.g., identifying the influence of the teachers' emotion pattern "inner satisfaction: experiencing student growth" as "student development" (see Tables 1, 2);
2. The sub-themes related to impact factors were then compared and inductively coded to form secondary codes, i.e., the main categories of the genres. For example, "gender, work seniority, work experience" were categorised as "individual characteristics" (see Table 3);
3. Finally, selective coding was carried out to distill the factors influencing teachers' emotions according to the framework of personal attributes, work context, and sociocultural levels (see Table 3). During the process of data analysis, members of the research team independently coded the information, subsequently comparing and analyzing the coding results on multiple occasions to arrive at the final analytical outcomes.

4 Results

Through a comprehensive analysis of the factors influencing the six types of teachers' emotional experiences and the nuanced experiences of class and trainee teachers, this study identified thirteen primary factors influencing teachers' emotions. Based on the findings and subsequent coding analysis of the data, it is posited that the factors affecting teachers' emotions can be categorised into three overarching levels, including teachers' personal attributes, work context factors, and sociocultural factors.

4.1 Teachers' personal attributes

Teachers' personal attributes include a variety of dimensions, and this study found that in terms of personal attributes, teachers' emotions are mainly due to their gender, work seniority, work

TABLE 1 Open coding processes for factors influencing teachers' emotional experiences (selection).[a]

Teachers' emotions states	Sub-themes related to impact factors	Patterns of teachers' emotions	Anecdotal texts
Happiness	Student Development	Inner satisfaction: Experiencing the growth of students	He coyly turned to me and said, "What does 5×1/5 equal?" Amidst the outcry of my classmates, I praised him loudly, "I like his honesty and bravery. He is not being hypocritical, and I can tell from his answer today that he is a smart kid. At least for this lesson, he understood it. If you all have time, you can help him catch up on his knowledge, and he'll be great." The classroom was quiet at that moment, and everyone cast approving glances at him. From then on, there was another pair of focused eyes in the math class. Sometimes smiling, sometimes helpless, but always filled with a thirst for knowledge. Isn't this what we expect as teachers? (XF-2-1)
Guilt	Professional Mistake	Frustration resulting from blind use of punishments	Thus, somehow I got really angry and unconsciously hit my hand hard on the desk. There was a "bang" sound, and because the desk surface was very thin, the sound was loud. I was startled, and the classroom immediately quieted down. But only I knew that my hand was vaguely hurting. At the same time, I also noticed their surprised eyes. The students immediately sat down, and while talking students also immediately turned around, staring at me. Suddenly, I regretted it. Could I have controlled the class better? Indeed, I should not have been so angry that the little children were intimidated by my toughness. Next, the new lesson did not go as well as I had hoped, as the atmosphere felt duller and I was frustrated. I felt embarrassed. I had thought that being angry would produce good results, but I did not expect it to make things worse. Before I got angry, some students liked to make eye contact with me. However, when I got angry, their eyes wandered and I felt they were deliberately avoiding my gaze. After class, a girl who is usually well-behaved whispered to me, "Do you know that you were so fierce just now! We were all scared by you." I was at a loss for words and secretly thought to myself that I would never do that again and that I needed to learn more from other teachers' teaching experiences to make up for my own shortcomings. (NJ-2-1)

[a]Due to space constraints, only selected codes are presented.

TABLE 2 Open coding process for factors influencing class supervisors and pre-service teachers' emotions (selection).[a]

Teacher status	Sub-themes related to impact factors	Patterns of teachers' emotions	Anecdotal texts
Class Supervisors	Class Management	Management of classroom affairs: Emotions hovering between hope and despair, and pain and care	On the 15th of December, when it was snowing outside, I told the children to turn off the lights, and close the doors and windows in the classroom. The school closed early that day because of the snow, and when I rushed back from outside, I saw that the doors were unlocked and the lights were not turned off, so I criticised them angrily. The next day, on December 16th, it happened to be my birthday. As soon as I got home, I received a phone call from a study committee member saying that there were some students in the class who were making a lot of noise and that I should come over and take care of them. I went to the classroom angrily. Some of the students who were usually the troublemakers stopped me and told me to go to the office to talk about it. About ten minutes later, I returned to the classroom and pushed the door open, just as a card fell on my hand and the whole class sang "Happy Birthday." I saw a big cake on the podium, and they were holding candles and singing the birthday song together. I realised that they had bought the cake themselves and decorated it in the classroom. That scene really touched me! Even though we do not pay much attention to birthdays, the children were very attentive; perhaps they had a conscience and knew that it was difficult for the teacher to accompany them every day in their studies, so they prepared a special birthday present for me. This is one of the most touching events in my relationship with my pupils. (BZR-1-1)
Pre-service Teachers	Community Culture	Relationships with neighbouring communities: From being strangers to friends	The restaurant owner's wife is very talkative, and the owner is very friendly. Every time we went to eat, we would chat and make some irrelevant jokes. The young son in the restaurant owner's family was our joy, we always carried him to the dormitory to play, and the owner also let his daughter follow us to go shopping. Their friendly attitude led us to experience a sense of belonging, of being accepted. There was also the owner of the barber shop, who was worried about his son's poor grades and wanted us to tutor him. We were touched by his eager and trusting gaze and felt a sense of responsibility and mission as teachers. (SX-7-1)

[a]Due to space constraints, only selected codes are presented.

TABLE 3 Selective coding of factors influencing teachers' emotions.

Core factors	Main category	Sub-themes related to impact factors
Teachers' personal attributes	Individual characteristics	Gender (3), work seniority (3), work experience (4)
	Educational beliefs	Educational achievement (2), professional attitude (1), educational justice (2)
	Professional identity	Student development (14), Concerns from students (2), recognition by superiors (1), trust of parents (2), professional value (1), lack of rewards (1), professional image (1), professional identity (3)
	Emotional intelligence	Educational resourcefulness (4)
	Professional quality	Professional mistake (7), professional prestige (1), professional quality (9), management experience (2), professional skills (3), coping skills (1), management skills (1), professional knowledge (1), student management (1), class management (2)
Work context factors	Organisational climate	Support of colleague (1), colleague motivation (2), internship life (3)
	Institutional norms	Management system (2), administrative system (1)
	Interpersonal interactions	Teacher-student interaction (3), teacher-colleague relationship (1), teacher-leader relationship (1), teacher-parent relationship (1), teacher-advisor relationship (6), teacher-student relationship (6), teacher-school member relationship (3), pre-service teacher teammates relationship (4), family-school relationship (3)
	Educational resources	Many chores but lack of resources (1)
	Physical environment	Teaching environment (1), pre-service teacher practice environment (1)
Sociocultural factors	Curriculum reform culture	Emotions in the context of curriculum reform (1), class teaching (1)
	Family education	Family-school collaboration (1)
	Community culture	Community culture (2)

experience, educational beliefs, professional identity, emotional intelligence, and professional quality.

4.1.1 Teachers' individual characteristics

The research found that teachers' individual characteristics, including aspects such as gender, work seniority, and work experience, obviously shape the emotional landscape of teachers. Teachers' emotional experiences were found to emerge from the interplay between their individual characteristics and the environment, with influences stemming from factors like gender, work seniority, and work experience. In terms of gender, female teachers were found to be more sensitive to their inner emotions. One teacher in the study, concerned about her pupil's homosexuality, used avoidance strategies to cope while hoping to avoid traumatising them. Another teacher delicately described her feelings: "I did not dare look at my students, firstly because I was afraid they would see me crying, and secondly because I was afraid I would not be able to control my tears anymore if I saw them" (XF-3-2). The stereotype associating women with more emotional expression than men is partially confirmed in some studies, particularly in relation to negative emotions (Givon et al., 2023). Yin (2007) argued that male teachers, facing rejection by patriarchal ideology, are reluctant to openly express their emotions in professional scenarios, including teaching or education reform. Female teachers are perceived as less professional because of their focus on emotions. These observations underscore notable differences between male and female teachers in terms of emotional experience, emotional regulation, and emotional perception. Gender characteristics emerge as an important dimension affecting teachers' emotions.

Concerning work seniority, this study found that young teachers were more prone to anxiety. When faced with a complicated situation, some participants expressed their unease, making statements such as: "I'm just a young teacher in my twenties, so I do not have any experience in dealing with such things and I cannot do anything about it" (YL-7-1), and, "I am worried and under great pressure about how to lead a class, especially with children from the urban–rural transition area who lack good family guidance" (YL-10-1). Another said: "When I first finished school and taught a class, I often felt helpless and worried" (BZR-3-1). A teacher who had just started giving online classes during the epidemic noted: "I panicked that the internet was unstable, that my mind could not work at all, and that the language would not flow" (KJ-1-1). First-time teachers in this study seemed to be easily angered by children who were in a lot of trouble. One noted: "When I first started working in kindergarten, I used to get so angry at the children that I would break out in anger. Why cannot they understand what I'm saying? It's really disempowering" (FN-1-1).

While some studies indicate that a teacher's tenure in the profession is considered to have a significant positive effect on the deep active regulation strategy of emotions (Zhou, 2020), our examination of work experience reveals that even veteran teachers grapple with new environments: "As a veteran teacher with 30 years of teaching experience who is about to retire, I am interested in the new way of teaching, such as online teaching, but filled with great anxiety" (KJ-2-1). Teachers who are new to the profession may face additional challenges related to class management, "Why are other teachers so methodical? What on earth am I supposed to do? I was thinking that I'm such a failure, I cannot really teach, and I'm miserable and discouraged because I do not have a method" (YL-10-2). Reinhard and Lisa (2014) analysed the factors influencing novice teachers'

emotions and concluded that they are job-related, with teaching ability and school workload shaping their sense of teaching efficacy and professional expectations. Notably, misbehaviour among students is more likely to provoke negative emotions such as fear, anger, worry, depression, irritation, stress, frustration, and disappointment in novice teachers (Reinhard and Lisa, 2014).

In sum, this study found that teachers' individual characteristics, such as gender, work seniority, and work experience, vary from person to person and are important factors influencing teachers' emotions.

4.1.2 Educational beliefs

Teachers' educational beliefs influence their attitudes. This study revealed instances where some teachers had physically punished students. While the occurrence of spankings may appear rooted in momentary lapses of judgement, a deeper exploration of the issue reveals the problem may be rooted in teachers' beliefs. In this study, some teachers were affected by parents' neglect and lack of responsibility for students' homework, impacting their own attitudes towards students' homework. This, in turn, manifested in a perfunctory approach to correcting homework, suggesting a potential lack of insight into the complexities of education and a lack of strong educational beliefs to guide their actions. Individuals' career choices often reflect their fundamental life beliefs, and for teachers, the commitment to teaching becomes an important manifestation of their high ideals as educators.

Teachers, with their passion for education and heartfelt care for their students, are often able to successfully navigate the difficulties and pressures of educational practice, finding profound joy in teaching. One participant said: "The students' performances are excellent and our joint efforts are rewarded. At this time, I really want to hug each one of them. I think they are very sweet, and I hope they will always be so sweet" (XF-1-1). Despite complaints and the hard work entailed, many teachers persist in the teaching process, experiencing its rewards. One teacher said: "I took over this notoriously challenging class (poor classroom manners, grades, and hygiene) that no one wanted to teach. Now that I've taken it over, I'm determined to do a good job with it" (XF-4-1). If teachers do not care for their students from the bottom of their hearts and do not maintain a love for education and a firm belief in education, they will not be able to perform well, even with high levels of knowledge and professionalism.

4.1.3 Professional identity

Our study found that primary and secondary teachers had different perceptions of their professional identity. There were differences in educational expectations between the two groups. Secondary teachers felt upset, helpless, embarrassed, and confused when their subjects and teaching practices were not recognised or respected by students. One teacher expressed: "One student said geography was not on the test, so why learn it? This arrogant tone made me both angry and helpless, and I felt that my dignity as a teacher had been challenged" (YL-14–1). The teaching profession is not insulated from societal utilitarian culture, and teachers of all subjects want to be valued, respected, and recognised for their educational efforts. In our study, we found that some teachers had gained a lot of respect from their students, which had surprised them and positively activated their professional identity. Professional identity is rooted in the emphasis on the "individual self" involving continual choices, identification, and

identity construction related to the "social self." The stronger the teachers' identification with their work and emotional involvement, the more likely they are to perceive their work as important in their lives, and foster positive subjective emotional experiences.

4.1.4 Emotional intelligence

Teachers can manage their emotions better if they have a high level of emotional intelligence. A teacher described the experience of happiness when invited a student struggling with mathematics to the podium to answer a question related to an easier method of multiplying rational numbers. The teacher keenly observed the shift in the class's emotional atmosphere and the student's nervousness, given that the student did not know how to answer the question. The teacher skillfully diffused the situation with encouraging words and praised the student's honesty in admitting not knowing the answer. This incident fully demonstrated the teacher's sensitivity and ability to navigate emotional dynamics, and their actions ultimately led to a significant change in the student. The educator noted: "Isn't this what we expect from teachers?" (XF-2-1). Empirical studies show that the higher the emotional intelligence of a teacher, the better the teacher can deal with incidents and achieve better outcomes (Taxer et al., 2019). Educators with higher emotional intelligence exhibit clearer emotional perception, enhanced communication skills, and a greater ability to meet the demands of their work, ultimately leading to higher teaching efficiency.

4.1.5 Professional quality

This study found that professional quality plays an important role in the formation of teachers' emotions. Professional quality refers to the deep and unique knowledge, skills, and inner qualities that people gradually develop through professional education or practical training. In a particular instance in this study, a teacher felt inadequate and nervous when he encountered difficulties in subject matters in class due to insufficient preparation. He did not know how to support students in their attempts to understand the challenging matter. The teacher said: "Who knows, every minute and every second of this lesson has been so agonising and difficult for me" (NJ-11–1). Ultimately, at the end of the lesson, the teacher hastily presented the answers to the students. Teachers feel ashamed and guilty for failing in their professional responsibilities, experiencing professional guilt for not preparing and failing to deliver a good lesson. The significance of professional quality is evident, serving as their core competence. Those with good professional quality are better able to identify and control their own emotions, and to guide students effectively in their learning process. However, a teacher with a lack of professionalism might often feel agitated and plagued by negative emotions when faced with unexpected events.

4.2 Work context factors

The professional work context in this study refers to the primary workplace of teachers, the environment in which they teach and manage their work, and where their emotions are generated. Teachers' work contexts are complex and diverse. This study found that the organisational climate, institutional norms, interpersonal interactions, educational resources, and the physical environment of the work context are important factors in influencing teachers' emotions.

4.2.1 Organisational climate

The organisational climate of the school has a significant impact on teachers' behaviors and feelings. Organisational climate reflects a shared perception of the work environment. A harmonious and progressive climate is likely to stimulate teachers' motivation and enthusiasm, thus promoting active engagement and improved performance. Conversely, within a poor and dysfunctional organisational climate, teachers may struggle with heightened psychological pressure, loss of sense of initiative at work, increased frustration, and diminished sense of achievement (Tian and Li, 2006). In this study, a novice teacher participating in a language teaching and research competition felt apprehensive because of his lack of experience; however, his confidence grew rapidly after receiving encouragement and help from colleagues. He said: "When I was apprehensive, my colleagues encouraged me like amiable family members, and their words were like reassurance pills" (XF-5-1). This teacher was ultimately successful and highly rated in the competition. This is a good example of a positive impact of the organisation, reflecting a climate that supports and motivates teachers to make progress. A positive organisational climate nurtures teacher development, building confidence and fostering mutual benefit. However, workplaces often host negative climates, where teachers are treated poorly and disrespected, and are unable to voice concerns or take action.

4.2.2 Institutional norms

The norms and school management system do not have a direct impact on teachers' emotions, but they do set behavioral expectations for teachers and constrain their behavior. Institutional norms delineate the rules and processes governing all dimensions of the organisational structure, like decision-making, implementation, monitoring, and feedback processes. These norms establish rules for the deployment, use, and management of organisational resources such as people, property, materials, time, and information. They serve as a system of guidance and discipline for individuals (Wu et al., 2010). The normative, democratic, and scientific nature of school institutional management can either restrict or enhance teacher autonomy, affecting their work and emotions to varying degrees. For example, during interviews, teachers talked about the clocking system and salary deductions for even a minute of lateness. They noted how this management practice could cause great distress to teachers. Teachers in the study said: "I have to go to the principal to ask for a leave, and the granting of the leave depends on the principal's mood, so I sit and wait, not knowing what to do" (BY-1-2). To facilitate the management of their school, some administrators tend to objectify teachers, i.e., treat them as objects to be controlled and observed. These actions suggest that some schools are losing their humanity and flexible orientation. Harsh institutional norms contribute to an excessively strict workplace environment that fosters negative feelings among teachers.

4.2.3 Interpersonal interactions

Teachers' interpersonal relationships are an important part of their professional development and a pivotal factor in generating teachers' emotions. These relationships include interactions with all members of the school community, including students, colleagues, leaders, and parents. In this study, class supervisors are important

actors who have often had to navigate relationships with students, colleagues, leaders, and parents, often experiencing a range of complex emotions in their interactions. One class supervisor highlighted: "As a class supervisor, I would like to work with regular teachers, not just good teachers, because regular teachers will take time. I can understand my colleagues and it's easy and brings me relief" (BZR-4-1). Mutual understanding between colleagues can provide teachers with a sense of peace, even when they are in challenging situations. Further, love and understanding from students generate feelings of empathy from teachers, recognition by superiors at the school boosts their confidence and motivation, and trust and respect from parents give teachers a sense of value in education.

In this study, we found that effective parent-teacher communication facilitates teaching and administrative work, contributing to students' academic performances. However, there were also cases reported where teachers and parents did not communicate well, and there were differences in their educational and classroom management philosophies. When participating teachers sought support from parents to help students with problems, they found issues with parenting methods. For example, in schools for migrant workers' children, some parents are faced with challenging schedules and believe that education falls primarily under the responsibility of the school and teachers, which impacts their communication with the school or teachers. Some parents take a harsher approach to education, which is not the best way to educate their children. This poses a challenge for teachers involved in family-school cooperation.

4.2.4 Educational resources

Educational resources are an important source of emotional impact on teachers. The lack of educational resources leads to an increased workload for teachers. In this study, certain teachers expressed annoyance due to the encroachment of their part-time administrative duties on their teaching time. One educator said: "We have too much to do here. I start work at 7 am and do not even get a break for lunch. I'm busy until the end of the day" (BY-2-1). Another noted: "In addition to teaching, I'm also the president of the teachers' union, so I have to do things on both sides, and if I'm busy with administration, I cannot concentrate on teaching, so I obviously feel overwhelmed. Even though I have six years of experience, I find that my teaching standard may not be able to keep up with those teachers who have only been teaching for three or four years" (BY-3-1). In schools facing a shortage of educational resources, a dearth of teaching staff exacerbates the workload for educators, compelling them to wear several hats. Constrained by limited manpower, teachers are burdened with various chores in addition to teaching, leading to dissatisfaction. Teachers lack motivation and complain about the increasing difficulties in carrying out their work. These negative feelings among teachers are caused by the unequal distribution of educational resources and the insufficient availability of high-quality resources. Therefore, the reasonable and fair use of educational resources, alongside the creation of better quality educational materials, is important for improving teachers' emotional satisfaction and overall happiness at work.

4.2.5 Physical environment

The poor physical environment had a significant impact on teachers' emotions. The school environment serves the most important

site of school life for both teachers and students, offering an important avenue for experiential learning. Transformed and shaped by the collaborative efforts of teachers and students, the school environment assumes an informal role in the cultivation of morals that cannot be achieved by the curriculum. The hidden curriculum, embedded in this environment, serves as a continual source of learning material, fostering diverse experiences and insights for teachers and students. During our study, some teachers complained about the poor school environment, noting that the offices and classrooms were smelly and hot, which significantly affected their mood. A substandard working environment detrimentally affects the physical wellbeing, learning, and work efficiency of teachers and students. Such conditions can make teachers feel depressed, suppressing their passions and originally positive sense of well-being and fostering feelings of irritability, impetuousness, and helplessness. However, sometimes under limited conditions, a positive atmosphere can emerge, as one pre-service teacher claimed: "The school where we did our placements had limited conditions, and could not provide adequate dormitories or offices. Thus, our placement team squeezed into dormitories together, ate together in the cafeteria, and worked in a temporary office, so we all bonded extraordinarily well" (SX-6-1).

4.3 Sociocultural factors

Sociocultural factors profoundly influence human beings in many ways, with cultural influences being both pervasive and deeply rooted. In the context of studying teachers' emotional influences, these factors play a crucial role in influencing teachers' educational ideals, professional identity, professional development, and interpersonal interactions. Views on life and career by teachers everywhere are shaped by their broader social and cultural context. Specifically, this study found that cultures surrounding curriculum reform, family education, and community culture had a potential impact on teachers' emotions.

4.3.1 Curriculum reform culture

Curriculum reform plays an important role in regulating and influencing teachers' emotions. Curriculum reform affects the entirety of the educational landscape and, indeed, the broader social system. This reform, along with the administrative culture of education, undoubtedly exerts a profound emotional impact on teachers, who are subject to a number of detailed educational policy requirements and multiple institutional norms. Teachers are monitored and evaluated from various sources to check whether their practices are in line with the requirements of the curriculum reform. Some teachers claimed: "The school's requirement of us teachers is that students get good grades and have high-scoring classmates. This situation is contrary to my original intention, so I am worried about my future career. In our secondary education, especially in vocational high schools, can we continue to judge a child's merits this way, based on grades?" (YL-9-2). The focus on good grades alone in schools represents a regressive culture that instills anxiety in teachers committed to curriculum reform. Teachers can be blamed and punished if their behaviors do not meet expectations (Zhang, 2007). The systems related to curriculum reform, teacher evaluation, and teacher training all have an impact on teachers' identity, and therefore, influence their emotions (Luo and Yu, 2016).

4.3.2 Family education

Teachers often feel pressurised by parents' misconceptions of education and the cultural atmosphere, and are unable to cope with parents and students, with interactions leading to feelings of anxiety and fear. In Chinese families, especially those with a single child, parents often show heightened concern about their child's education. As a result, they treat it as a kind of investment, resulting in the placement of higher demands on teachers. In some under-resourced schools, there are cases where exhausted parents, tired from work, lack the time to look after their children. In this study, we found that many parents send their children to school and take it for granted that the school should take full responsibility for their children's education, relegating their parental responsibilities to the background. Indiscriminate or non-existent signatures in the "family-school contact book," incompletion of homework assigned by the class WeChat group, and a lack of communication and collaboration with the teachers become signs of parents' disregard for cooperation between family and school. These actions also serve as an indication of problems related to views on education in the family. Parental perceptions of education constitute a significant influence on students and teachers. It hinders the work of teachers, which in turn affects their emotions.

4.3.3 Community culture

Our study found that the community in which teachers live has a significant influence on their emotions. The community in which teachers live is another important context that unconsciously and subconsciously influences their sense of community values and other factors. When positive, it can effectively nurture teachers' spiritual growth, renewing their courage during professional development, freeing them from anxiety and fear, and encouraging a sense of calm and relaxation. "The boss of the restaurant is very talkative, and the owner is very friendly, which makes us feel a sense of belonging, of being accepted (SX-7-1)," said one of the pre-service teachers. Then there was the owner of the hairdressing salon who was worried about his son's poor grades and wanted us to tutor his son. His eager and trusting eyes touched us and we felt a sense of responsibility and mission as teachers (SX-7-1). Another trainee teacher said: "Sharing and listening to each other in this simple and peaceful community made life and nature more connected" (SX-7-2). A good regional educational ecology creates a community environment supporting teachers' spiritual growth on a macro level, building a symbiotic platform for mutual assistance. It creates a harmonious community atmosphere, providing fertile ground for each teacher's personal development, and empowering them to conquer their fears and anxieties.

5 Discussion

With the objective of constructing a model that elucidates the mechanisms of teachers' emotional generation within the Chinese context, we employed qualitative research methods, utilizing the writing of anecdotal texts to collect data. Through the process of coding, we identified thirteen key factors that impact teachers' emotions and are significant determinants in the occurrence of teachers' emotional responses. Upon analysis, the study revealed that these key factors can be categorized into teachers' personal attributes,

work context factors, and sociocultural factors, which are interwoven and reflect the dynamics of teachers' emotional generation. Teachers' personal attributes are in the direct area of the model and directly govern the formation of their emotions, while their work context consists of a transitional area in emotion formation and the sociocultural system acts as the latent band influencing emotion development. The mechanism model constructed in this study, as depicted in Figure 1, captures the factors leading to emotional responses among teachers within the educational environment and portrays the dynamics of teachers' emotional experiences. This model holds significant importance for understanding the emotions of teachers within the educational context in China.

5.1 Teachers' personal attributes: the direct governing system of the formation of teachers' emotions

Teachers' emotions are psychological states arising from the interplay between individual teachers and their environment, influenced by internal factors specific to the teachers themselves. Teachers' personal attributes influence how they perceive and react to the educational environment and, as identified in our findings, serve as the cornerstone of teachers' emotional responses in the educational context. Emotions connect the microsystem of teachers (Sun and Lee, 2014). The emergence of teachers' emotions is directly related to events, but it is not the event itself that dictates the ebb and flow of teachers' emotions. Rather, it is the teachers' understanding and reaction to these events that shape their emotional responses. Personal Attributes affect the formation of teachers' emotions, as shown in Figure 1. Key contributors to the formation of teachers' emotions include demographic variables, educational beliefs, professional identity, emotional intelligence, and professional quality. Demographic variables such as gender, seniority, and work experience have a direct impact on teachers' emotions. Male and female teachers experience different emotional "triggers," leading to distinct emotional responses. Gender-related emotional differences may reflect variations in one or more components of their emotional experience and expression (Gard and Kring, 2007). Further, increased age and work experience lend to more maturity and rationality when facing inconsistency and emergencies. The findings of this study are consistent with Yuan's study that demographic variables, like gender, age, education, teaching experience, and position, have a significant effect on teachers' emotional intelligence (Yuan, 2019). In addition, it is shared with other research that teachers' individual knowledge, educational beliefs, professional identity, experience, and competence in teaching practice are related to emotional understanding, ultimately shaping teachers' emotions (Zembylas, 2007; Cubukcu, 2013).

Teachers' individual factors are important subjective influencers of their emotions, and their professional choices serve as important manifestations of their educational beliefs. Strong educational beliefs and a robust sense of professional identity are intertwined, mutually reinforcing one another. Teachers with sturdy educational beliefs and professionalism, and who strongly identify with the teaching profession, tend to exhibit greater maturity. They possess the ability to accurately perceive themselves, readily recognise their emotional states, and deal with unexpected events or conflicts in their lives with a rational mindset, resulting in smoother emotional states. Conversely,

FIGURE 1
Mechanism model elucidating the generation of teachers' emotions.
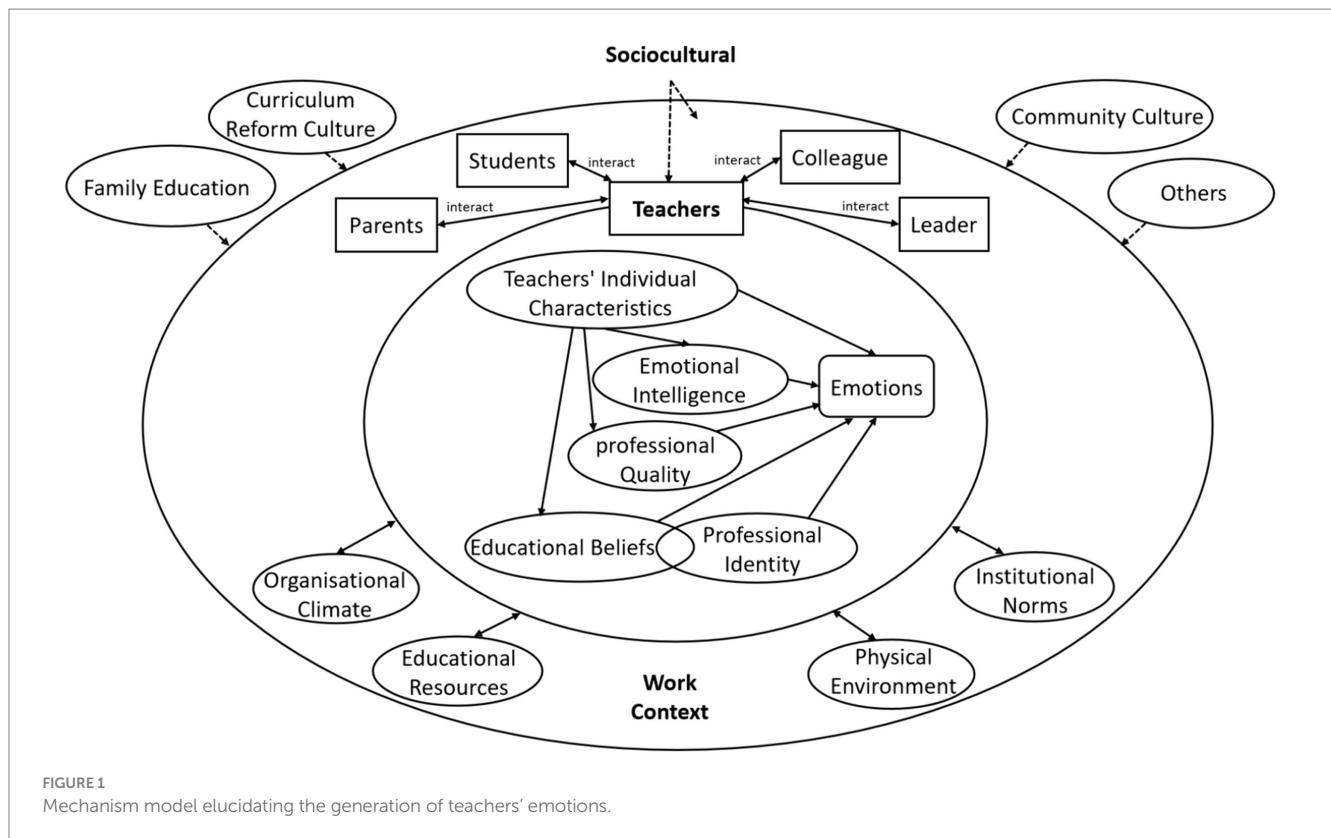
teachers lacking a profound belief in education, perceiving it merely as just a job, find it difficult to truly understand the meaning of teaching and nurturing people. This lack of understanding diminishes their sense of responsibility for teaching and their overall happiness. Consequently, these educators tend to become more susceptible to various emotional disorders.

Teachers' emotions are manifest within a broader context, influenced, constrained, and propelled by both internal and external factors. On an individual level, teachers are their own primary governance system, with the work context then also serving as an influence. The dynamics of teachers' interactions with students, colleagues, leaders, and parents collectively contribute to the fluid changes in teachers' emotions. Within the teachers' internal system, their individual characteristics, educational beliefs, professional identity, emotional intelligence, and professional qualities are the most critical factors influencing teachers' emotions. Notably, educational beliefs and professional identity exhibit overlapping characteristics, resulting in their effects becoming intertwined. Together, these factors form the teacher's microsystem, which is the key area from which teachers' emotions are generated.

5.2 Teachers' work context: the transition zone for the formation of teachers' emotions

Teachers' emotions are mainly generated in the work context, and teachers' emotional experiences within the specific work context are usually generally unfold during the process of teaching, managing, and interacting with different subjects. Factors in the work context impact

teachers through their internal system. The work context, depicted in the middle circle in Figure 1, serves as the transition zone for the formation of teachers' emotions. Emotional experience is generated from interactions between individuals and their environment, shaped not only by the internal characteristics of the individual but by the dynamic interaction with the external environment. Here, the term "environment" extends beyond physical space, to encompass interpersonal, cultural, organisational, and institutional dimensions (Sun and Lee, 2014). The work context, as a transitional zone for emotional formation, is a complex interplay of organisational climate, institutional norms, interpersonal interactions, educational resources, and the physical environment in teachers' workplaces.

Within the work context, both teachers and their counterparts in interpersonal interactions, including students, colleagues, and parents, are affected by the organisational climate, institutional norms, educational resources, physical environment, and interactions between teachers and different subjects. This work context serves as an important field for teachers to engage with different subjects, at various times every day, through teacher-student interactions, and relationships with colleagues, leaders, and parents. Pre-service teachers must be in close contact with their supervisors and with team members, while the work of class supervisors is even more complex. In these intricate relationships, the relationship between teachers and students stands out as the fundamental interpersonal relationship, while relationships with colleagues, leaders, and parents are also essential. Teachers, as complex emotional labourers due to the special nature of their work, are required to maintain a long-term emotional equilibrium, keeping their spirits high, and always showing optimistic, positive, friendly, pleasant, and calm emotions. In the face of various challenges, teachers need to carry out appropriate emotional work.

The teachers' work context acts as the transition zone for emotional generation, particularly prone to causing emotional outbursts in specific interaction contexts. The levels of the work context and teachers' personal qualities mutually influence and interact with each other. When analysing the work context factors that influence teachers' emotional generation, it is important to clarify the interaction between these factors and teachers' emotional experiences. Various measures can help improve teachers' work situations, including creating an equitable organisational atmosphere, creating an open dialogue environment, building a harmonious learning community, formulating a reasonable and standardised work system, ensuring a humane leave policy, implementing a fair evaluation mechanism, establishing a reward system, and promoting a harmonious and comfortable teaching environment. These measures can contribute to the promotion of positive moods among teachers and foster a positive cycle of interactive relationships.

5.3 Sociocultural systems: the subtle zones of teachers' emotional formation

The sociocultural systems, encompassing the curriculum reform culture, family education concepts and styles, and community culture, represent the subtle zones of teachers' emotional formation, as shown in the outermost circle of Figure 1, constituting an open system. Sociocultural influences are macro factors that impact the formation of teachers' emotions, acting as a "hidden factor" that influences teachers' emotions in an infiltrative manner. Our findings suggest that elements at this level do not directly affect teachers' emotional experiences, but the social context, ideology, and culture of educational reform will affect teachers' emotions by influencing their thoughts, values, attitudes, and actions. The influence of social culture on teachers' educational ideals, professional identity, career development, and interpersonal interactions is not only subtle but also deep-rooted. As researchers have argued, culture is one of many environmental factors that influence teachers' well-being, job satisfaction levels, and job stress levels (Hepburn et al., 2021). It can be said that teachers' perspectives on life and the profession are everywhere and implicitly sociocultural. It is also the cultural representation of the emotional generation of teachers. Teachers' emotions reflect the interaction between the individual and social culture.

However, the cultural factors that influence the formation of teachers' emotions extend beyond those listed in this study, some even more subtle and open. So the outermost level of this model, as shown in Figure 1, is an open system. As Hargreaves points out, the socioeconomic and cultural factors affecting teachers' emotions include the complexities of local education policies, globalisation, and local competition (Wang and Cheng, 2011). Their influence on teachers' emotions is often invisible but strong, potentially heavily shaping teachers' attitudes and behaviors, thus forming the sociocultural framework for the generation and expression of teachers' emotions. The sociocultural dimension is a subtle and hidden factor in the formation of teachers' emotions.

6 Conclusion

In summary, the factors influencing teachers' emotions are both explicit and implicit, internal and external, direct and indirect, micro

and macro. The formation of teachers' emotions is intricately linked not only to teachers' internal factors but also to the interplay of factors such as teachers' work context and social culture. These factors are intertwined and interact, producing the internal logic of teachers' emotions. The mechanism model depicts the three systems of factors influencing the generation of teachers' emotions and their interconnections. The model can help us to understand the origins and roots of teachers' emotions and to analyse the interactions between the teachers, their work contexts, and their sociocultural environments. The study will ultimately aid in advancing research on teachers' emotions.

7 Implications

The results of qualitative research are not mechanically created as an integrated whole, but as an intrinsic part of lived experience (Richardson, 2018). Although this study is from China, this model has more general relevance for understanding teachers' emotions and their pedagogical practices. From a macroscopic perspective, this study helps us to gain a deeper understanding of teachers' emotions and the visible and invisible mechanisms that generate them. Specifically, administrators can employ this framework to understand the factors influencing and interplaying with teachers' emotions, prompting reflections on system regulation and school culture construction, with the aim of cultivating a conducive atmosphere for teachers' professional development. And teachers can use this framework to gain a deeper understanding of their own emotional experience. Moreover, researchers can use this framework to identify the sources of teachers' emotions, gaining inspiration to conduct in-depth research on these influences and explore the pedagogical implications of teachers' emotions.

8 Limitations and future directions

There are some limitations in our study. First, the sample was exclusively drawn from China, potentially introducing cultural bias and limiting the generalisability of the findings. Moreover, the emotional experiences in this study were mainly confined to six common types—happiness, guilt, worry, fear, complaint, and anger—rather than other complex emotions. The study focused on the emotional experiences of class supervisors and pre-service teachers, neglecting other categories of teachers. Future researchers can expand the study sample to explore the emotional experiences of teachers from different countries, focus on a wider array of emotional experiences, and explore the emotional experiences of teachers with different identities. Such expansions of this research would provide a deeper understanding of the factors and generative mechanisms that influence teachers' emotions.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding authors.

Ethics statement

Author contributions

LL: Writing – original draft, Writing – review & editing. WS: Visualization, Writing – review & editing. YX: Supervision, Writing – review & editing. JZ: Resources, Writing – review & editing.

Funding

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

References

Bascia, N., and Hargreaves, A. (Eds.) (2000). The sharp edge of educational change: teaching, leading, and the realities of reform. London, New York: Routledge.

Bronfenbrenner, U. (1979). The ecology of human development: Experiments by nature and design. Cambridge, Mass: Harvard University Press.

Bingham, A. J. (2023). From data management to actionable findings: A five-phase process of qualitative data analysis. *Int. J. Qual. Methods.* 22, 1–11. doi: 10.1177/16094069231183620

Burić, I. (2019). The role of emotional labor in explaining teachers' enthusiasm and students' outcomes: a multilevel mediational analysis. *Learn. Individ. Differ.* 70, 12–20. doi: 10.1016/j.lindif.2019.01.002

Burić, I., Slišković, A., and Sorić, I. (2020). Teachers' emotions and self-efficacy: a test of reciprocal relations. *Front. Psychol.* 11:1650. doi: 10.3389/fpsyg.2020.01650

Chen, J. (2016). Understanding teacher emotions: the development of a teacher emotion inventory. *Teach. Teach. Educ.* 55, 68–77. doi: 10.1016/j.tate.2016.01.001

Chen, J. (2019). Exploring the impact of teacher emotions on their approaches to teaching: a structural equation modelling approach. *Br. J. Educ. Psychol.* 89, 57–74. doi: 10.1111/bjep.12220

Coppola, C., Di Martino, P., Mollo, M., Pacelli, T., and Sabena, C. (2013). Pre-service primary teachers' emotions: the math-redemption phenomenon., in proceedings of the 37th conference of the International Group for the Psychology of mathematics education, (Germany), 225–232.

Coppola, C., Di Martino, P., Pacelli, T., and Sabena, C. (2012). Primary teachers' affect: a crucial variable in the teaching of mathematics. *Nord. Mat.* 17, 101–118.

Cross, D. I., and Hong, J. Y. (2012). An ecological examination of teachers' emotions in the school context. *Teach. Teach. Educ.* 28, 957–967. doi: 10.1016/j.tate.2012.05.001

Cubukcu, F. (2013). The significance of teachers' academic emotions. *Procedia-Soc. Behav. Sci.* 70, 649–653. doi: 10.1016/j.sbspro.2013.01.105

De Ruiter, J. A., Poorthuis, A. M. G., and Koomen, H. M. Y. (2021). Teachers' emotional labor in response to daily events with individual students: the role of teacher–student relationship quality. *Teach. Teach. Educ.* 107:103467. doi: 10.1016/j.tate.2021.103467

Di Martino, P., and Sabena, C. (2011). "Elementary pre-service teachers' emotions: shadows from the past to the future" in Current state of research on mathematical beliefs XVI. ed. K. Kislenko (Tallinn: Tallinn University), 89–105.

Evans, D., Butterworth, R., and Law, G. U. (2019). Understanding associations between perceptions of student behaviour, conflict representations in the teacher-student relationship and teachers' emotional experiences. *Teach. Teach. Educ.* 82, 55–68. doi: 10.1016/j.tate.2019.03.008

Gard, M. G., and Kring, A. M. (2007). Sex differences in the time course of emotion. *Emotion* 7, 429–437. doi: 10.1037/1528-3542.7.2.429

Givon, E., Berkovich, R., Oz-Cohen, E., Rubinstein, K., Singer-Landau, E., Udelsman-Danieli, G., et al. (2023). Are women truly "more emotional" than men? Sex differences in an indirect model-based measure of emotional feelings. *Curr. Psychol.* 42, 32469–32482. doi: 10.1007/s12144-022-04227-z

Hammarberg, K., Kirkman, M., and De Lacey, S. (2016). Qualitative research methods: when to use them and how to judge them. *Hum. Reprod.* 31, 498–501. doi: 10.1093/humrep/dev334

Hargreaves, A. (2001). The emotional geographies of teachers' relations with colleagues. *Int. J. Educ. Res.* 35, 503–527. doi: 10.1016/S0883-0355(02)00006-X

Hargreaves, A. (2005). Educational change takes ages: life, career and generational factors in teachers' emotional responses to educational change. *Teach. Teach. Educ.* 21, 967–983. doi: 10.1016/j.tate.2005.06.007

Hepburn, S.-J., Carroll, A., and McCuaig-Holcroft, L. (2021). A complementary intervention to promote wellbeing and stress management for early career teachers. *Int. J. Environ. Res. Public Health* 18:6320. doi: 10.3390/ijerph18126320

Hodgen, J., and Askew, M. (2007). Emotion, identity and teacher learning: becoming a primary mathematics teacher. *Oxf. Rev. Educ.* 33, 469–487. doi: 10.1080/03054980701451090

Isenbarger, L., and Zembylas, M. (2006). The emotional labour of caring in teaching. *Teach. Teach. Educ.* 22, 120–134. doi: 10.1016/j.tate.2005.07.002

Jacobson, M. J., Levin, J. A., and Kapur, M. (2019). Education as a complex system: conceptual and methodological implications. *Educ. Res.* 48, 112–119. doi: 10.3102/0013189X19826958

Jiang, J., Vauras, M., Volet, S., and Salo, A.-E. (2019). Teacher beliefs and emotion expression in light of support for student psychological needs: a qualitative study. *Educ. Sci.* 9:68. doi: 10.3390/educsci9020068

Keller, M. M., Chang, M.-L., Becker, E. S., Goetz, T., and Frenzel, A. C. (2014). Teachers' emotional experiences and exhaustion as predictors of emotional labor in the classroom: an experience sampling study. *Front. Psychol.* 5:1442. doi: 10.3389/fpsyg.2014.01442

Lakshman, M., Sinha, L., Biswas, M., Charles, M., and Arora, N. K. (2000). Quantitative vs qualitative research methods. *Indian J. Pediatr.* 67, 369–377. doi: 10.1007/BF02820690

Luo, Z., and Yu, Q. (2016). A study of teacher identity and teacher emotions in curriculum reforms. *Teach. Adm.* 6, 8–11.

Mevarech, Z. R., and Maskit, D. (2015). The teaching experience and the emotions it evokes. *Soc. Psychol. Educ.* 18, 241–253. doi: 10.1007/s11218-014-9286-2

Nias, J. (1996). Thinking about feeling: the emotions in teaching. *Camb. J. Educ.* 26, 293–306. doi: 10.1080/0305764960260301

Reinhard, P., and Lisa, L.-G. (Eds.) (2014). International handbook of emotions in education. New York: Routledge, Taylor & Francis Group.

Reio, T. G. (2011). "Teacher emotions and socialization-related learning in the context of educational change" in New understandings of teacher's work: Emotions and educational change. eds. C. Day and J. C. Lee (Berlin: Springer), 105–118.

Richardson, J. (2018). The discovery of cumulative knowledge: strategies for designing and communicating qualitative research. *Account. Audit. Account. J.* 31, 563–585. doi: 10.1108/AAAJ-08-2014-1808

Saunders, R. (2013). The role of teacher emotions in change: experiences, patterns and implications for professional development. *J. Educ. Change* 14, 303–333. doi: 10.1007/s10833-012-9195-0

Schutz, P. A., and Zembylas, M. (Eds.) (2009). Advances in teacher emotion research: The impact on teachers' lives. Boston, MA: Springer US.

Smeyers, P. (Ed.) (2018). International handbook of philosophy of education. Cham: Springer International Publishing.

Strauss, A. L., and Corbin, J. M. (1998). Basics of qualitative research: Techniques and procedures for developing grounded theory. *2nd* Edn. Thousand Oaks: Sage Publications.

Sun, C., and Lee, J. C. K. (2014). The formation of teachers' emotions: an ecological perspective. *Glob. Educ.* 43:82.

Sutton, R. E., and Wheatley, K. F. (2003). Teachers' emotions and teaching: a review of the literature and directions for future research. *Educ. Psychol. Rev.* 15, 327–385. doi: 10.1023/A:1026131715856

Taxer, J. L., Becker-Kurz, B., and Frenzel, A. C. (2019). Do quality teacher–student relationships protect teachers from emotional exhaustion? The mediating role of enjoyment and anger. *Soc. Psychol. Educ.* 22, 209–226. doi: 10.1007/s11218-018-9468-4

Tian, B., and Li, L. (2006). The influence of school organizational climate on job burnout. *J. Psychol. Sci.* 29, 189–193. doi: 10.16719/j.cnki.1671-6981.2006.01.052

Van Manen, M. (1982). Phenomenological pedagogy. *Curric. Inq.* 12, 283–299. doi: 10.1080/03626784.1982.11075844

Van Veen, K., and Lasky, S. (2005). Emotions as a lens to explore teacher identity and change: different theoretical approaches. *Teach. Teach. Educ.* 21, 895–898. doi: 10.1016/j.tate.2005.06.002

Van Veen, K., and Sleegers, P. (2006). How does it feel? Teachers' emotions in a context of change. *J. Curric. Stud.* 38, 85–111. doi: 10.1080/00220270500109304

Van Veen, K., and Sleegers, P. (2009). "Teachers' emotions in a context of reforms: to a deeper understanding of teachers and reforms" in Advances in teacher emotion research. eds. P. A. Schutz and M. Zembylas (Boston, MA: Springer US), 233–251.

Van Veen, K., Sleegers, P., and Van De Ven, P.-H. (2005). One teacher's identity, emotions, and commitment to change: a case study into the cognitive–affective processes of a secondary school teacher in the context of reforms. *Teach. Teach. Educ.* 21, 917–934. doi: 10.1016/j.tate.2005.06.004

Wang, J., and Cheng, L. (2011). Hargreaves' views of teachers and teaching. *Glob. Educ.* 40, 15–21.

Wu, Y., Wang, S., Nie, Y., and Zhao, L. (2010). Modern university management: from institutional norms to cultural immersion. *J. Natl. Acad. Educ. Adm.* 28, 29–32.

Yin, H. (2007). Teacher emotion: An issue urgently to be taken into consideration. *Res. Educ. Dev.* 6, 44–48.

Yuan, X. (2019). A survey of emotional intelligence of primary school teachers under demographic variables. *J. Jilin Prov. Inst. Educ.* 35, 110–114. doi: 10.16083/j.cnki.1671-1580.2019.11.021

Zembylas, M. (2007). Emotional ecology: the intersection of emotional knowledge and pedagogical content knowledge in teaching. *Teach. Teach. Educ.* 23, 355–367. doi: 10.1016/j.tate.2006.12.002

Zhang, J. (2007). On the professional identity of teachers. *Res. Educ. Dev.* 46, 39–41.

Zhou, J. (2020). An empirical study of strategies and factors affecting emotional labour of high school teachers. *Eachers J.* 7, 66–70.

Correlation between impostor syndrome among doctoral students and supervisor empathy in Tunisia

Oumayma Slimi[1]*, Antonella Muscella[2], Santo Marsigliante[2] and Mourad Bahloul[3]

[1]High Institute of Sport and Physical Education, University of Sfax, Sfax, Tunisia, [2]Department of Biological and Environmental Sciences and Technologies (Di.S.Te.B.A.), University of Salento, Lecce, Italy, [3]Higher Institute of Education and Continuing Training, Virtual University of Tunis, Tunis, Tunisia

Introduction: The prevalence of impostor syndrome among PhD students has increased rapidly in recent years, having very negative effects on their mental and psychological health as well as on their doctoral journey. This exploratory study aims to examine whether there is a causal correlation between impostor syndrome among PhD students and empathy among supervisors.

Methods: This study encompasses 562 doctoral students (300 females, 262 males) and 152 Tunisian supervisors (68 females, 84 males).

Results: Employing ANOVA, significant influences on impostor syndrome emerge for gender, marital status, professional status, and the doctoral enrollment level ($p < 0.001$). Concurrently, supervisors' empathy is significantly affected by gender, marital status, and experience ($p < 0.001$). Linear regression establishes a noteworthy negative correlation ($p = 0.045$): a 1-unit increase in empathy correlates with a 0.122-unit decrease in impostor syndrome.

Discussion: These findings underscore the intricate relationship between socio-professional factors, empathy, and impostor syndrome within the academic milieu, offering crucial insights for interventions and psychological support. The study aligns with the broader context of understanding mental health challenges in academia, emphasizing the imperative for ongoing support initiatives.

1 Introduction

In the face of escalating global competition in academic research (Kosmützky and Krücken, 2023), pursuing a doctoral thesis presents a formidable challenge for many students, leading to a significant number prematurely abandoning their studies (Bai et al., 2023). Despite their objective successes, some individuals struggle to accept their achievements and fear being perceived as impostors. This phenomenon, often referred to as the "impostor syndrome" (Clance and Imes, 1978; Harvey, 1981; Bravata et al., 2020), has been extensively studied for its negative effects on individuals' well-being (Sonnak and Towell, 2001) as well as on their professional advancement (de Vries, 2005; Vergauwe et al., 2015; Neureiter and Traut-Mattausch, 2016). The prevalence of what is commonly known as "impostor syndromes" among doctoral candidates exacerbates this issue, leading to psychological costs such as fragile self-esteem (Kamarzarin, 2013; Wilkinson et al., 2017), low perceptions of competence

(McDowell et al., 2015), negative perfectionism (Ferrari and Thompson, 2006), high anxiety, a sense of lack of control (Vergauwe et al., 2015), negative affectivity, and depression (Wang and Li, 2023).

Impostor syndrome (also commonly called impostor phenomenon and fraud syndrome) is a behavioral phenomenon first described by Pauline Rose Clance as an insecurity in one's abilities or in achievements, despite any success one has achieved. This is a very common and frustrating phenomenon, where individuals fail to internalize their success and as a result experience feelings of insecurity, anxiety and/or fear of being exposed as fraud in their work, despite verifiable evidence and objectives of one's success (Kananifar et al., 2015). Individuals most linked to impostor syndrome are high-achieving individuals, disproportionately from academia, particularly in the healthcare field. There is particular interest in studying this phenomenon, as there is an established relationship between Impostor syndrome and other behavioral disorders, including depression, anxiety, and aggravation of other behavioral health problems (Bravata et al., 2020). Although there is no widely accepted medical definition (e.g., the DSM-V criteria), the six original criteria identified by Clance, and expanded upon, can be summarized as a set of characteristics that may or may not be present in an individual with impostor syndrome: perfectionism, super heroism, fear of failure, denial of competence, and success mephophobia (Thomas and Bigatti, 2020).

Crucial to the doctoral journey is mentorship support, with the relationship between the doctoral candidate and supervisor being a pivotal external factor impacting the overall experience (Bravata et al., 2019). Research mentorship, however, faces challenges such as personality mismatches, poor communication of expectations, and misunderstandings, often resulting in ruptures in student-supervisor relationships (Denis and Lison, 2023). Emotional intelligence in supervisors is essential for successful mentorship (Pyhältö et al., 2012), requiring an empathetic approach to adapt to diverse learning styles and understand the emotional states of students (Dugué et al., 2021). Tutor transparency and empathy can go a long way in building confidence and trust in students.

Among emotional skills, empathy is the ability to understand another person's mood and emotional situation, without recourse to verbal communication (Slimi et al., 2023). Whereby, empathy is a social skill of fundamental importance and represents one of the basic aptitudes for developing emotional competence, especially for fostering social ties, and effective interpersonal communication (Davies, 1990). Empathy is the basis of successful interpersonal relationships, and it is the ability to establish stimulating and inspiring relationships; in addition, the empathic person contributes to their welfare. The concept of empathy has developed through the past century; different studies pointed out different concepts of empathy and its definition (Sánchez-Pérez et al., 2014).

Despite the magnitude of the issue, doctoral program abandonment receives minimal attention from the media, decision-makers, and the scientific community. Empirical research on perseverance in doctoral studies is insufficient, with limited exploration of students' emotions and the role of supervisors in the emotional process of doctoral candidates (Bošnjaković and Radionov, 2018). Although some studies have alluded to empathic relationships between thesis supervisors and supervisees, particularly in Spanish research (Wollast et al., 2023), few have specifically studied doctoral students' mental health in relation to their supervisors' empathic capacity.

This study addresses these gaps by proposing to explore the complex interactions among doctoral candidates, their supervisors, and semiprofessional factors, specifically focusing on impostor syndrome and empathy. By shedding light on psychological challenges in the Tunisian academic context, the research aims to identify potential avenues for psychological intervention and support.

In summary, this study underscores the pressing need to examine the psychological aspects of doctoral studies, emphasizing the impact of impostor syndrome and the crucial role of empathetic mentorship. The investigation contributes to the broader understanding of academia by addressing the well-being of doctoral candidates and promoting interventions to foster a supportive academic environment.

2 Materials and methods

2.1 Participants

The participant sample consisted of 562 doctoral candidates ($n = 562$), comprising 300 females and 262 males, aged between 25 and 44 years. Among the participants, 244 were employed, while the remaining were students actively seeking employment. Specifically, 110 individuals were in their first year, 122 in the second year, 236 in the third year, 60 in the fourth year, and 34 in the fifth year across five different Tunisian universities, voluntarily participating in this quantitative study. Within this population, 173 females and 178 males were engaged (married, divorced, and/or had children), while the rest were single (Table 1).

The sample of mentors ($n = 152$) consisted of 68 females and 84 males, aged between 36 and 59 years. Among them, 43 females and 61 males were engaged (married, divorced, and/or had children), with 95 being experienced (≥ 10 years) and the rest being novices (less than 10 years) in the field of scientific mentoring (Table 2).

2.2 Randomization

The study employed a randomized controlled trial design. A statistical data analyst, blinded to the study, facilitated the randomization process. The 562 doctoral candidates (aged 25–44 years) were randomly assigned to either the female (F, $n = 300$) or male (H, $n = 262$) group. Similarly, the 152 mentors (aged 36–59 years) were randomly assigned to either the female (F, $n = 68$) or male (H, $n = 84$) group. The randomization procedure used computer-generated random numbers through JASP software (Jeffreys's Amazing Statistics Program), version 0.17.3, with essential information stored in a database.

Gender-based randomization was employed to achieve a balanced distribution of participants across different analysis groups while upholding ethical standards and ensuring the reliability of our findings. The primary objective was to minimize potential biases associated with gender distribution among study groups, thereby enhancing the assessment of gender-specific effects on the variables under investigation. Participants were randomly assigned to their respective groups with careful consideration of gender. This ensured that during participant selection and assignment to various study groups (e.g., based on marital or professional status), there was a near-equal representation of male and female participants within each

TABLE 1 Demographic and professional profile of participating doctoral candidates.

Gender	Marital status	Professional status	Age (years)	Years of thesis enrollment	N = 562
Females	Engaged	Unemployed	30.2 ± 3.18	2.05 ± 0.77	116
		Employed	39.4 ± 1.5	4.23 ± 0.92	57
	Single	Unemployed	28.7 ± 3.5	1.67 ± 0.8	114
		Employed	38.08 ± 0.86	3.08 ± 0.28	13
Males	Engaged	Unemployed	34.29 ± 1.6	2.91 ± 0.29	56
		Employed	38.99 ± 1.75	3.42 ± 0.53	122
	Single	Unemployed	29.21 ± 2.62	1.88 ± 0.67	67
		Employed	38.18 ± 1.74	3.29 ± 0.47	17

TABLE 2 Demographic and professional profile of participating the supervisor.

Gender	Marital status	Experience (years)	N = 152	Age (years)
Females	Engaged	−10	8	37.87 ± 1.80
		10+	35	50.86 ± 4.45
	Single	−10	21	37.38 ± 1.2
		10+	4	44 ± 2.71
Males	Engaged	−10	7	37.57 ± 2.07
		10+	54	53.09 ± 4.32
	Single	−10	21	37.14 ± 1.24
		10+	2	41.5 ± 0.71

group. Importantly, our approach did not involve strict segregation of male and female groups. All participants, regardless of gender, were included in analyses based on their demographic and professional characteristics as outlined in our study results. Throughout our research, we adhered to ethical guidelines and maintained professional conduct. In summary, gender-based randomization was thoughtfully implemented to enhance the integrity of our findings and ensure equitable representation across study groups.

2.3 Design

We hypothesize that there are significant influences on both impostor syndrome and supervisor empathy depending on gender, marital status, professional status, and level of doctoral enrollment. Furthermore, we explored a possible negative correlation between empathy and impostor syndrome. In addition, regarding the relationship between supervisors and students, we conducted a linear regression analysis to examine the relationship between supervisors' empathy quotient and impostor syndrome among doctoral students. Then, we formulate two hypotheses: (1) there is no significant relationship between supervisors' empathy quotient and impostor syndrome among doctoral students, null Hypothesis (H$_0$); (2) there is a significant relationship between supervisors' empathy quotient and impostor syndrome among doctoral students, alternative Hypothesis (H$_1$). We conducted a linear regression analysis to examine the relationship between supervisors' empathy quotient and impostor syndrome among doctoral students.

2.3.1 Impostor phenomenon

The Clance Impostor Phenomenon Scale (CIPS; Clance and Imes, 1978) was employed to measure the impostor syndrome as a trait, as previously validated (Fernández-Fastuca, 2021). Comprising 20 items, the scale assesses various manifestations of the syndrome, including the fear of failure, attribution of success to luck, and rejection of others' recognition. Scores range from 20 to 100, with higher scores indicating a greater impostor syndrome. Scores ≤40 suggest few impostor syndrome characteristics, 41–60 indicate moderate experiences, 61–80 suggest a high frequency, and scores >80 indicate intense experiences. The Clance Impostor Phenomenon Scale was administered to collect doctoral candidates' perceptions. Some participants completed questionnaires via email, a validated method for data collection.

2.3.2 Empathy quotient

The empathy quotient of Tunisian supervisors was assessed using the Baron-Cohen and Wheelwright questionnaire (Czerniawski, 2023), and previously validated (Baron-Cohen and Wheelwright, 2004). It is consisting of 60 questions. Respondents could score between 0 and 2 points for each of the 40 questions targeting empathy, with a maximum score of 80.

2.4 Statistical analysis

Data were analyzed using JASP software, version 0.17.3. Descriptive statistics were presented as mean ± standard deviation (SD). The Shapiro–Wilk test was conducted to check for normal distribution. An ANOVA was used to compare impostor phenomenon severity among doctoral candidates based on gender, age, marital status, profession, and enrollment year. Additionally, empathy levels among doctoral candidates and supervisors of different ages, marital statuses, and mentoring experiences were compared. Linear correlation was calculated to explore the relationship between impostor syndrome among doctoral candidates and supervisors' empathy levels.

3 Results

3.1 Impostor syndrome among doctoral candidates

Our findings demonstrated that female doctoral students experience significantly higher levels of impostor syndrome than their

male counterparts [$F(1, 633) = 45.673$, $p < 0.001$, $\eta^2 = 0.041$]. This suggests that gender differences account for 4.1% of the total variance in impostor syndrome.

Marital status shows a statistically significant difference [$F(1, 633) = 59.969$, $p < 0.001$, $\eta^2 = 0.054$], indicating that doctoral students who are married, divorced, or have children exhibit higher levels of impostor syndrome than to single students. The interaction between gender and marital status is not significant [$F(1, 633) = 0.590$, $p = 0.443$, $\eta^2 = 5.320 \times 10^{-4}$], indicating that the combined effect of gender and marital status is not statistically different from the sum of their individual effects.

Doctoral students who are also employed experience a more pronounced impostor syndrome than those who are not employed [$F(1, 633) = 136.257$, $p < 0.001$, $\eta^2 = 0.123$], suggesting that variations in professional status explain 12.3% of the total variance in impostor syndrome. This means that having a professional activity alongside doctoral studies can exacerbate this feeling of imposture. Employed men (sum of squares $= 24{,}837.26$, $F = 136.26$) and employed women both exhibits significantly higher levels of impostor syndrome compared to those who are not employed ($p < 0.001$). Significant interactions include those between marital status and professional status [$F(1, 633) = 12.789$, $p < 0.001$, $\eta^2 = 0.012$], while the triple interaction among gender, marital status, and professional status is marginal [$F(1, 633) = 3.009$, $p = 0.083$, $\eta^2 = 0.003$].

Years of enrollment in the doctoral program were found to have a significant impact on the severity of impostor syndrome [$F(4, 633) = 125.373$, $p < 0.001$, $\eta^2 = 44.1\%$], with a notable decrease in syndrome levels as enrollment years advanced, indicating that doctoral students enrolled in their 1st, 2nd, 3rd, 4th, or 5th year show decreasing levels of the syndrome, respectively. The residual variance is significant (115384.855, df $= 633$), indicating that other factors not included in the model influence impostor syndrome. In summary, the model suggests that gender, marital status, professional status, and thesis enrollment all have significant effects on impostor syndrome. The triple interaction is marginal, indicating that the combined influence of these three factors is at the threshold of statistical significance (Table 3).

3.2 Empathy quotient among supervisors

Supervisors' empathy plays a crucial role. We investigated the relation between empathy and the gender, marital status and work experience of the supervisor.

Empathy quotient differs significantly by gender, with women ($M = 72.54$) showing higher levels of empathy than men ($M = 65.12$). This indicates that gender explains 7.390% of the variance in empathy levels among supervisors.

Similarly, marital status significantly influences empathy quotient [$F(1) = 46.194$, $p < 0.001$, $\eta^2 = 6.487\%$], explaining 6.487% of the total variance in empathy levels among supervisors. Married supervisors show higher levels of empathy compared to unmarried supervisors. The interaction effect between gender and marital status is not statistically significant [$F(1) = 2.966$, $p = 0.087$, $\eta^2 = 0.416\%$], suggesting that the combined effect of gender and marital status is not statistically different from the sum of their individual effects.

Professional experience significantly impacts empathy quotient [$F(1) = 27.95$, $p < 0.001$, $\eta^2 = 0.132\%$], with variations in experience

explaining 13.2% of the total variance in empathy levels. Supervisors with more than 10 years of experience show higher levels of empathy than those with less than 10 years of experience (Table 4).

3.3 Correlation between doctoral impostor syndrome and supervisor empathy

Greater empathy from supervisors is associated with a decrease in impostor syndrome among doctoral students. Table 5 displays the results of a linear regression analysis investigating the impact of empathy quotient on impostor syndrome among doctoral students.

Thus, we found a significant negative correlation between supervisors' empathy quotient and impostor syndrome among doctoral students ($p = 0.045$). This means that we reject the null hypothesis, Ho (no significant relationship or effect between the variables studied), and accept the alternative hypothesis, Hi (there is a significant relationship or effect between the variables studied), indicating that an increase in supervisors' empathy is indeed associated with a decrease in impostor syndrome.

When the empathy quotient is zero, the impostor syndrome is estimated at 73.711 with a standard error of 0.821 and is highly significant ($p < 0.001$). In H_1 considering a non-zero empathy quotient, yields an intercept estimate of 69.866 with a standard error of 2.071, also highly significant ($p < 0.001$).

Regarding the empathy quotient's effect, our analysis revealed that an increase in supervisors' empathy quotient is associated with a decrease in impostor syndrome among doctoral students, with the associated coefficient of 0.122, indicating that a 1-unit increase in the empathy quotient is associated with a decrease of 0.122 units in impostor syndrome.

With a standard error of 0.060, this coefficient presents a standardized correlation (β) of -0.163, signifying a negative correlation. The T-value of 2.019 and a p-value of 0.045 denote a statistically significant relationship between the empathy quotient and impostor syndrome.

Initially, our study included exploratory elements to identify potential influencing factors. By employing ANOVA and linear regression analyses, we were able to explore both correlational and potential causal relationships between the supervisors' empathy quotient and impostor syndrome among doctoral students. The results, as presented in Table 5, show a significant negative correlation ($p = 0.045$), leading us to reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1) (Table 5).

4 Discussion

The current study explores the correlation between imposter syndrome among doctoral students and the empathy levels of supervisors. The multifactorial analysis reveals substantial connections with gender, marital status, professional status, and thesis enrolment level. The results illuminate the intricate relationship between socio-professional factors, empathy, and imposter syndrome within the academic environment. Poor mental health can have numerous negative consequences for doctoral students and their supervisors, as it can negatively impact quality of life, attrition, and academic productivity. Although the number of doctoral students suffering from psychological problems has increased significantly in recent years, few studies have examined

TABLE 3 Multifactorial exploration of impostor syndrome determinants through extended ANOVA.

Case	Sum of squares	df	Moyenne des carrés	F	p	η^2
Gender	8325.31	1	8325.31	45.67	< 0.001	0.041
Marital status	10931.35	1	10931.35	59.97	< 0.001	0.054
Gender ✱ Marital status	107.51	1	107.51	0.59	0.443	5.32×10^{-4}
Professional status	24837.26	1	24837.26	136.26	< 0.001	0.123
Gender ✱ Professional status	274.83	1	274.83	1.51	0.220	0.001
Marital status ✱ Professional status	2331.23	1	2331.23	12.79	< 0.001	0.012
Gender ✱ Marital status ✱ Professional status	548.45	1	548.45	3.01	0.083	0.003
Thesis enrollment	89089.45	4	22272.36	125.37	< 0.001	0.441
Residuals	115384.85	633	182.28			

TABLE 4 Exploration of empathy quotient determinants through ANOVA.

Case	Sum of squares	df	Mean squares	F	p	η^2
Gender	244772.37	1	244772.37	52.63	< 0.001	7.390
Marital status	214856.41	1	214856.41	46.19	< 0.001	6.487
Gender ✱ Marital status	13795.16	1	13795.16	2.97	0.087	0.416
Work experience	4388.44	1	4388.44	27.95	< 0.001	0.132

TABLE 5 Linear regression of empathy quotient effects on doctoral impostor syndrome.

Model	Unstandardized	Standard error	Standardized Beta	T	p
H_0	(Intercept)	73.711	0.821	89.774	< 0.001
H_1	(Intercept)	69.866	2.071	33.743	< 0.001
Empathy quotient	0.122	0.060	0.163	2.019	0.045

how the supervisor-supervisee relationship may influence the emotional well-being of male and female doctoral students.

Consistent with previous studies that found that women reported statistically significantly higher rates of impostor feelings than men (Cokley et al., 2015; Kananifar et al., 2015; Rajhi et al., 2020), our results demonstrated that female doctoral students experience significantly higher levels of impostor syndrome compared to their male counterparts. This means they feel more negative emotions related to this syndrome. In fact, men and women often deal with their impostor feelings differently (Robertson, 2022). In contrast, other researchers have found no differences in impostor syndrome between men and women (Kananifar et al., 2015; Hutchins and Rainbolt, 2016). In addition, when Brauer and Proyer studied psychology students and professionals, they found gender effects for impostor syndrome only among students, not professionals (Kamarzarrin et al., 2013). Thus, although impostor syndrome is common in women, it also affects men.

Not only do women experience more negative emotions related to this syndrome, but also doctoral students who are married, divorced, or with children also have higher levels of impostor syndrome than single student. This finding conforms to previous work showing that unmarried subjects had higher self-esteem than their peers who are married, divorced, or separated (Brauer and Proyer, 2017).

However, Henning et al. (1998) had shown that married medical students experienced less distress than their single colleagues (Heydari

et al., 2008), and it has been suggested that marriage may serve as an antidote to distress.

Another aspect related to impostor syndrome is experience/duty in a position where those with less experience are more likely to experience higher levels of impostor syndrome. For example, the qualitative study by Meister et al. (2014) and Coombs and Fawzy (1982) noted how transitions into leadership roles improve both their responsibilities and visibility to others, often eliciting greater impostor syndrome. Context can impact and even change the direction of IP relationships (Meister et al., 2014).

A key element of this context is the leader–member relationship that "may be the single most powerful connection an employee can build in an organization" (Johns, 2006). Our results indicate a significant correlation between supervisors' empathy levels and a reduction in imposter syndrome among doctoral students. This discovery highlights the crucial importance of emotional support from supervisors in mitigating the negative impacts of imposter syndrome. The complex interactions between gender, marital status, and professional status underscore the need for tailored support programs considering these socio-professional variables. These results have significant implications for the development of targeted interventions to alleviate imposter syndrome among doctoral students, emphasizing the importance of mentorship programs tailored to gender-specific concerns, marital dynamics, and professional roles.

Furthermore, the conclusion of Nori and Vanttaja (Hui et al., 2004) regarding the link between lack of childhood encouragement and low planning levels during doctoral candidacy align with our own results (Hui et al., 2004). Our analyses confirm these associations, demonstrating a significant correlation between early lack of encouragement and insufficient planning in the doctoral journey. Additionally, previous research has highlighted the relationship between imposter phenomenon and neuroticism (Hui et al., 2004), as well as the impact of self-centered belief of being an imposter on emotional and mental well-being (Kaur and Jain, 2022). Our results confirm these trends, showing a significant positive correlation between neuroticism and imposter syndrome, along with an overuse of emotional regulation strategies associated with poor well-being. On the other hand, the perspectives of Kolontari et al. (2023) and Bonetto et al. (2023) challenge the notion of imposter syndrome and propose a model of affirmation of disability. While our results are consistent with observed manifestations of imposter syndrome, they could benefit from a more in-depth exploration in light of these new perspectives (Bonetto et al., 2023). Statistical analyses could be expanded to examine how these alternative models apply in our specific context.

With respect to doctoral supervision, the importance of considering individual students' contexts and their relationships to their current and emerging professional identity is clear (Kolontari et al., 2023), as well as psychological safety in student-supervisor relationships (Gunasekera et al., 2021). Our findings confirm the significant effect of psychological safety in reducing impostor syndrome among doctoral students.

Finally, the research of Kong et al. on the intercultural adaptive orientation of advisors, the engagement of student-advisor interactions, and the mediating role of psychological safety provide important insights for understanding interpersonal dynamics in the academic context (Sujon, 2023). Our statistical analyses confirm these mediations, highlighting the importance of intercultural adaptive orientation of advisors and psychological safety in strengthening the academic engagement of international doctoral students.

Our study contributes significantly to the field by highlighting the importance of socio-professional factors and supervisors' empathy in understanding imposter syndrome. The implications of our findings are crucial for developing targeted support programs aimed at alleviating imposter syndrome among Tunisian doctoral students. For example, implementing mentorship programs tailored to specific concerns related to gender, marital dynamics, and professional roles could enhance doctoral students' well-being and foster a more inclusive and supportive academic environment.

Our research offers a unique contribution to understanding the factors that exacerbate or alleviate imposter syndrome in the academic context. In conclusion, our results underscore the importance of socio-professional factors and supervisor empathy in comprehending imposter syndrome. These findings open avenues for targeted interventions aimed at improving the well-being of doctoral students, thereby enhancing the academic environment.

5 Conclusion

Our in-depth study exploring the correlation between impostor syndrome among doctoral students and their supervisors' empathy levels reveals significant findings, particularly highlighting the crucial impact of empathy levels.

As a company's reputation contributes to its sustainable competitive advantage, supervisors' levels of empathy emerge as a critical element in managing impostor syndrome. The results indicate a significant correlation between supervisors' levels of empathy and reductions in impostor syndrome among doctoral students. This finding highlights the crucial importance of emotional support from supervisors in mitigating the negative impacts of impostor syndrome.

Expanding this conclusion to the broader context of academic sustainability, it becomes evident that mentoring and supervision programs that promote empathetic communication can play a vital role in improving doctoral student well-being. The positive effect of empathy on the perception of impostor syndrome suggests that interventions focused on developing empathic skills among supervisors could have positive effects on the academic experience of doctoral students.

Empathy is an emotional capacity, which is based on the ability to detect, feel active and share emotions. The supervisor having the skills to emotionally understand how students feel and see things becomes a precursor and inducer of the intellectual skills needed to conduct doctoral research. In interacting with young people, for example, active listening creates a safe and stimulating environment, encouraging them to freely express their logical thinking and scientific imagination. This shows respect and a better understanding of experiences, perspectives, and emotions, which builds trust and self-esteem and ensures the development of a sense of self-esteem and self-confidence (Kong et al., 2023). In addition, the learning environment contributes either positively or negatively to the academic achievements of students (Stojiljković et al., 2012).

Our conclusion highlights an important avenue for future research and initiatives in the field of academic mentoring. Further exploration of how empathy levels can be strengthened and integrated into supervision programs could be a promising path to promoting a healthier academic environment. In conclusion, our findings highlight the importance of socio-professional factors and supervisors' empathy in understanding impostor syndrome. These findings provide solutions for targeted interventions aimed at improving the well-being of doctoral students, thereby improving the academic environment.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material; further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by Institutional Review Board Statement. The study was conducted in accordance with the Declaration of Helsinki for human experimentation. Ethical approval was obtained from the local research ethics committee of the Higher Institute of Sport and Physical Education of Sfax, with reference number 049/2023. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the

individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

OS: Writing – review & editing. AM: Conceptualization, Writing – review & editing, Visualization, Supervision. SM: Conceptualization, Writing – review & editing. MB: Writing – original draft.

Funding

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

References

Bai, B., Ge, Y., and Li, Z. (2023). Psychological study of international doctoral students studying in China: cross-cultural adaptation. *Curr. Psychol.* 42, 32270–32283. doi: 10.1007/s12144-022-04133-4

Baron-Cohen, S., and Wheelwright, S. (2004). The empathy quotient: an investigation of adults with Asperger syndrome or high functioning autism, and normal sex differences. *J. Autism Dev. Disord.* 34, 163–175. doi: 10.1023/B:JADD.0000022607.19833.00

Bonetto, E, Guiller, T, and Pavani, JB (2023). "Imposter syndrome and (mal)adaptive cognitive emotion regulation strategies among Phd candidates." PsyArXiv [Preprint]. doi: 10.31234/osf.io/atyb6

Bošnjaković, J., and Radionov, T. (2018). Empathy: concepts, theories and neuroscientific basis. *Alcohol. Psychiatr. Res. J. Psychiatr. Res. Addict.* 54, 123–150. doi: 10.20471/dec.2018.54.02.04

Brauer, K., and Proyer, R. T. (2017). Are impostors playful? Testing the association of adult playfulness with the impostor phenomenon. *Personal. Individ. Differ.* 116, 57–62. doi: 10.1016/j.paid.2017.04.029

Bravata, D. M., Mak, K. K. L., Kleitman, S., and Abbott, M. J. (2019). Impostor phenomenon measurement scales: a systematic review. *Front. Psychol.* 10:671. doi: 10.3389/fpsyg.2019.00671

Bravata, D. M., Watts, S. A., Keefer, A. L., Madhusudhan, D. K., Taylor, K. T., Clark, D. M., et al. (2020). Prevalence, predictors, and treatment of impostor syndrome: a systematic review. *J. Gen. Intern. Med.* 35, 1252–1275. doi: 10.1007/s11606-019-05364-1

Clance, P. R., and Imes, S. A. (1978). The imposter phenomenon in high achieving women: dynamics and therapeutic intervention. *Psychother. Theory Res. Pract.* 15, 241–247. doi: 10.1037/h0086006

Cokley, K., Awad, G., Smith, L., Jackson, S., Awosogba, O., Hurst, A., et al. (2015). The roles of gender stigma consciousness, impostor phenomenon and academic self-concept in the academic outcomes of women and men. *Sex Roles* 73, 414–426. doi: 10.1007/s11199-015-0516-7

Coombs, R. H., and Fawzy, F. I. (1982). The effect of marital status on stress in medical school. *Am. J. Psychiatry* 139, 1490–1493. doi: 10.1176/ajp.139.11.1490

Czerniawski, G. (2023). Power, positionality, and practitioner research: schoolteachers' experiences of professional doctorates in education. *Br. Educ. Res. J.* 49, 1372–1386. doi: 10.1002/berj.3902

Davies, B. N. (1990). The relationship of lean limb volume to performance in the handgrip and standing long jump tests in boys and girls, aged 11.6–13.2 years. *Eur. J. Appl. Physiol. Occup. Physiol.* 60, 139–143. doi: 10.1007/BF00846034

de Vries, M. F. R. K. (2005). The dangers of feeling like a fake. *Harv. Bus. Rev.* 83:159.

Denis, C., and Lison, C. (2023). L'abandon aux études doctorales: un problème de direction? *Rev. Int. Pédag. Enseign. Supér.* 39, 1–21. doi: 10.4000/ripes.4499

Dugué, M., Sirost, O., and Dosseville, F. (2021). A literature review of emotional intelligence and nursing education. *Nurse Educ. Pract.* 54:103124. doi: 10.1016/j.nepr.2021.103124

Fernández-Fastuca, L. (2021). ¿Por qué directores y tesistas deciden discontinuar la relación pedagógica?*. *Rev. Int. Investig. Educ.* 14, 1–26. doi: 10.11144/Javeriana.m14.pqdt

Ferrari, J. R., and Thompson, T. (2006). Impostor fears: links with self-presentational concerns and self-handicapping behaviours. *Personal. Individ. Differ.* 40, 341–352. doi: 10.1016/j.paid.2005.07.012

Gunasekera, G., Liyanagamage, N., and Fernando, M. (2021). The role of emotional intelligence in student-supervisor relationships: implications on the psychological

safety of doctoral students. *Int. J. Manag. Educ.* 19:100491. doi: 10.1016/j.ijme.2021.100491

Harvey, J.C. (1981). The impostor phenomenon and achievement: A failure to internalize success; Temple University.

Henning, K., Ey, S., and Shaw, D. (1998). Perfectionism, the imposter phenomenon and psychological adjustment in medical, dental, nursing and pharmacy students. *Med. Educ.* 32, 456–464. doi: 10.1046/j.1365-2923.1998.00234.x

Heydari, J., Jafary, H., Afzali, M., Mohamadpor, R., and Mahmodi, G. (2008). Criteria of marriage for single students of Mazandaran University of Medical Sciences. *Iran. J. Nurs. Res.* 3, 56–62.

Hui, C., Lee, C., and Rousseau, D. M. (2004). Employment relationships in China: do workers relate to the organization or to people? *Organ. Sci.* 15, 232–240. doi: 10.1287/orsc.1030.0050

Hutchins, H. M., and Rainbolt, H. (2016). What triggers imposter phenomenon among academic faculty? A critical incident study exploring antecedents, coping, and development opportunities. *Hum. Resour. Dev. Int.* 20, 194–214. doi: 10.1080/13678868.2016.1248205

Johns, G. (2006). The essential impact of context on organizational behavior. *Acad. Manag. Rev.* 31, 386–408. doi: 10.5465/amr.2006.20208687

Kamarzarin, H. (2013). A study of the relationship between self-esteem and the imposter phenomenon in the physicians of Rasht City. *Eur. J. Exp. Biol.* 3, 363–366.

Kamarzarrin, H., Khaledian, M., Shooshtari, M., Yousefi, E., and Ahrami, R. (2013). A study of the relationship between self-esteem and the imposter phenomenon in the physicians of Rasht city (Iran). *Eur J Exp Biol.* 3, 363–366.

Kananifar, N., Seghatoleslam, T., Atashpour, S., Hoseini, M., Habil, M., and Danaee, M. (2015). The relationships between imposter phenomenon and mental health in Isfahan universities students. *Intern. Med. J.* 22, 144–146.

Kaur, D. T., and Jain, N. (2022). Relationship between impostor phenomenon and personality traits: a study on undergraduate students. *J. Posit. Sch. Psychol.* 6, 734–746.

Kolontari, F., Lawton, M., and Rhodes, S. (2023). Using developmental mentoring and coaching approaches in academic and professional development to address feelings of 'imposter syndrome. *J. Perspect. Appl. Acad. Pract.* 11, 34–41. doi: 10.56433/jpaap.v11i1.537

Kong, L., Ma, Z., Li, X., and Kim, H. (2023). Interactions between international doctoral students studying in China and their advisors: the role of intercultural adaptive guidance and psychological safety. *Int. J. Intercult. Relat.* 96:101872. doi: 10.1016/j.ijintrel.2023.101872

Kosmützky, A., and Krücken, G. (2023). "Governing research: new forms of competition and cooperation in academia" in University Collegiality and the Erosion of Faculty Authority. eds. K. Sahlin and U. Eriksson-Zetterquist, vol. *86* (University Collegiality and the Erosion of Faculty Authority, Research in the Sociology of Organizations; Emerald Publishing Limited), 31–57.

McDowell, W., Grubb, W. III, and Geho, P. (2015). The impact of self-efficacy and perceived organizational support on the impostor phenomenon. *Am. J. Manag.* 15, 23–29.

Meister, A., Jehn, K. A., and Thatcher, S. M. (2014). Feeling misidentified: the consequences of internal identity asymmetries for individuals at work. *Acad. Manag. Rev.* 39, 488–512. doi: 10.5465/amr.2013.0102

Neureiter, M., and Traut-Mattausch, E. (2016). An inner barrier to career development: preconditions of the impostor phenomenon and consequences for career development. *Front. Psychol.* 7:48. doi: 10.3389/fpsyg.2016.00048

Pyhältö, K., Toom, A., Stubb, J., and Lonka, K. (2012). Challenges of becoming a scholar: a study of doctoral students' problems and well-being. *ISRN Educ.* 2012, 1–12. doi: 10.5402/2012/934941

Rajhi, O., Halayem, S., Ghazzai, M., Taamallah, A., Moussa, M., Abbes, Z. S., et al. (2020). Validation of the Tunisian social situation instrument in the general pediatric population. *Front. Psychol.* 11:557173. doi: 10.3389/fpsyg.2020.557173

Robertson, M. J. (2022). "Surviving and thriving: doing a doctorate as a way of healing imposter syndrome" in The Palgrave Handbook of Imposter Syndrome in Higher Education. eds. M. Addison, M. Breeze and Y. Taylor (Cham: Springer International Publishing), 277–291.

Sánchez-Pérez, N., Fuentes, L. J., Jolliffe, D., and González-Salinas, C. (2014). Assessing children's empathy through a Spanish adaptation of the basic empathy scale: parent's and child's report forms. *Front. Psychol.* 5:1438. doi: 10.3389/fpsyg.2014.01438

Slimi, O., Marsigliante, S., Ciardo, V., Bahloul, M., Selmi, O., Jebabli, N., et al. (2023). The effects of adapted physical education sessions on the empathy of female students with overweight. *Front. Psychol.* 14:1170446. doi: 10.3389/fpsyg.2023.1170446

Sonnak, C., and Towell, T. (2001). The impostor phenomenon in British university students: relationships between self-esteem, mental health, parental rearing style and socioeconomic status. *Personal. Individ. Differ.* 31, 863–874. doi: 10.1016/S0191-8869(00)00184-7

Stojiljković, S., Djigić, G., and Zlatković, B. (2012). Empathy and teachers' roles. *Procedia Soc. Behav. Sci.* 69, 960–966. doi: 10.1016/j.sbspro.2012.12.021

Sujon, D. Z. (2023). Exploring the doctoral journey and good supervisorial practice. *Spark UAL Creat. Teach. Learn. J.* 6, 27–32.

Thomas, M., and Bigatti, S. (2020). Perfectionism, impostor phenomenon, and mental health in medicine: a literature review. *Int. J. Med. Educ.* 11, 201–213. doi: 10.5116/ijme.5f54.c8f8

Vergauwe, J., Wille, B., Feys, M., De Fruyt, F., and Anseel, F. (2015). Fear of being exposed: the trait-relatedness of the impostor phenomenon and its relevance in the work context. *J. Bus. Psychol.* 30, 565–581. doi: 10.1007/s10869-014-9382-5

Wang, Y, Li, W. (2023). The impostor phenomenon among doctoral students: a scoping review. *Front Psychol.* 14, 1233434. doi: 10.3389/fpsyg.2023.1233434

Wilkinson, H., Whittington, R., Perry, L., and Eames, C. (2017). Examining the relationship between burnout and empathy in healthcare professionals: a systematic review. *Burn. Res.* 6, 18–29. doi: 10.1016/j.burn.2017.06.003

Wollast, R., Aelenei, C., Chevalère, J., Van der Linden, N., Galand, B., Azzi, A., et al. (2023). Facing the dropout crisis among PhD candidates: the role of supervisor support in emotional well-being and intended doctoral persistence among men and women. *Stud. High. Educ.* 48, 813–828. doi: 10.1080/03075079.2023.2172151

Check for updates

Psychometric properties of the SocioEmotional Skills Instrument for Teachers using network approach: English and Spanish version

Fabiola Sáez-Delgado[1]*, Javier Mella-Norambuena[2] and
Yaranay López-Angulo[3]

[1]Departamento Fundamentos de la Pedagogía, Facultad de Educación, Universidad Católica de la Santísima Concepción, Concepción, Chile, [2]Departamento de Ciencias, Universidad Técnica Federico Santa María, Concepción, Chile, [3]Departamento de Psicología, Facultad de Ciencias Sociales, Universidad de Concepción, Concepción, Chile

The importance of socioemotional teaching skills has been highlighted for its link with better academic, social, emotional, and behavioral results of students, as well as for its contribution to the work wellbeing, mental health, and prosperity of teachers. However, there are few instruments that measure these skills in teachers in the context of their professional practice. The purpose of this research was to analyze the psychometric properties of the socioemotional Skills Instrument for Teachers (SEMS-IT). An instrumental design and a sample of 853 Chilean secondary school teachers were used. To evaluate the dimensional structure of the instrument, a portion of the sample ($n=468$) underwent a network estimation method with exploratory graph analysis (EGA) using a Gaussian GLASSO model. Then, in order to confirm the structural consistency and stability of the items, the analysis was replicated in a second sample ($n=385$), where these results were additionally contrasted with those of the confirmatory factor analysis (CFA). The EGA findings confirmed a structure of four dimensions and 19 items in total: (a) cognitive management of teacher emotion (four items), (b) teacher empathic concern (four items), (c) teacher–student relationship (four items), and (d) adverse classroom climate (seven items), with a 7-point Likert scale response format. The CFA showed good and acceptable fit indicators, $X^2(171)=354.546$ ($p<0.001$), Comparative Fit Index (CFI)=0.971, Tucker–Lewis index (TLI)=0.966, Root Mean Square Error of Approximation (RMSEA)=0.061, and Standardized Root Mean Square Residual (SRMR)=0.062. In conclusion, a tool for the assessment of teachers' socioemotional skills, valid for school-based educational research, is provided. Implications of the findings at the theoretical and practical levels are discussed, as well as limitations and future projections for future research.

KEYWORDS

network approach, socioemotional skills, psychometric, teachers, validation

1 Introduction

1.1 Importance of socioemotional skills for teachers

Understanding and delimiting the concept of Social–Emotional Skills (SEMS) is not a simple task, as it is frequently used as a generic term that allows people to express, regulate and understand their thoughts, emotions, and behaviors in everyday situations and interactions with others, as well as to adapt to changing conditions (Schoon, 2021). In the present study, situated in the school context, SEMS are defined as the effective deployment of strategies that enable teachers to handle/manage complex situations, both interpersonally and intrapersonally, in a way that promotes their own well-being and that of their students, positively impacting socioemotional development—mutual/collective/group. Teachers' SEMS have high associations with positive outcomes in social, behavioral, affective, academic, and student well-being outcomes (DeLay et al., 2016; Roorda et al., 2017). Recent studies have also shown that these skills function as a protective factor for teachers' mental health, professional achievement, well-being, and thriving (Oliveira et al., 2021; Ornaghi et al., 2023; Sáez-Delgado et al., 2023; Sánchez-Pujalte et al., 2021; Serrano-Díaz et al., 2017; Zhang et al., 2023).

1.2 Models for the study of SEMS in teachers

There are several theoretical models in the socioemotional field (Fitzgerald et al., 2022; Muzzio and Strasser, 2022). Among the referent models are Mayer and Salovey's emotional intelligence model 2000 (Mayer et al., 2000) and Bar-On (1997, 2006); both focused on the concept of emotional intelligence. Gross (1998) emphasizes the concept of emotional regulation. Bisquerra and Peréz (2007) is linked to the concept of emotional competencies. Collaborative for Academic, Social, and Emotional Learning (CASEL) (2008, 2013) includes the concept of social and emotional learning (SEL). Frameworks include that of Jones and Bouffard (2012); there is also Schonert-Reichl's (2017) three-component framework on SEL that includes three distinct and interrelated dimensions (learning context, student SEL, and teacher SEL). Other models, such as the prosocial classroom model (Jennings and Greenberg, 2009), include five teaching consciences as a framework for understanding teachers' SEC, where it is emphasized that with awareness comes competence (Rodriguez et al., 2020); the Social and Emotional Competence School Model of Collie (2020); and the DOMASEC-Domains and manifestations of socio-emotional competences of Schoon (2021), which focus specifically on social–emotional competences (SEC).

The delimitation and characterization of these models can be done by considering two central aspects. First, a key aspect of the models is the areas or contexts in which they have been formulated and/or mainly implemented, some of which have been applied in a variety of contexts, such as labor, clinical, educational, and organizational. Second, another key aspect of the models is the central construct that they define since the diversity and breadth of principles on which they are based are recognized, which vary between models of capacity, competence, trait and ability. However, the ability models stand out for having the potential to learn, that is, they allow socioemotional

development, versus those models, such as trait models, that include factors that do not really change over time (they are stable), and, therefore, will not change with an intervention. The above background delimited the selection of specific theoretical models for the design of the instrument of this study. The models of Jennings and Greenberg (2009), Collaborative for Academic, Social, and Emotional Learning (CASEL) (2008, 2013), and Collie (2020) were mainly considered because, on the one hand, they describe integral socioemotional skills and, on the other hand, they have been focused on educational and school contexts, highlighting the importance of adapting and applying these theoretical models according to the needs and characteristics of the environment in which they are to be implemented, in this case specifically, focused on the socioemotional skills needed by teachers for the success of their professional practice.

1.3 Instruments used for the measurement of teachers' SEMS

In empirical studies on teachers' SEMS, it is possible to identify the use of different self-report instruments, among which the following stand out: Trait Meta-Mood Scale (TMMS), based on the model of Salovey and Mayer (1990), which assesses emotional intelligence in the dimensions of emotional attention, emotional clarity, and emotional repair; Petrides (2009) Trait Emotional Intelligence Questionnaire (TEIQue), an instrument that combines scales of emotion regulation and relationship management skills, which measures the degree to which subjects perceive themselves as controlling their own emotions, how they influence other people's feelings, how they assert themselves, and how they establish positive relationships with others; Yoder's (2014) Self-Assessing Social and Emotional Instruction and Competencies which measures teaching practices that affect students' SEL and own SECs to implement those teaching practices with students; The Social and Emotional Competencies Questionnaire (SEC-Q) (Zych et al., 2018), which includes four scales (self-awareness, self-awareness and motivation, social awareness and prosocial behavior, and responsible decision making); and the EduSEL which is a multidimensional self-report instrument to assess educators' SEL competencies (Hemi and Kasperski, 2023). A review of these instruments reveals significant limitations related to the age group and context for which they were originally designed. Although applied to teachers, many were originally designed for adolescents and adults in general (e.g., see Salovey et al., 1995; Bar-On, 1997; Mayer et al., 2002; Mayer et al., 2003; Zych et al., 2018), others were focused on clinical populations (e.g., see Bar-On, 1997; Gross and John, 2003; Pérez-Escoda et al., 2021). However, instruments specifically developed for teachers, addressing SEL and essential teaching skills, are limited/scarce (e.g., see Hemi and Kasperski, 2023; Aldrup et al., 2020; Yoder, 2014) and mostly focused on general SEL, but not on crucial, specific, delimited skills necessary for teaching success. Thus, it can be argued that there is a need to validate specific instruments for teachers that include variables relevant to the educational context and items that fit the classroom routine.

A relevant aspect to consider is that most psychometric studies in the area of educational psychology have used the traditional exploratory and confirmatory factor analyses, but recently, the so-called network analysis models, also known as network

psychometrics, have caught the interest of researchers (Christensen et al., 2019). One of the potential differences between models that include latent variables is that they conceive of observable variables as the product of unobservable latent factors, whereas network analysis models implement graph theory to construct a network that can represent the different associations between observable variables (Cai et al., 2020). Therefore, the structural characteristics of network models exponentially enrich the possibility of revealing the multiple relationships between variables in a dynamic system, providing a new perspective for the visualization and study of various current phenomena in educational psychology. This type of analysis responds assertively to the complexity of the analyzed variables of human beings and its valuable contributions favor modelling to improve the proposal of psychometric instruments, in this case, to understand teacher SEMS (Borsboom, 2022).

1.4 Essential teacher's SEMS

It is indisputable that teaching SEMS positively impacts the socioemotional development of their students within the school environment, acting as role models in social and emotional skills, norms, and behaviors. School, as the primary socialization environment after home, underscores the importance of educators promoting healthy interactions and effectively managing the learning environment (Schoon, 2021; Lechner et al., 2019; Lee et al., 2016). Although there is a wide variety of SEMS, among those that are critical for teachers, the following inter- and intrapersonal skills stand out: (a) cognitive management of teacher emotion (CMTE), (b) teacher empathic concern (TEC), (c) teacher–student relationship, and (d) Adverse Classroom Climate (ACC; Lechner et al., 2019; Martínez-Yarza et al., 2023; Scheirlinckx et al., 2023).

1.4.1 Cognitive management of teacher emotion

Gross's (1998, 2002) model of emotion regulation illustrates how people influence their emotions, determining which emotions they experience and when and how they express them. The importance of cognitive management of emotions is highlighted here because it addresses one of the most reported aspects of emotion regulation, that is, emotional experience (Gross, 2001). This allows the adjustment of emotional responses and is considered a key aspect in understanding people's everyday emotional regulation (Gross and John, 2003). In this study, it has been defined as the use of cognitive strategies (reappraisal) deployed by teachers to manage emotional responses in the context of their teaching. It is considered an intrapersonal skill.

Empirical evidence confirms the positive role of CMTE implemented in classrooms. A study involving 189 high school teachers in Germany showed that CMTE was related to teachers' experience of positive emotions, such as enjoyment (Lee et al., 2016); another study on 205 high school teachers also in Germany confirmed the importance of teachers' CMTE in predicting their behaviors for effective classroom instruction (Seiz et al., 2015). However, research on how teachers regulate their emotions is still scarce, and little empirical evidence is available. This is surprising, as how teachers regulate their emotions has been recognized as a fundamental aspect in improving their effectiveness (Gross, 2002), their personal and professional success, equipping them to show empathy toward their students, highlighting its indisputable importance in school contexts (Gross, 2001; Fan and Wang, 2022).

1.4.2 Teacher empathic concern

Empathy is understood as the ability to orient and respond to the thoughts, actions, feelings, and experiences of others (Coke et al., 1978; Decety and Cowell, 2014; Matravers, 2014); multidimensional in nature given that it integrates cognitive, socioemotional, and behavioral components; therefore, it can influence interpersonal and social relationships (Landler-Pardo et al., 2022; Shamay-Tsoory et al., 2009). Among the various types of empathy, empathic concern has been defined as an affective, sensitive, and compassionate response characterized by the fostering of altruistic motivation to support or help people (Batson et al., 2007; Fry and Runyan, 2018; Winczewski et al., 2016). In this study, TEC, has been defined as an emotion oriented toward students, activated by perceiving that they need something, triggering motivation, prosocial behavior, and a compassionate disposition to increase their well-being during class.

In educational settings, TEC plays an indispensable role (Landler-Pardo et al., 2022) since it is linked to the promotion of healthy intergroup relationships in the classroom (Fry and Runyan, 2018); it also allows for the deployment of empathic behaviors in complex interactions, being fundamental to consolidate strong and positive relationships with students (Landler-Pardo et al., 2022); this is why it is considered a significant component of teachers' social–emotional learning, an important prerequisite for high-quality teacher–student interactions, development and positive outcomes of their students (Aldrup et al., 2022).

1.4.3 Teacher–student relationship

Teacher–Student Relationship (TSR) are dyadic social processes characterized by continuous and feedback two-way interactions between teachers and students in classrooms that provide insight into how teachers and students feel about each other and how teachers and students perceive their shared relationships (Brinkworth et al., 2018; Cooper and Miness, 2014; Wentzel, 2022). In this study, it has been defined as an interpersonal teacher's skill. In educational contexts, TSR is recognized as a crucial aspect of making schools inclusive and committed to providing a learning environment for healthy development and optimal learning support for all students regardless of achievement, language, readiness for learning and behavior, or disability (Pastore and Luder, 2021; Wentzel, 2022).

Empirical evidence recognizes TSR as the core of the school experience (Gehlbach et al., 2012). A longitudinal study with 1,088 German high school students showed that positive teacher–student relationships improved satisfaction of competence, relatedness, and autonomy needs (Bakadorova and Raufelder, 2018). A systematic review examining 46 studies found that high-quality teacher–student relationships are linked to higher school engagement, reflected in better academic performance, higher attendance, and decreased disruptive behaviors and dropout rates (Quin, 2017). Therefore, a strong and positive TSR is critical to emotional well-being, academic success, and engagement in learning, acting as an essential pillar for an educational environment where mutual support and understanding foster a climate conducive to learning and personal development.

1.4.4 Adverse classroom climate

Classrooms are complex social systems, and the different situations generated within them are often multicomponent challenges for teachers (Pianta et al., 2012). ACC is defined in this study as the awareness of challenging situations with students in a

given class according to the teacher's self-report (behaviors, performances and/or attitudes) and corresponds to a teacher's interpersonal skill.

Empirical evidence has shown that lower levels of conflict in the teacher–student relationship was related to higher levels of student enjoyment of learning processes (Clem et al., 2021). A study involving 267 students and 93 teachers conducted classroom climate observations revealing that emotional support favors the development of the student–teacher relationship, where students who received greater emotional support experienced closeness in the relationship and decreased conflicts with peers (Moen et al., 2019). Another study in a sample of 3,225 students from schools in Germany and Switzerland evidenced that classroom climate had a direct positive effect on counter-talk and social skills (Wachs et al., 2023). Therefore, the challenge of dealing with adversity in the classroom and the need to promote a positive climate highlight the crucial importance of teacher social–emotional development in the educational context.

1.5 The present study

The growing incorporation of social–emotional programs in schools underscores the need for precise methods to assess Social–Emotional Skills (SEMS) in both students and teachers. Although self-report instruments have been used for this purpose, there is a significant gap in tools specifically designed to capture the complexity of SEMS in the teaching environment, considering factors such as age, educational context, and the specific role of teachers in social–emotional development. This study set out to examine the psychometric properties of the SocioEmotional Skills Instrument for Teachers (SEMS-IT), aimed at assessing essential SEMS in teachers.

2 Method

An instrumental design was used to carry out the study, which, according to the classification of Ato et al. (2013), considers the analysis of the psychometric characteristics of measurement scales.

2.1 Sample

The total study sample consisted of 853 teachers from schools in southern Chile, with an age of M = 36.64 (SD = 10.20). Regarding sex, 610 (71.5%) were female, 229 (26.9%) were male, and 14 (1.6%) preferred not to state their sex. Two samples were used for the present study: sample 1 was composed of 468 teachers, age M = 35.79 (SD = 9.99), of whom 343 were women, 120 were men, and five indicated having another sex or preferred not to say. Regarding the declared contract hours, they had, on average, M = 35.51 (SD = 13.74) working hours per week and finally, regarding teaching experience, the participants indicated an M = 9.65 (SD = 8.74) years; and sample 2 was composed of 385 teachers of age M = 37.95 (SD = 9.79), of whom 267 indicated being female, 109 indicated being male and nine indicated having another sex or preferred not to say. Regarding reported contract hours, participants worked M = 39.89 (SD = 6.58) hours per week. Finally, participants had an average of 11.64 (SD = 8.91) years of experience.

2.2 Instrument

2.2.1 Preliminary construction of the SocioEmotional Skills Instrument for Teachers

For the design process of this instrument, the steps for instrument construction in research (Muñiz and Fonseca-Pedrero, 2019) and the guidelines of the International Test Commission (Hernández et al., 2020) were followed. Exhaustive reviews of the specialized literature were conducted to systematize the available evidence on the history, concept, instruments, and models available on Teachers' Social–Emotional Competence (Lozano et al., 2021, 2022, 2023; Scheirlinckx et al., 2023). From these literature reviews, dimensions and items were proposed considering specific contributions of some related instruments (Davis, 1983; Gross and John, 2003; López-Angulo et al., 2020; Pagano and Vizioli, 2021; Péloquin and Lafontaine, 2010; Zhou and Ee, 2012). As a result of this process, the first version of the SocioEmotional Skills Instrument for Teachers (SEMS-IT) was constituted as a 7-point Likert-type scale (where 1 is never and 7 is always), with 29 items distributed in four dimensions: (1) CMTE (six items); (2) TEC (eight items); (3) TSR (eight items); (4) ACC (seven items).

2.2.2 Evidence of validity of the SEMS-IT

The validity of an instrument is obtained when evidence and theory allow the adequate interpretation of its scores for the purpose for which it was constructed (AERA, 2014; Taherdoost, 2016); for this reason, recommendations were followed to evidence four sources of instrument validity (see Figure 1).

2.2.3 Evidence of validity of consequence: ethics committee analysis

The instrument is part of a larger research project. It was submitted to the Ethics Committee of the University of affiliation of the first author of this article. The committee reviewed the instrument and the ethical protocols associated with its implementation in the target sample, to ensure the corresponding safeguards for the integrity of the participants. The respective approval was obtained.

2.2.4 Evidence of content validity: analysis by expert judges

This process considered the participation of seven doctors from the areas of Education and Psychology, four from Chile and three internationals (Mexico, Ecuador, and Spain). Each expert judge evaluated the instrument using a matrix with specific criteria (pertinence, relevance, clarity, and sufficiency of each item) to measure the teaching SEMS construct and its four proposed dimensions. The inter-rater consistency results were high (Cohen's Kappa >0.7) in the four specified criteria and all its items (Pedrosa et al., 2013; Polit et al., 2007). In addition, the wording of the items was improved when this was suggested by more than one judge.

2.2.5 Evidence of response format validity: cognitive interviews

This process involved the development of cognitive interviews with nine secondary education teachers from different specialties and three schools selected by accessibility. The purpose of the cognitive interview was the identification of comprehension and/or writing difficulties of the different items (Castillo-Díaz and Padilla, 2013;
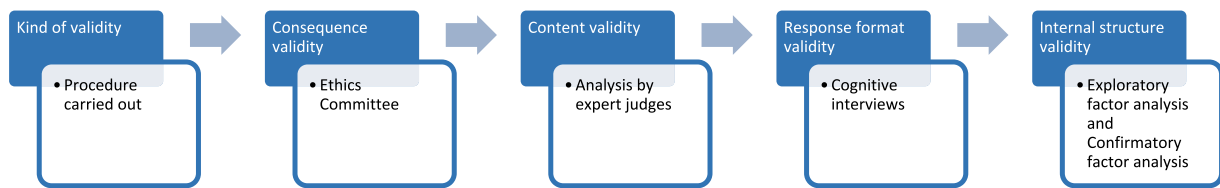
FIGURE 1
The validation process of the SocioEmotional Skills Instrument for Teachers (SEMS-IT).

Wolcott and Lobczowski, 2021). The interviews followed a protocol that considered the presentation of the study, the objective of the research project, confidentiality of personal information, instructions, clarification of doubts, and finally, the implementation of the interview. In the instruction stage, it was explained to the teachers that as they were answering the instrument, they should do so through the "thinking aloud" procedure, making observations, comments, suggestions, or consultations on the wording and/or content of the items, understanding of the instructions or the scale for answering. As a result of this process, minor changes were made to specific words in the items, such as some synonyms or adding examples in parentheses to make it easier to understand the instrument.

2.2.6 Evidence of validity of factorial structure

For the third phase of structural validity of the SocioEmotional Skills Instrument for Teachers (SEMS-IT), two samples of teachers were used. The first sample ($n = 468$) was used to carry out the exploratory graph analysis (EGA). The second sample ($n = 385$) was used to conduct confirmatory factor analysis (CFA). The results section of this study presents in detail the structural validity process of this instrument.

2.3 Data collection procedure

The participating schools were contacted, and the principals and their respective management teams were informed about the purposes of the research and their authorization was requested. Subsequently, the schools that agreed to participate provided a contact from the management team to coordinate the presentation of the study and extend the invitation to participate to the teachers. In face-to-face meetings and/or through the Zoom platform, as decided by each school, teachers were informed of the details of the research and a deadline was coordinated for sending and responding to the instrument. The instrument was applied in online format using the surveymonkey tool. The link was sent by e-mail. The average response time was 15 min. The data were collected during the second semester of the year 2023. The questionnaire sent to the teachers had three sections: the first one displayed the informed consent; then, those who agreed to participate displayed the second part on sociodemographic data of the teachers such as for example, sex, age, employment contract (hours per week), work experience (years); and finally, the third part was the SEMS-IT instrument. All the procedures were authorized by the scientific ethical committee of the sponsoring institution of the main author of this study, guaranteeing the conditions of confidentiality, voluntariness and protection of the data obtained.

2.4 Data analysis procedure

A descriptive statistical analysis of the total sample was performed. Subsequently, the sample was divided into two groups, the first to examine the structure of the SEMS-IT ($n = 468$) and the second for its confirmation ($n = 385$). Statistical-descriptive analyses were performed on both samples, and the lack of differences between them was verified. First, the Kolmogorov–Smirnov test with the Lilliefors modification (samples larger than 50 subjects) was used to verify the normality assumption. Then, the homoscedasticity assumption was verified using Levene's test. Considering that the results of this process showed that the normality assumption was not met, and neither was the homoscedasticity assumption fully met, the comparison of the two samples was performed with the Yuen test (Wilcox, 2012), being the robust alternative to the Student's T-test. To estimate the effect size, we used the one proposed by Algina et al. (2005), which is the robust option to Cohen's d and is interpreted in the same way. To identify the factor structure of the instrument with sample 1 ($n = 468$), we first checked the local independence assumption, which states that the variables (items) are not related after conditioning on a latent variable (redundancy), in order to avoid, for example, model misspecification and biased parameters. For this, we used the UVA Function of the EGAnet package that uses an EBICglasso.qgraph network estimation method and the weighted topological overlap (wTO) (Christensen et al., 2023). EGA was then implemented with the EGAnet library (Golino and Christensen, 2021), verifying dimensionality using a Gaussian GLASSO model and Louvain's algorithm that determined the number of communities through a visual representation of regularized partial correlations; this procedure has demonstrated more accuracy than other exploratory methods (Christensen et al., 2020).

In the framework of network analyses, reliability was examined using two estimates (Christensen et al., 2020): (a) structural consistency, which is the proportion of times the number of dimensions derived from the initial EGA was exactly recovered in the replicated bootstrap samples and (b) item stability, which is the number of times each item is replicated within the empirical dimension and in other dimensions identified in the replication networks. Both procedures were performed with the EGAnet library and the bootEGA function (Golino and Christensen, 2021) with GLASSO estimation considering 1,000 replicates and the LE eigenvalue algorithm. For the interpretation of structural consistency and item stability, a minimum value of 90% was used; that is, the dimension was expected to replicate exactly in 90% of the bootstrap samples, and the items were expected to replicate in at least 90% of the

derived dimensions (Golino and Christensen, 2021). Next, the fit of the structure suggested by EGA was verified by CFA with the CFA function of the EGAnet package (Golino and Epskamp, 2017). WLSMV estimation was used, which is suitable for scales consisting of ordinal-level items. The model was evaluated using chi-square (χ^2), CFI, TLI, RMSEA, and SRMR. The criteria used to adequately evaluate the model were as follows: (a) χ^2 $p < 0.05$, (b) CFI and TLI greater than 0.9 correspond to an acceptable fit and above 0.95 to a good fit, and (c) RMSEA and SRMR with values less than 0.08 indicate an acceptable fit and less than 0.06 a good fit (Hu and Bentler, 1999). With the second sample ($n = 385$), EGA and bootEGA resampling were performed again to confirm the structural consistency and stability of the items. Finally, the results of these analyses were checked with the CFA analysis.

3 Results

3.1 Descriptive analysis of the samples

The possibility that the samples were disproportionate according to sex was analyzed with the chi-square test. The test result was X^2 (3, $N = 853$) = 3.55, $p = 0.31$. Therefore, there was no evidence that the samples were unbalanced according to sex (see Table 1).

Also, to ensure equivalence between the data of the samples, first, a descriptive analysis was performed for each item of the instrument and the variables age, contract hours, and experience. Then, to evaluate significant differences, the assumption of normality was verified, identifying that all the variables in both samples did not comply with a normal distribution ($p < 0.05$). Subsequently, the homoscedasticity assumption was verified, in this case, the variables that did not meet this assumption were: (1) EC: employment contract (hours per week), (2) TSR-17, (3) CMTE-3, and (4) CMTE-5. With this background and considering that sample 1 was larger than sample 2, the Yuen test was performed, which is a robust option of the Student's t-test. For the effect size this test uses the one proposed by Algina et al. (2005), an alternative to Cohen's d and interpreted on the same scale. The results showed significant differences in the variables: (1) age T (487.64) = 2.69, $p < 0.01$, ES = 0.15; (2) employment contract (hours per week) T (478.95) = 2.96, $p < 0.01$, ES = 0.16, and (3) work experience (years) T (493.24) = 3.12, $p < 0.01$, ES = 0.16. In all these cases, differences of a small magnitude were identified. On the other hand, all the items of the instrument did not show significant differences between the samples (see Table 2).

TABLE 1 Descriptive of the composition of the samples.

Sex	Sample 1	Sample 2
Man	120 (25.6%)	109 (28.3%)
Woman	343 (73.3%)	267 (69.4%)
Another	2 (0.4%)	2 (0.5%)
I prefer not to say	3 (0.6%)	7 (1.8%)
Total	468 (100%)	385 (100%)

3.2 Results of exploratory graph analysis on sample 1

Exploratory graph analysis with the GLASSO network estimation method and the Louvain community detection algorithm estimated four factors (Figure 2), representing the theoretical factors. Community 3 is consistent with the dimension "teacher empathic concern" (TEC1, TEC2, TEC3, TEC4, TEC5, TEC6, TEC7, TEC8). Community 4 is consistent with the dimension "cognitive management of teacher emotion" (CMTE1, CMTE3, CMTE5, CMTE7, CMTE8, CMTE10). Community 1 corresponds almost entirely to the dimension "teacher–student relationship" (TSR9, TSR11, TSR13, TSR14, TSR15, TSR17, TSR23), except for item TSR12, which was assigned to community 2, which corresponds theoretically to the dimension Adverse Classroom Climate (ACC10, ACC16, ACC18, ACC19, ACC20, ACC21, ACC22).

The item that presents this problem (TSR12) has the following wording "My students are uncomfortable when I give them physical affection (such as pats on the shoulder, a handshake)" one explanation may be the conflict and risks associated with the current context where physical contact could be interpreted as harassment, making it difficult for teachers to respond to this item.

The UVA analysis showed evidence of 2 pairs of items with large to very large redundancy (wTO > 0.30), four pairs of items with moderate to large redundancy (wTO > 0.25) and three pairs of items with small to moderate redundancy (wTO > 0.20). Considering this background, the strategy of eliminating redundant items was used.

With this background of theoretical correspondence and local redundancy in a multivariate dataset, it is decided to eliminate the items: TEC2, TEC3, CMTE7, TEC7, TEC8, CMTE8, TSR15, and TSR12 (see Figure 3).

To evaluate the stability of these dimensions and their reproduction in a resampling, the bootEGA function with 1,000 iterations was used. Due to the ordinal nature of the Likert scales, a nonparametric resampling was used, where the network structure obtained from the median of the iterations has four dimensions, like the empirical EGA (Figure 3).

The first review of stability was performed by reviewing the descriptive statistics (Table 1). It could be observed that the median was four dimensions, the same as that reflected by the empirical EGA, together with a narrow confidence interval (95% CI [3.76, 4.24]), as a complementary measure, the frequency of each dimensional solution can be observed (Table 3).

With the frequency analysis, four dimensions were identified 98.5% of the time, which corresponds to 985 times out of 1,000 bootstrap resamples; on the other hand, three dimensions were identified 1.5% of the time, or in 15 out of 1,000 bootstrap resamples. These results suggest that the four-dimensional solution has good stability (see Table 4).

To obtain a better understanding of the stability of each dimension, the structural consistency, or the frequency with which the empirical EGA dimension replicated exactly in the Bootstrap resampling was calculated. The structural stability result shows that dimension 1, which represents TSR, presents a stability (0.782), being the only one lower than 0.9 (Table 5).

Then, the stability values of the items in the empirical dimensions of the EGA were observed (zero values have been eliminated to facilitate interpretability); items TSR14 and TSR9 coincided 86.5 and 81.5%,

TABLE 2 Comparison of samples 1 and 2 in the study variables.

Variable	Sample 1 (n = 468)					Sample 2 (n = 385)					Levene	Yuen	EN
	Mean	SD	Skew	Kurtosis	K-S Lilliefors	Mean	SD	Skew	Kurtosis	K-S Lilliefors			
Age	35.79	9.99	0.80	0.07	D=0.12***	37.95	9.79	0.85	0.01	D=0.13***	F(1,851)=0.06	T(487.64)=2.69**	0.15
EC	35.51	13.74	−1.86	ī	D=0.27***	39.89	6.58	−2.65	9.62	D=0.27***	F(1,851)=32.37***	T(478.95)=2.96**	0.16
WE	9.65	8.74	1.23	1.22	D=0.13***	11.64	8.91	1.18	0.95	D=0.16***	F(1,851)=0	T(493.24)=3.12**	0.16
TSR9	6.32	0.81	−1.04	0.65	D=0.31***	6.26	0.89	−1.18	1.00	D=0.29***	F(1,851)=0.52	T(490.84)=0.45	
TSR11	**5.47**	**1.07**	**−0.52**	**0.06**	**D=0.23*****	**5.50**	**1.12**	**−0.55**	**0.18**	**D=0.21*****	**F(1,851)=0.75**	**T(490.73)=0.11**	
TSR12	6.22	1.09	−2.11	5.57	D=0.27***	6.24	1.03	−2.10	6.33	D=0.27***	F(1,851)=0.06	T(490.82)=0.09	
TSR13	**6.04**	**0.88**	**−0.59**	**−0.35**	**D=0.23*****	**5.99**	**0.89**	**−0.59**	**−0.30**	**D=0.24*****	**F(1,851)=0.01**	**T(492.53)=0.61**	
TSR14	6.57	0.69	−1.55	1.81	D=0.41***	6.56	0.69	−1.56	1.94	D=0.40***	F(1,851)=0.06	T(489.3)=0.29	
TSR15	5.53	1.15	−0.56	0.04	D=0.20***	5.45	1.25	−0.72	0.09	D=0.21***	F(1,851)=1.08	T(420.51)=0.30	
TSR17	**5.05**	**1.11**	**−0.29**	**−0.05**	**D=0.18*****	**5.04**	**1.22**	**−0.49**	**0.11**	**D=0.19*****	**F(1,851)=5.58***	**T(478.08)=0.33**	
TSR23	**5.27**	**1.21**	**−0.57**	**0.43**	**D=0.17*****	**5.30**	**1.23**	**−0.46**	**−0.25**	**D=0.20*****	**F(1,851)=2.16**	**T(480.11)=0.16**	
ACC10	**2.24**	**1.31**	**1.48**	**2.21**	**D=0.29*****	**2.20**	**1.32**	**1.38**	**1.91**	**D=0.23*****	**F(1,851)=1.22**	**T(473.71)=0.19**	
ACC16	**2.22**	**1.11**	**1.67**	**4.15**	**D=0.30*****	**2.16**	**1.00**	**1.58**	**4.47**	**D=0.29*****	**F(1,851)=0.81**	**T(489.36)=0.05**	
ACC18	**2.90**	**1.26**	**0.73**	**0.68**	**D=0.19*****	**2.95**	**1.26**	**0.56**	**0.22**	**D=0.18*****	**F(1,851)=0.06**	**T(487.33)=0.85**	
ACC19	**3.09**	**1.37**	**0.45**	**−0.16**	**D=0.18*****	**3.18**	**1.30**	**0.38**	**−0.03**	**D=0.16*****	**F(1,851)=1.86**	**T(495.75)=1.27**	
ACC20	**3.59**	**1.29**	**0.35**	**−0.03**	**D=0.18*****	**3.48**	**1.38**	**0.29**	**−0.31**	**D=0.15*****	**F(1,851)=3.8**	**T(418.45)=1.17**	
ACC21	**2.76**	**1.40**	**1.04**	**0.82**	**D=0.25*****	**2.59**	**1.33**	**1.04**	**0.72**	**D=0.27*****	**F(1,851)=1.56**	**T(498.21)=1.75**	
ACC22	**2.34**	**1.30**	**1.09**	**1.04**	**D=0.26*****	**2.30**	**1.17**	**0.88**	**0.50**	**D=0.26*****	**F(1,851)=1.97**	**T(495.18)=0.48**	
TEC1	**6.32**	**0.85**	**−1.19**	**1.34**	**D=0.32*****	**6.24**	**1.08**	**−1.78**	**3.85**	**D=0.31*****	**F(1,851)=1.35**	**T(491.61)=0.75**	
TEC2	6.42	0.81	−1.37	1.54	D=0.36***	6.41	0.84	−1.38	1.57	D=0.36***	F(1,851)=0.07	T(490.73)=0.03	
TEC3	6.53	0.77	−1.51	1.30	D=0.41***	6.48	0.87	−1.91	4.63	D=0.40***	F(1,851)=0.69	T(490.18)=0.11	
TEC4	**6.53**	**0.83**	**−2.33**	**7.42**	**D=0.40*****	**6.53**	**0.85**	**−2.08**	**4.59**	**D=0.40*****	**F(1,851)=0.01**	**T(492.76)=0.40**	
TEC5	**6.18**	**0.94**	**−0.99**	**0.32**	**D=0.28*****	**6.11**	**1.09**	**−1.42**	**2.09**	**D=0.26*****	**F(1,851)=2.25**	**T(488.42)=0.18**	
TEC6	**6.52**	**0.86**	**−2.10**	**4.85**	**D=0.40*****	**6.51**	**0.88**	**−1.91**	**3.18**	**D=0.40*****	**F(1,851)=0.03**	**T(491.66)=0.18**	
TEC7	6.27	0.98	−1.37	1.45	D=0.32***	6.21	1.00	−1.25	0.98	D=0.29***	F(1,851)=1.01	T(372.8)=0.99	
TEC8	5.78	1.21	−0.83	0.08	D=0.22***	5.60	1.29	−0.80	0.15	D=0.22***	F(1,851)=1.40	T(418.9)=1.75	
CMTE1	**5.00**	**1.56**	**−0.85**	**0.22**	**D=0.18*****	**4.83**	**1.67**	**−0.60**	**−0.35**	**D=0.16*****	**F(1,851)=2.96**	**T(484.21)=1.94**	
CMTE3	**5.14**	**1.27**	**−0.44**	**−0.22**	**D=0.18*****	**4.99**	**1.38**	**−0.40**	**−0.23**	**D=0.18*****	**F(1,851)=4.70***	**T(478.04)=1.83**	
CMTE5	**5.65**	**1.17**	**−0.96**	**1.08**	**D=0.23*****	**5.56**	**1.34**	**−0.98**	**0.77**	**D=0.23*****	**F(1,851)=4.59***	**T(405.36)=0.02**	
CMTE7	5.20	1.42	−0.93	0.60	D=0.21***	5.10	1.43	−0.73	0.15	D=0.19***	F(1,851)=0.01	T(487.84)=1.39	
CMTE8	5.24	1.26	−0.73	0.46	D=0.21***	5.25	1.25	−0.59	−0.14	D=0.23***	F(1,851)=0.35	T(482.71)=0.06	
CMTE10	**5.34**	**1.23**	**−0.81**	**0.68**	**D=0.22*****	**5.28**	**1.27**	**−0.77**	**0.38**	**D=0.23*****	**F(1,851)=0.39**	**T(483.28)=0.57**	

SD, standard deviation; K-S Lilliefors, Kolmogorov–Smirnov with Lilliefors modification; * = p < 0.05; ** = p < 0.01; *** = p < 0.001; EC = employment contract (hours per week); WE: work experience (years); CMTE = cognitive management of teacher emotion; TEC = teacher empathic concern; TSR = teacher–student relationship; ACC = adverse classroom climate; In bold the items selected in the final scale after the exploratory graph analysis (EGA).
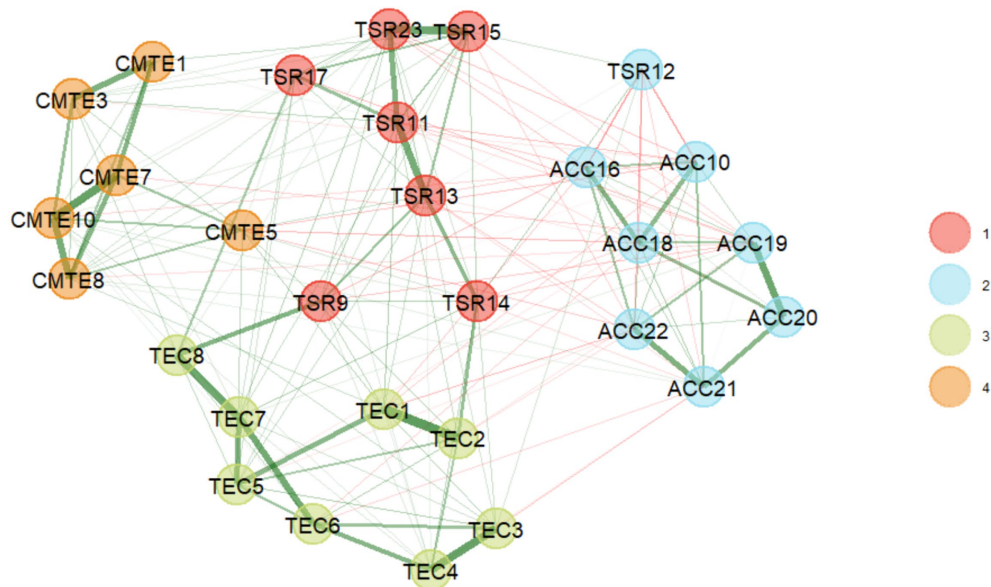
FIGURE 2
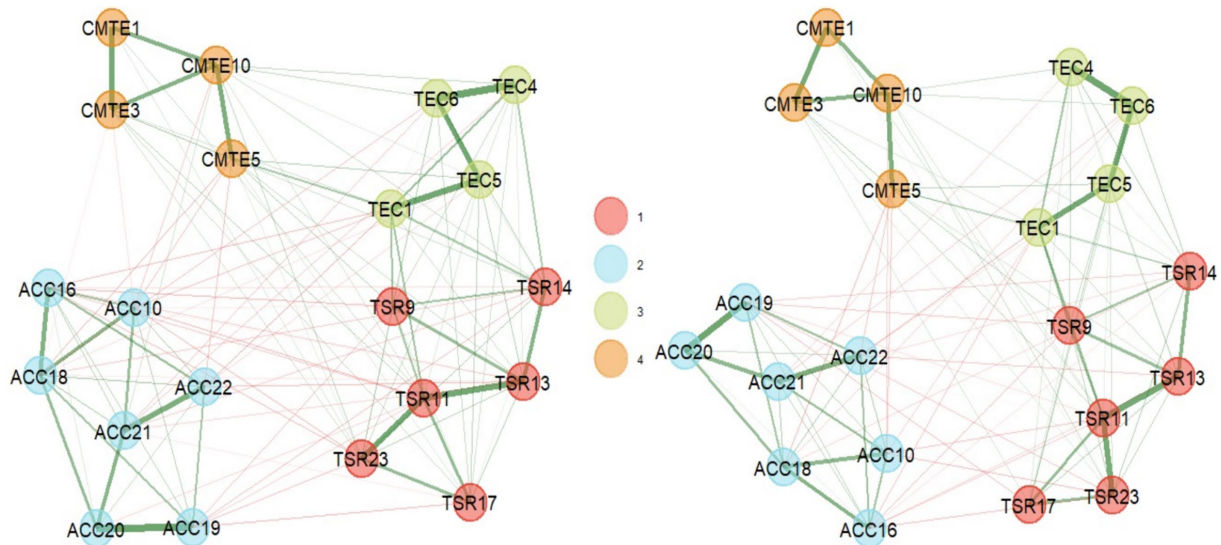EGA dimensionality results (29 items).

FIGURE 3
Dimensionality results in EGA (left) and bootEGA (right) 21-item questionnaire.

respectively, with their theoretical dimension (dimension 1), which is considered unstable, on the other hand, the items of dimension 2 representing the ACC were the only ones that in their totality presented a stability of 100% with their theoretical dimension (see Table 6). These results suggest that, although, in general, the items are associated with their theoretical dimension, there is evidence of unstable items that cause problems with the consistency of the SEMS-IT closeness dimension. With this background, we proceeded to eliminate items TSR9 and TSR14.

Finally, in this last SEMS-IT solution of 19 items (see Figure 4), it could be observed that both the EGA analysis and the bootEGA resampling presented similar four-factor structures, where the dimension 1 corresponding to TSR was composed of the items TSR11,

TSR13, TSR17 and TSR23; dimension 2 corresponding to ACC and was composed of items ACC10, ACC16, ACC18, ACC19, ACC20, ACC21, and ACC22; dimension 3 corresponding to TEC and was composed of items TEC1, TEC4, TEC5, and TEC6; finally dimension 4 corresponding to CMTE and was composed of items CMTE1, CMTE3, CMTE5, and CMTE10.

Regarding the stability of the dimensions, the frequency analysis indicated that the four-dimensional solution replicated 99.3% of 1,000 resamples, and the structural consistency or the frequency with which the empirical EGA dimension replicated exactly on resampling was 0.999 for dimensions 1 and 2, respectively, dimension 3 replicated 0.994 and dimension 4 replicated 0.988.

TABLE 3 Descriptive statistics of the stability of the dimensions.

N. Boots	Median dim	SE dim	CI dim	Lower CI	Upper CI	Lower quantile	Upper quantile
1,000	4	0.12	0.24	3.76	4.24	4	4

TABLE 4 The frequency of the number of dimensions in the resampling process.

No. of factors	Frequency
4	0.985
3	0.015

TABLE 5 Stability by the dimension of SEMS-IT in bootstrap resampling.

Dimension	Stability
1 (TSR)	0.782
2 (ACC)	1.000
3 (TEC)	0.977
4 (CMTE)	0.992

Then, when observing the stability of the items, it could be seen that the items were replicated in their community at least 99% of the time in their dimension (Figure 5).

Finally, the fit of the structure suggested by EGA was estimated by CFA, using the CFA function of the EGAnet package, where the model presented good fit indicators, X^2 (171) = 340.926***, CFI = 0.982, TLI = 0.979, RMSEA = 0.05, and SRMR = 0.055 (Figure 6).

3.3 Results of the exploratory graph analysis in sample 2

Finally, these findings were analyzed in a second sample with the items of the final solution that were selected. A new EGA was performed with the GLASSO network estimation method and the Louvain community detection algorithm, which confirmed the four-factor structure (Figure 1), consistent with the theoretical factor representation. The stability of these dimensions, as in the first part, was evaluated with the bootEGA function with 1,000 iterations, where the network structure obtained from the median of the iterations also had four dimensions, like the empirical EGA (Figure 7) has the new numbering of the items, and the adjustment of this numbering can also be seen in Appendix 1 the final scale.

In the frequency analysis, four dimensions were identified 94.4% of the time, corresponding to 944 times out of 1,000 bootstrap resamples. Regarding structural consistency or the frequency with which the empirical dimension of EGA replicated exactly in the resampling was 0.997 for dimension 1 (TSR), dimension 2 (ACC) replicated 0.932, dimension 3 (TEC) replicated 0.924 and dimension 4 (CMTE) replicated 0.991. Then, when analyzing the stability of the items, it could be observed that they replicated in their community at least 93% of the time (Figure 8).

Finally, the fit of the structure suggested by EGA was checked by CFA, using the CFA function of the EGAnet package. The results evidenced good and acceptable fit indicators, X^2 (171) = 354.546

($p < 0.001$), CFI = 0.971, TLI = 0.966, RMSEA = 0.061, and SRMR = 0.062.

4 Discussion

This research focused on examining the psychometric properties of the SocioEmotional Skills Instrument for Teachers (SEMS-IT), an instrument that includes critical and essential teacher SEMS, using the network model. This study is relevant given that SEMS are fundamental for the successful development of a person and for the effective performance of teachers. Among the most important findings, it was evidenced that the SEMS-IT presents optimal metric properties and an adequate internal structure. These results inform that the SEMS-IT can be used as a type of brief measure of SEMS in teachers.

4.1 Strengths of this research

One of the strengths of this research is the use of network analysis with the EGAnet package. This type of analysis provides the area of social sciences with a deeper and more integrative understanding of the structure and dynamics of the constructs being studied toward a unifying theory (Borsboom and Cramer, 2013; Lange et al., 2020). It is constituted as a psychometric network model, in this case on an instrument to measure teaching SEMS, which offers significant advantages compared to other types of analysis given that it is characterized by: (1) flexibility in representation, given that it helps to model complex relationships between different variables, which is crucial to understand the interactions between SEMS (Golino and Epskamp, 2017; Handcock et al., 2008); (2) an approach focused on network topology, which allows identifying key nodes and their connections, which is valuable for understanding how SEMS relate to each other and how patterns of influence emerge (Epskamp et al., 2017; Leskovec and Sosič, 2016); (3) the detection of spillover effects through mediating pathways in the network, for example, if one SEMS affects another through a third, the EGAnet captures this (Christensen et al., 2020); (4) robustness to missing data, since it handles them more flexibly without the need for a complete correlation matrix, and can even estimate relationships when some data are absent without affecting parameter estimation (Christodoulou et al., 2023); and (5) intuitive visualization since it provides graphical representations of the network facilitating the interpretation and communication of results. All in all, the EGAnet is considered a powerful tool in psychometric analysis (Isvoranu and Epskamp, 2023; Marsman et al., 2018; Soares et al., 2021).

Another important aspect of constructing an instrument such as this is that in the field of psychometrics, it is possible to identify measurement scales based on traits and others based on skills (Bradberry and Su, 2006; Brannick et al., 2009). However, when dealing with psychological constructs but applied in an educational

TABLE 6 Stability of the SEMS-IT items in bootstrap resamplings.

	1 (TSR)	2 (ACC)	3 (TEC)	4 (CMTE)
TSR11	1			
TSR13	0.986		0.014	
TSR14	0.815		0.185	
TSR17	1			
TSR23	1			
TSR9	0.865		0.135	
ACC10		1		
ACC16		1		
ACC18		1		
ACC19		1		
ACC20		1		
ACC21		1		
ACC22		1		
TEC1	0.023		0.977	
TEC4	0.015		0.985	
TEC5	0.015		0.985	
TEC6	0.015		0.985	
CMTE1				1
CMTE10				1
CMTE3				1
CMTE5		0.001	0.007	0.992

performance context, it is more beneficial to have scales that facilitate the identification of categories based on people's responses, which are possible to improve and, therefore, guide the deployment of actions for socio-emotional development. This has an important value because, even if variables with low development are identified in teachers, they have the possibility of working on them until they reach a desirable performance for the effectiveness of their classroom practice (Lee et al., 2023). The instrument has also been limited to measure teachers' own skills in their interaction with students, highlighting its value with respect to the specificity of the constructs it measures and in a defined context, which compared to instruments that have been designed without delimiting a context, do not contribute theoretically significant amounts of variance to the models, while instruments of specific skills and specific to a context, contribute substantial amounts to the variance of the modelled predictions (Spitzberg, 1991).

4.2 Implications of this study at the theoretical level

This study also has strong theoretical and practical implications. First, the findings obtained may be valuable for expanding the conceptual framework of the variable SEMS teachers (Dung and Zsolnai, 2021), especially considering that the possibilities of socioemotional development depend largely on the context in which a person develops (Jones et al., 2019). The structure of individual differences in many social and emotional attributes is required to
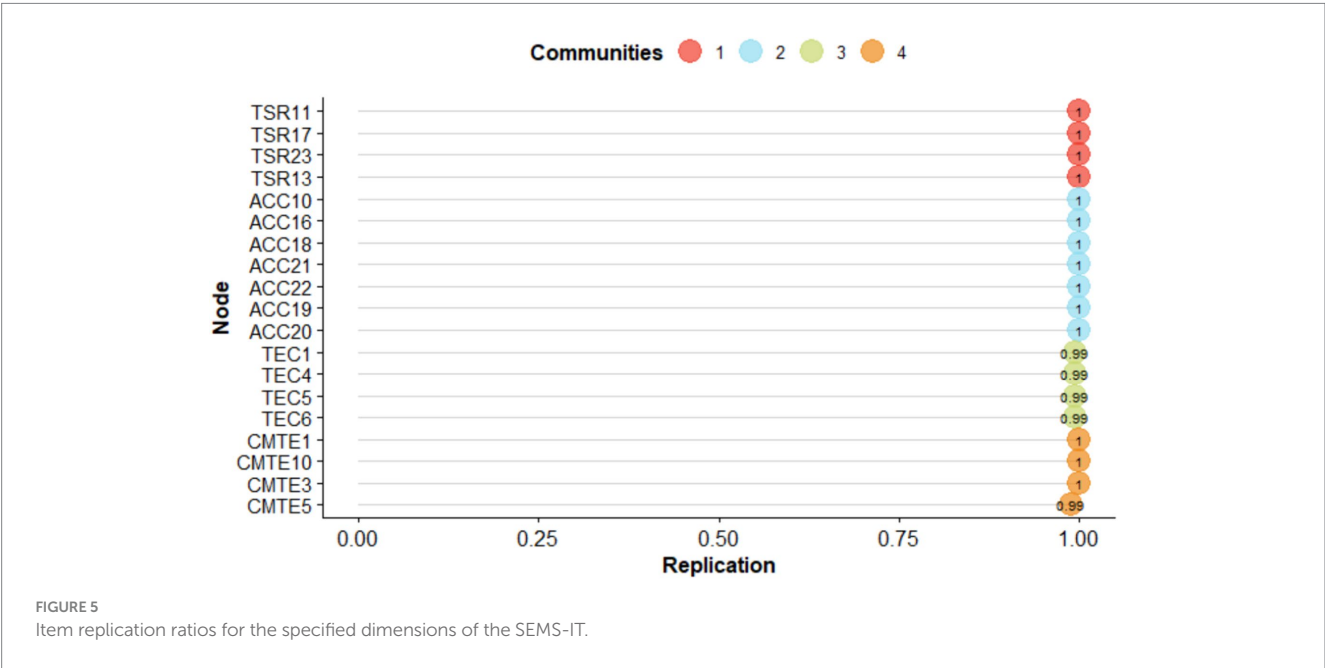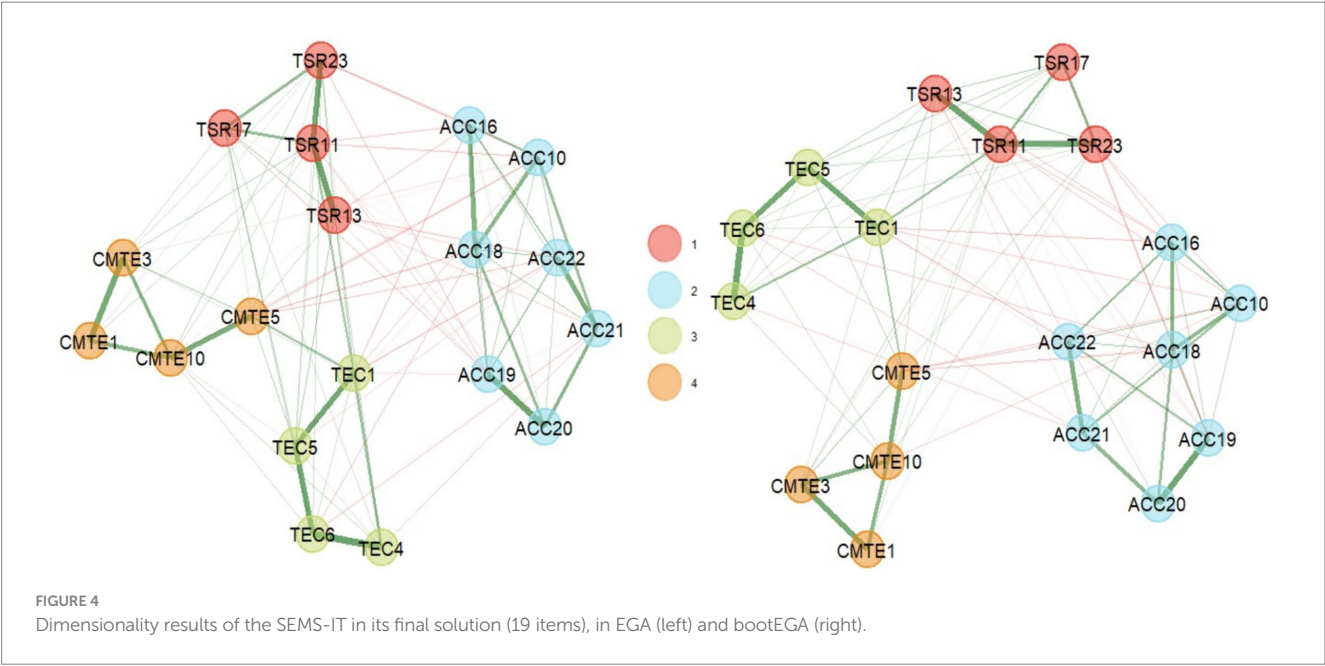
be specified, especially in teachers and their performance in the educational area, resulting in the essential to identify the main domains of socioemotional content that are required to be assessed through instruments (Primi et al., 2019). This study does not intend to propose a definitive instrument, but rather to contribute with a measurement tool that contributes to the research of teaching SEMS and encourages other instruments that complement the included domains that have been rigorously selected within the wide number of possibilities.

Specifically, we integrated as dimensions of the instrument as follows: (a) the cognitive management of emotions, as it allows teachers a cognitive change where they can modify the emotional effects before various situations in the classroom, so when they want to feel more positive emotions or less negative emotions while teaching, they can change their way of thinking about the situation (Gross, 1998; Gross and John, 2003; Hagenauer et al., 2015); (b) empathic concern, which involves teachers' deployment of a constellation of authentic emotions when they observe needs or difficulties (personal and/or social) in their students during their teaching, allowing them to understand their thoughts and feelings by responding compassionately with sensitivity, concern, attention, sympathy, without losing sight of their students' learning (Fry and Runyan, 2018; Bialystok and Kukar, 2018; Meyers et al., 2019); (c) the TSR, which reflects the teacher's influence and proximity to his or her students while teaching, which has been associated with significant changes in student performance and motivation (Simon et al., 2022; Wubbels and Brekelmans, 2005); (d) adverse situations in the classroom, which allows understanding the complex and problematic situations experienced by teachers during their teaching, which are directly related to teacher burnout, symptoms of depression, stress, anxiety, low professional optimism, in turn considered critical factors in the decision of teachers to move schools or leave their profession (Agyapong et al., 2022; Burić et al., 2019; Flores, 2020; McLean et al., 2020; Papastylianou et al., 2009; Sáez-Delgado et al., 2024).

Therefore, the theoretical contribution of this study is directed toward the inquiry of those theoretical–empirical models that integrate SEMS for effective performance and high quality of teacher education (LeTendre, 2017) that allow teachers to overcome the daily difficulties in their professional practice (Fitzgerald et al., 2022; Hen and Goroshit, 2016; Jones et al., 2013), and also includes those SEMS fundamental for themselves and their students to thrive in the 21st century (Collie and Perry, 2019; Scheirlinckx et al., 2023).

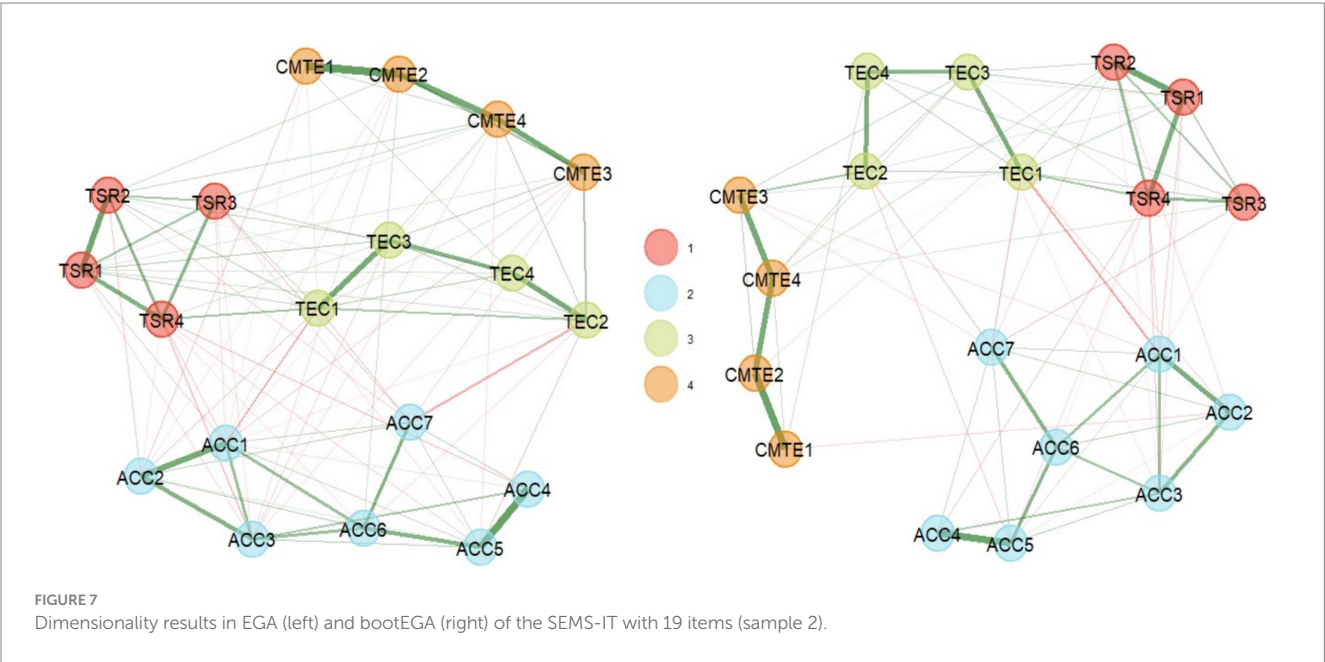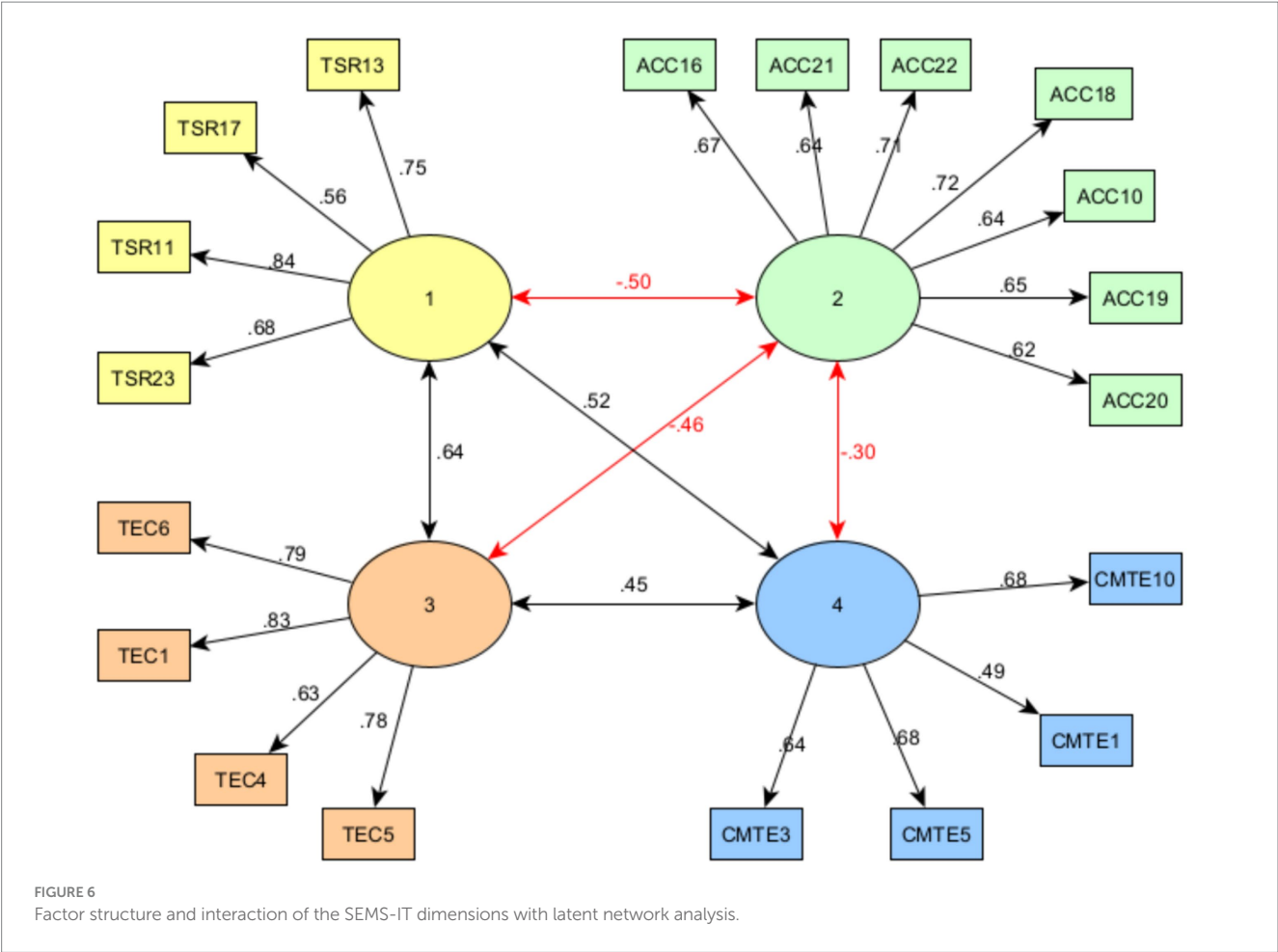## 4.3 Implications of this study at the practical level

The implications of this study at a practical level consist in the proposal of a scale that contributes to the possibility of guaranteeing greater quality and validity of the research by providing more reliable empirical evidence in the collection of data on teachers' SEMS, especially valuable when attempting to account for the effects of interventions on SEL in teachers. This is especially relevant, given that it has been noted in the literature that studies have assessed very heterogeneous and different variables through multiple instruments that may reflect inconsistency in assessment procedures (Oliveira et al., 2021). Therefore, adequate consistency is required between the

FIGURE 4
Dimensionality results of the SEMS-IT in its final solution (19 items), in EGA (left) and bootEGA (right).

FIGURE 5
Item replication ratios for the specified dimensions of the SEMS-IT.

instruments selected to measure teaching SEMS with the variables to be studied, the objectives and the contents addressed in a given intervention to achieve the sensitivity of actually measuring the construct intended to be improved in the program (Domitrovich et al., 2016). In this sense, this study makes available an instrument based on the approach that has been most frequently used for the measurement of SEMS, that of self-report, because it facilitates the operationalization of the skills that are intended to be measured (Schoon, 2021). It also stands out for being a tool that adequately captures SEMS that respond to a specific context, in this case, to school-level teachers considering their formative and modelling role of these skills in their students (Jones and Bouffard, 2012; Martínez-Yarza et al., 2023; Sáez-Delgado et al., 2022).

4.4 Limitations and future lines of research

The results obtained provide valuable information on the validity and reliability of the SEMS-IT. However, it is important to consider some limitations and areas for future research. One aspect to consider as a limitation is related to the type of instrument used (self-report), which, especially when applied to samples of teachers, could show possible social desirability biases in the responses obtained, that is, it could be questioned whether they reach a high average in the different SEMS. There is some background on the results of teachers' self-reports regarding their SEMS, which do not necessarily correlate with the elicitation of other data, such as physiological measures (Ciuk et al., 2015). Therefore, as a future line of research one could consider

FIGURE 6
Factor structure and interaction of the SEMS-IT dimensions with latent network analysis.

FIGURE 7
Dimensionality results in EGA (left) and bootEGA (right) of the SEMS-IT with 19 items (sample 2).

exploring other alternative or complementary measurement strategies. Within the forms/methodologies to measure socioemotional aspects, it is recognized that these vary widely, not only due to the intrinsic content of the social and emotional that is sought to be evaluated but also because some authors make a distinction between skills and competencies. Regarding the instruments for the measurement of SEMS, there are several types that have been used in empirical research highlighting the self-report, situational (Aldrup et al., 2020;

FIGURE 8
Item replication ratios for the specified dimensions.
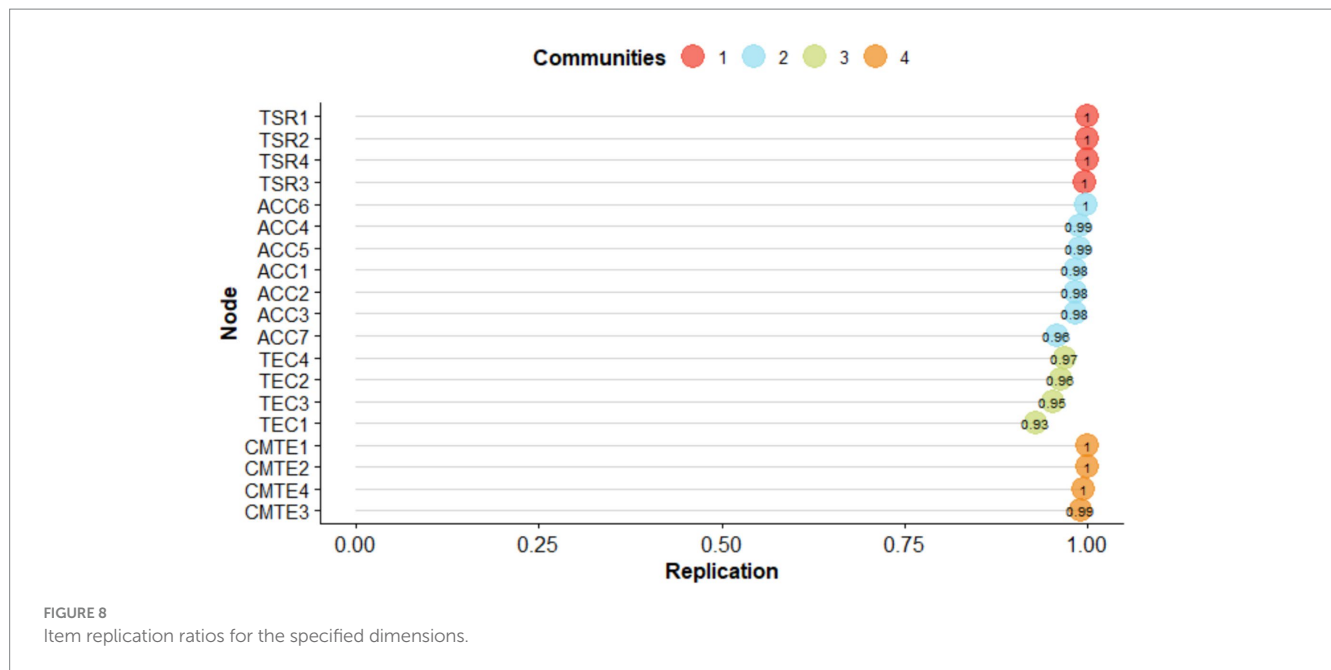
MacCann and Roberts, 2008; Mayer et al., 2002) observation (Achenbach, 2019; Goodman et al., 2000; Schoon, 2021) and physiological types. Given that each of these types of instruments has strengths and limitations, future studies could consider the application of more than one of them, which would provide a deeper insight into teaching SEMS during their teaching.

Another limitation is that the participants in this study are secondary school teachers; therefore, the conclusions of this study should be applied with care to this specific group. It would be useful to replicate this study with different samples of teachers to analyze the psychometric properties of the instrument and, consequently, the generalization of the results to teachers at other educational levels. A third limitation consists of the teaching SEMS integrated into this instrument. As mentioned above, it does not seek to be a unique instrument, but rather, a relevant measurement resource to measure some key and necessary SEMS to analyze in teachers; undoubtedly, future studies could explore other SEMS that could be included, in the extent that those relevant to teachers and their socioemotional challenges in the classroom are identified. A fourth limitation is important to mention, and this one refers to the lack of a specific analysis based on the network approach that allows analyzing the relationship between the different dimensions that make up the instrument with other related variables; however, this also allows guiding a path for future research, that is, exploring the relationships between these socioemotional skills with other constructs of teachers, and also of students (Palikara et al., 2021). This will strengthen the evidence and understanding of the role that these dimensions play in the outcomes of greatest interest regarding teacher effectiveness (Bardach et al., 2022).

Finally, researchers are encouraged to use this instrument not only for the diagnosis or description of teachers' SEMS but also in intervention studies that seek to improve SEMS, considering that educators' own social and emotional skills play an important role in the quality of the educational experiences they offer to their students. The issue of measuring SEMS has become an increasingly urgent concern among both researchers and school leaders, who are more frequently beginning to integrate social–emotional work into classrooms to experiment with and replicate the promising effects reported in research. This is where the present study becomes very valuable to be able to evaluate the effect of interventions or teacher socioemotional development, using a sensitive measurement instrument capable of accurate assessment, which will allow causal inferences to be made about change over time in teacher socioemotional indicators (LeTendre, 2017).

In conclusion, this study contributes to the existing literature on teacher SEMS and provides a useful tool for its evaluation. The findings may have significant implications for teacher training and professional development, as well as for promoting positive and effective learning environments.

Data availability statement

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

Ethics statement

The studies involving humans were approved by Comité Ético Científico, Universidad Católica de la Santísima Concepción. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

FS-D: Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing. JM-N:

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.

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2024.1421164/full#supplementary-material

References

Achenbach, T. (2019). International findings with the Achenbach system of empirically based assessment (ASEBA): applications to clinical services, research, and training. *Child Adolesc. Psychiatry Ment. Health* 13, 1–10. doi: 10.1186/s13034-019-0291-2

AERA (2014). "American Educational Research Association (2014)" in Standards for educational and psychological testing (Washington DC, United States of America: American Educational Research Association).

Agyapong, B., Obuobi-Donkor, G., Burback, L., and Wei, Y. (2022). Stress, burnout, anxiety and depression among teachers: a scoping review. *Int. J. Environ. Res. Public Health* 19:10706. doi: 10.3390/ijerph191710706

Aldrup, K., Carstensen, B., and Klusmann, U. (2022). Is empathy the key to effective teaching? A systematic review of its association with teacher-student interactions and student outcomes. *Educ. Psychol. Rev.* 34, 1177–1216. doi: 10.1007/s10648-021-09649-y

Aldrup, K., Carstensen, B., Köller, M., and Klusmann, U. (2020). Measuring teachers' social-emotional competence: development and validation of a situational judgment test. *Front. Psychol.* 11, 1–20. doi: 10.3389/fpsyg.2020.0089

Algina, J., Keselman, H., and Penfield, R. (2005). An alternative to Cohen's standardized mean difference effect size: a robust parameter and confidence interval in the two independent groups case. *Psychol. Methods* 10, 317–328. doi: 10.1037/1082-989X.10.3.317

Ato, M., López-García, J., and Benavente, A. (2013). A classification system for research designs in psychology. *Ann. Psychol.* 29, 1038–1059. doi: 10.6018/analesps.29.3.178511

Bakadorova, O., and Raufelder, D. (2018). The essential role of the teacher-student relationship in students' need satisfaction during adolescence. *J. Appl. Dev. Psychol.* 58, 57–65. doi: 10.1016/j.appdev.2018.08.004

Bardach, L., Klassen, R., and Perry, N. (2022). Teachers' psychological characteristics: do they matter for teacher effectiveness, teachers' well-being, retention, and interpersonal relations? An integrative review. *Educ Psych Rev* 34, 259–300. doi: 10.1007/s10648-021-09614-9

Bar-On, R. (1997). The emotional quotient inventory (EQ-i): A test of emotional intelligence. Toronto, Canada: Multi-Health Syst.

Bar-On, R. (2006). The Bar-On model of emotional-social intelligence (ESI). *Psicothema* 18, 13–25. Available at: https://reunido.uniovi.es/index.php/PST/article/view/8415/8279

Batson, C., Eklund, J., Chermok, V., Hoyt, J., and Ortiz, B. (2007). An additional antecedent of empathic concern: valuing the welfare of the person in need. *J. Pers. Soc. Psychol.* 93, 65–74. doi: 10.1037/0022-3514.93.1.65

Bialystok, L., and Kukar, P. (2018). Authenticity and empathy in education. *Theory Res. Educ.* 16, 23–39. doi: 10.1177/1477878517746647

Bisquerra, R., and Peréz, N. (2007). Las competencias emocionales. *Educ. XX1*, 61–82. doi: 10.1109/PESGM.2012.6344804

Borsboom, D. (2022). Possible futures for network psychometrics. *Psychometrika* 87, 253–265. doi: 10.1007/s11336-022-09851-z

Borsboom, D., and Cramer, A. (2013). Network analysis: an integrative approach to the structure of psychopathology. *Annu. Rev. Clin. Psychol.* 9, 91–121. doi: 10.1146/annurev-clinpsy-050212-185608

Bradberry, T., and Su, L. (2006). Ability-versus skill-based assessment of emotional intelligence. *Psicothema* 18, 59–66

Brannick, M., Wahi, M., Arce, M., Johnson, H., Nazian, S., and Goldin, S. (2009). Comparison of trait and ability measures of emotional intelligence in medical students. *Med. Educ.* 43, 1062–1068. doi: 10.1111/j.1365-2923.2009.03430.x

Brinkworth, M., McIntyre, J., Juraschek, A., and Gehlbach, H. (2018). Teacher-student relationships: the positives and negatives of assessing both perspectives. *J. Appl. Dev. Psychol.* 55, 24–38. doi: 10.1016/j.appdev.2017.09.002

Burić, I., Slišković, A., and Penezić, Z. (2019). Understanding teacher well-being: a cross-lagged analysis of burnout, negative student-related emotions, psychopathological symptoms, and resilience. *Educ. Psychol.* 39, 1136–1155. doi: 10.1080/01443410.2019.1577952

Cai, Y., Dong, S., Yuan, S., and Hu, C. (2020). Network analysis and its applications in psychology. *Adv. Psych. Sci.* 28, 178–190. doi: 10.3724/SP.J.1042.2020.00178

Castillo-Díaz, M., and Padilla, J. (2013). How cognitive interviewing can provide validity evidence of the response processes to scale items. *Soc. Indic. Res.* 114, 963–975. doi: 10.1007/s11205-012-0184-8

Christensen, A., Garrido, L., and Golino, H. (2023). Unique variable analysis: a network psychometrics method to detect local dependence. *Multivariate Behav. Res.* 58, 1165–1182. doi: 10.1080/00273171.2023.2194606

Christensen, A., Golino, H., and Silvia, P. (2020). A psychometric network perspective on the validity and validation of personality trait questionnaires. *Eur. J. Personal.* 34, 1095–1108. doi: 10.1002/per.2265

Christensen, A., Gross, G., Golino, H., Silvia, P., and Kwapil, T. (2019). Exploratory graph analysis of the multidimensional schizotypy scale. *Schizophr. Res.* 206, 43–51. doi: 10.1016/j.schres.2018.12.018

Christodoulou, A., Karekla, M., Costantini, G., and Michaelides, M. (2023). A network analysis approach on the psychological flexibility/inflexibility model. *Behav. Ther.* 54, 719–733. doi: 10.1016/j.beth.2023.01.002

Ciuk, D., Troy, A., and Jones, M. (2015). Measuring emotion: self-reports vs. physiological indicators. Annual Meeting of the Midwest Political Science Association. 1–28.

Clem, A., Rudasill, K., Hirvonen, R., Aunola, K., and Kiuru, N. (2021). The roles of teacher–student relationship quality and self-concept of ability in adolescents' achievement emotions: temperament as a moderator. *Eur. J. Psychol. Educ.* 36, 263–286. doi: 10.1007/s10212-020-00473-6

Coke, J., Batson, C., and McDavis, K. (1978). Empathic mediation of helping: a two-stage model. *J. Pers. Soc. Psychol.* 36, 752–766. doi: 10.1037/0022-3514.36.7.752

Collaborative for Academic, Social, and Emotional Learning (CASEL) (2008). SEL assessment, tools, needs and outcome assessments. Chicago, Illinois: Collaborative for Academic, Social, and Emotional Learning.

Collaborative for Academic, Social, and Emotional Learning (CASEL) (2013). Effective social and emotional learning programs. Chicago, Illinois, USA: Preschool and Elementary School Edition.

Collie, R. (2020). The development of social and emotional competence at school: an integrated model. *Int. J. Behav. Dev.* 44, 76–87. doi: 10.1177/0165025419851864

Collie, R., and Perry, N. (2019). Cultivating teacher thriving through social–emotional competence and its development. *Aust. Educ. Res.* 46, 699–714. doi: 10.1007/s13384-019-00342-2

Cooper, K., and Miness, A. (2014). The co-creation of caring student-teacher relationships: does teacher understanding matter? *High School J.* 97, 264–290. doi: 10.1353/hsj.2014.0005

Davis, M. (1983). Measuring individual differences in empathy: evidence for a multidimensional approach. *J. Pers. Soc. Psychol.* 44, 113–126. doi: 10.1037/0022-3514.44.1.113

Decety, J., and Cowell, J. (2014). Friends or foes: is empathy necessary for moral behavior? *Psychol. Sci.* 9, 525–537. doi: 10.1177/1745691614545130

DeLay, D., Zhang, L., Hanish, L., Miller, C., Fabes, R., Martin, C., et al. (2016). Peer influence on academic performance: a social network analysis of social-emotional intervention effects. *Prev. Sci.* 17, 903–913. doi: 10.1007/s11121-016-0678-8

Domitrovich, C., Bradshaw, C., Berg, J., Pas, E., Becker, K., Musci, R., et al. (2016). How do School-based prevention programs impact teachers? Findings from a randomized trial of an integrated classroom management and social-emotional program. *Prev. Sci.* 17, 325–337. doi: 10.1007/s11121-015-0618-z

Dung, D., and Zsolnai, A. (2021). Teachers' social and emotional competence: a new approach of teacher education in Vietnam. *Hung Educ. Res. J.* 12, 131–144. doi: 10.1556/063.2021.00050

Epskamp, S., Rhemtulla, M., and Borsboom, D. (2017). Generalized network psychometrics: combining network and latent variable models. *Psychometrika* 82, 904–927. doi: 10.1007/s11336-017-9557-x

Fan, J., and Wang, Y. (2022). English as a foreign language teachers' professional success in the Chinese context: the effects of well-being and emotion regulation. *Front. Psychol.* 13, 1–12. doi: 10.3389/fpsyg.2022.952503

Fitzgerald, M., Shipman, K., Pauletic, M., Ellesworth, K., and Dymnicki, A. (2022). Promoting educator social emotional competence, well-being, and student–educator relationships: a pilot study. *Ment. Health Prev.* 26, 200234–200210. doi: 10.1016/j.mhp.2022.200234

Flores, M. (2020). Surviving, being resilient and resisting: teachers' experiences in adverse times. *Cambridge J. Educ.* 50, 219–240. doi: 10.1080/0305764X.2019.1664399

Fry, B., and Runyan, J. (2018). Teaching empathic concern and altruism in the smartphone age. *J. Moral Educ.* 47, 1–16. doi: 10.1080/03057240.2017.1374932

Gehlbach, H., Brinkworth, M., and Harris, A. (2012). Changes in teacher–student relationships. *Br. J. Educ. Psychol.* 82, 690–704. doi: 10.1111/j.2044-8279.2011.02058.x

Golino, H., and Christensen, A. (2021). EGAnet: Exploratory Graph Analysis—A framework for estimating the number of dimensions in multivariate data using network psychometrics.

Golino, H., and Epskamp, S. (2017). Exploratory graph analysis: a new approach for estimating the number of dimensions in psychological research. *PLoS One* 12, e0174035–e0174026. doi: 10.1371/journal.pone.0174035

Goodman, R., Ford, T., Simmons, H., Gatward, R., and Meltzer, H. (2000). Using the strengths and difficulties questionnaire (SDQ) to screen for child psychiatric disorders in a community sample. *Br. J. Psychiatry* 177, 534–539. doi: 10.1192/bjp.177.6.534

Gross, J. (1998). The emerging field of emotion regulation: an integrative review. *Rev. Gen. Psychol.* 2, 271–299. doi: 10.1037/1089-2680.2.3.271

Gross, J. (2001). Emotion regulation in adulthood: timing is everything. *Curr. Dir. Psychol. Sci.* 10, 214–219. doi: 10.1111/1467-8721.00152

Gross, M. (2002). *Social and emotional issues for exceptionally intellectually gifted students. In The social and emotional development of gifted children: What do we know?* eds. M. Neihart, S. M. Reis, N. M. Robinson and S. M. Moon (UK: Prufrock Press Inc.), pp. 19–29.

Gross, J., and John, O. (2003). Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being. *J. Pers. Soc. Psychol.* 85, 348–362. doi: 10.1037/0022-3514.85.2.348

Hagenauer, G., Hascher, T., and Volet, S. (2015). Teacher emotions in the classroom: associations with students' engagement, classroom discipline and the interpersonal teacher-student relationship. *Eur. J. Psychol. Educ.* 30, 385–403. doi: 10.1007/s10212-015-0250-0

Handcock, M., Hunter, D., Butts, C., Goodreau, S., and Morris, M. (2008). Statnet: software tools for the representation, visualization, analysis and simulation of network data. *J. Stat. Softw.* 24, 1548–7660. doi: 10.18637/jss.v024.i01

Hemi, M., and Kasperski, R. (2023). Development and validation of 'EduSEL': Educators' socio-emotional learning questionnaire. *Pers. Individ. Differ.* 201, 111926–111913. doi: 10.1016/j.paid.2022.111926

Hen, M., and Goroshit, M. (2016). Social-emotional competencies among teachers: an examination of interrelationships. *Cogent Educ.* 3, 1–9. doi: 10.1080/2331186X.2016.1151996

Hernández, A., Hidalgo, M., Hambleton, R., and Gómez, J. (2020). International test commission guidelines for test adaptation: a criterion checklist. *Psicothema* 32, 390–398. doi: 10.7334/psicothema2019.306

Hu, L., and Bentler, P. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct. Equ. Modeling Mult. J.* 6, 1–55. doi: 10.1080/10705519909540118

Isvoranu, A., and Epskamp, S. (2023). Which estimation method to choose in network psychometrics? Deriving guidelines for applied researchers. *Psychol. Methods* 28, 925–946. doi: 10.1037/met0000439

Jennings, P., and Greenberg, M. (2009). The prosocial classroom: teacher social and emotional competence in relation to student and classroom outcomes. *Rev. Educ. Res.* 79, 491–525. doi: 10.3102/0034654308325693

Jones, S., and Bouffard, S. (2012). Social and emotional learning in schools: from programs to strategies. Social policy report. *Soc. Res. Child. Dev.* 26, 1–33. Available at: https://files.eric.ed.gov/fulltext/ED540203.pdf

Jones, S., Bouffard, S., and Weissbourd, R. (2013). Educators´ social and emotional skills vital to learning. *Phi Delta Kappan.* 94, 62–65. doi: 10.1177/003172171309400815

Jones, S., McGarrah, M., and Kahn, J. (2019). Social and emotional learning: a principled science of human development in context. *Educ. Psychol.* 54, 129–143. doi: 10.1080/00461520.2019.1625776

Landler-Pardo, G., Arviv, R., Levi-Keren, M., and Weinberger, Y. (2022). Being empathic in complex situations in intercultural education: a practical tool. *Intercult. Educ.* 33, 391–405. doi: 10.1080/14675986.2022.2090688

Lange, J., Dalege, J., Borsboom, D., van Kleef, G., and Fischer, A. (2020). Toward an integrative psychometric model of emotions. *Perspect. Psychol. Sci.* 15, 444–468. doi: 10.1177/1745691619895057

Lechner, C. M., Anger, S., and Rammstedt, B. (2019). "Socio-emotional skills in education and beyond: recent evidence and future research avenues" in Research handbook on the sociology of education. ed. R. Becker (UK: Edward Elgar Publishing), 427–453.

Lee, E., Lacey, H., Van Valkenburg, S., McGinnis, E., Huber, B., Benner, G., et al. (2023). What about me? The importance of teacher social and emotional learning and well-being in the classroom. *Bey Behav* 32, 53–62. doi: 10.1177/10742956221145942

Lee, M., Pekrun, R., Taxer, J., Schutz, P., Vogl, E., and Xie, X. (2016). Teachers' emotions and emotion management: integrating emotion regulation theory with emotional labor research. *Soc. Psychol. Educ.* 19, 843–863. doi: 10.1007/s11218-016-9359-5

Leskovec, J., and Sosič, R. (2016). Snap: a general-purpose network analysis and graph-mining library. *ACM Trans. Intell. Syst. Technol.* 8, 1–20. doi: 10.1145/2898361

LeTendre, G. (2017). "Socio-emotional learning and teacher quality" in International Handbook of Teacher Quality and Policy. eds. M. Akiba and G. LeTendre (UK: Routledge), 1–13.

López-Angulo, Y., Mella-Norambuena, J., Sáez-Delgado, F., and Álvarez-Jara, R. (2020). La Inteligencia emocional en apoderados chilenos confinados por la COVID-19. *CienciAmérica* 9, 285–298. doi: 10.33210/ca.v9i2.320

Lozano, G., Sáez-Delgado, F., and López-Angulo, Y. (2022). Competencias socioemocionales en docentes de primaria y secundaria: una revisión sistemática. *Pag Educ.* 15, 01–22. doi: 10.22235/pe.v15i1.2598

Lozano, G., Saez-Delgado, F., López-Angulo, Y., and Mella-Norambuena, J. (2021). Teachers' social–emotional competence: history, concept, models, instruments, and recommendations for educational quality. *Sustain. For.* 13:12142. doi: 10.3390/su132112142

Lozano, G., Sáez-Delgado, F., López-Angulo, Y., Mella-Norambuena, J., Contreras-Saavedra, C., and Ramos-Huenteo, V. (2023). Programas de intervención docente en competencias socioemocionales: una revisión sistemática de la literatura. *Aula Enc.* 25, 218–245. doi: 10.17561/ae.v25n2.7391

MacCann, C., and Roberts, R. (2008). New paradigms for assessing emotional intelligence: theory and data. *Emotion* 8, 540–551. doi: 10.1037/a0012746

Marsman, M., Borsboom, D., Kruis, J., Epskamp, S., van Bork, R., Waldorp, L., et al. (2018). An introduction to network psychometrics: relating Ising network models to item response theory models. *Multivariate Behav. Res.* 53, 15–35. doi: 10.1080/00273171.2017.1379379

Martínez-Yarza, N., Santibáñez, R., and Solabarrieta, J. (2023). A systematic review of instruments measuring social and emotional skills in school-aged children and adolescents. *Child Indic. Res.* 16, 1475–1502. doi: 10.1007/s12187-023-10031-3

Matravers, D. (2014). "Empathy as a route to knowledge" in Empathy: Philosophical and psychological perspectives. eds. A. Coplan and P. Goldie (Oxford: Oxford University Press), 19–30.

Mayer, J., Salovey, P., and Caruso, D. (2000). Emotional intelligence: Key readings on the Mayer and Salovey model: Dude Publishing Available at: https://psycnet.apa.org/record/2004-16474-000.

Mayer, J., Salovey, P., and Caruso, D. (2002). Mayer–Salovey–Caruso emotional intelligence test (MSCEIT) user's manual. Toronto, Canada: MHS Available at: https://scholars.unh.edu/personality_lab/27/.

Mayer, J., Salovey, P., Caruso, D., and Sitarenios, G. (2003). Measuring emotional intelligence with the MSCEIT V2.0. *Emotion* 3, 97–105. doi: 10.1037/1528-3542.3.1.97

McLean, L., Abry, T., Taylor, M., and Gaias, L. (2020). The influence of adverse classroom and school experiences on first year teachers' mental health and career optimism. *Teach. Teach. Educ.* 87, 1–13. doi: 10.1016/j.tate.2019/102956

Meyers, S., Rowell, K., Wells, M., and Smith, B. (2019). Teacher empathy: a model of empathy for teaching for student success. *Coll. Teach.* 67, 160–168. doi: 10.1080/87567555.2019.1579699

Moen, A., Sheridan, S., Schumacher, R., and Cheng, K. (2019). Early childhood student–teacher relationships: what is the role of classroom climate for children who are disadvantaged? *Early Child Educ J.* 47, 331–341. doi: 10.1007/s10643-019-00931-x

Muñiz, J., and Fonseca-Pedrero, E. (2019). Diez pasos para la construcción de un test. *Psicothema* 31, 7–16. doi: 10.7334/psicothema2018.291

Muzzio, E., and Strasser, K. (2022). An integrative framework of early socio-emotional competencies: cognition, regulation and communication. *Int. J. Psychol.* 56, e1330–e1317. doi: 10.30849/ripijp.v56i1.1330

Oliveira, S., Roberto, M., Pereira, N., Marques-Pinto, A., and Veiga-Simão, A. (2021). Impacts of social and emotional learning interventions for teachers on teachers' outcomes: a systematic review with meta-analysis. *Front. Psychol.* 12, 1–19. doi: 10.3389/fpsyg.2021.677217

Ornaghi, V., Conte, E., Cavioni, V., Farina, E., and Pepe, A. (2023). The role of teachers' socio-emotional competence in reducing burnout through increased work engagement. *Front. Psychol.* 14, 1–11. doi: 10.3389/fpsyg.2023.1295365

Pagano, A., and Vizioli, N. (2021). Adaptación del Cuestionario de Regulación Emocional (ERQ) en población adulta de la Ciudad Autónoma de Buenos Aires y el Conurbano Bonaerense. *Rev. Psic.* 21, 18–32. doi: 10.18682/pd.v21i1.3881

Palikara, O., Castro-Kemp, S., Gaona, C., and Eirinaki, V. (2021). The mediating role of school belonging in the relationship between socioemotional well-being and loneliness in primary school age children. *Austr. J. Psych.* 73, 24–34. doi: 10.1080/00049530.2021.1882270

Papastylianou, A., Kaila, M., and Polychronopoulos, M. (2009). Teachers' burnout, depression, role ambiguity and conflict. *Soc. Psychol. Educ.* 12, 295–314. doi: 10.1007/s11218-008-9086-7

Pastore, G., and Luder, R. (2021). Teacher-student-relationship quality in inclusive secondary schools: theory and measurement of emotional aspects of teaching. *Front. Educ.* 6, 1–7. doi: 10.3389/feduc.2021.643617

Pedrosa, I., Suárez-Álvarez, J., and García-Cueto, E. (2013). Content validity evidences: theoretical advances and estimation methods. *Ac Psicol.* 10, 3–20. doi: 10.5944/ap.10.2.11820

Péloquin, K., and Lafontaine, M. (2010). Measuring empathy in couples: validity and reliability of the interpersonal reactivity index for couples. *J. Pers. Assess.* 92, 146–157. doi: 10.1080/00223890903510399

Pérez-Escoda, N., Alegre Rosselló, A., and López-Cassà, E. (2021). Validación y fiabilidad del cuestionario de desarrollo emocional en Adultos (CDE-A35). *Educ S XXI.* 39, 37–60. doi: 10.6018/educatio.422081

Petrides, K. (2009). "Psychometric properties of the trait emotional intelligence questionnaire (TEIQue)" in Assessing emotional intelligence: Theory, research, and applications. eds. J. Parker, D. Saklofske and C. Stough (Boston, MA: Springer US), 85–101.

Pianta, R., Hamre, B., and Allen, J. (2012). "Teacher-student relationships and engagement: conceptualizing, measuring, and improving the capacity of classroom interactions" in Handbook of research on student engagement. (eds.) S. Christenson, A. Reschly and C. Wylie (Boston, MA: Springer US), 365–386.

Polit, D., Beck, C., and Owen, S. (2007). Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Res Nur Health.* 30, 459–467. doi: 10.1002/nur.20199

Primi, R., Santos, D., Hauck, N., Fruyt, F., and John, O. (2019). Mapping self-report questionnaires for socio-emotional characteristics: what do they measure? *Estud. Psicol.* 36, 1–15. doi: 10.1590/1982-0275201936e180138

Quin, D. (2017). Longitudinal and contextual associations between teacher-relationships and student engagement: a systematic review. *Rev. Educ. Res.* 87, 345–387. doi: 10.3102/0034654316669434

Rodriguez, V., Solis, S., Mascio, B., Kiely, K., Jennings, P., and Brotman, L. (2020). With awareness comes competency: the five Awarenesses of teaching as a framework for understanding teacher social-emotional competency and well-being. *Early Educ. Dev.* 31, 940–972. doi: 10.1080/10409289.2020.1794496

Roorda, D., Jak, S., Zee, M., Oort, F., and Koomen, H. (2017). Affective teacher-student relationships and students' engagement and achievement: a meta-analytic update and test of the mediating role of engagement. *School Psych. Rev.* 46, 239–261. doi: 10.17105/SPR-2017-0035.V46-3

Sáez-Delgado, F., López-Angulo, Y., Mella-Norambuena, J., Baeza-Sepúlveda, C., Contreras-Saavedra, C., and Lozano-Peña, G. (2022). Teacher self-regulation and its relationship with student self-regulation in secondary education. *Sustain. For.* 14:16863. doi: 10.3390/su142416863

Sáez-Delgado, F., López-Angulo, Y., Mella-Norambuena, J., Hartley, K., and Sepúlveda, F. (2023). Mental health in school teachers: an explanatory model with emotional intelligence and coping strategies. *Elec. J. Res. Educ. Psychol.* 21, 559–586. doi: 10.25115/ejrep.v21i61.8322

Sáez-Delgado, F., Manriquez, C., López-Angulo, Y., Mella-Norambuena, J., and Contreras-Saavedra, C. (2024). Self-regulatory processes in secondary school teachers during online classes by covid-19. *Zona Próxima.* 41, 89–109. doi: 10.14482/zp.41.456.654

Salovey, P., and Mayer, J. (1990). Emotional Intelligence. *Imag. Cogn. Per.* 9, 185–211. doi: 10.2190/DUGG-P24E-52WK-6CDG

Salovey, P., Mayer, J., Goldman, S., Turvey, C., and Palfai, T. (1995). "Emotional attention, clarity, and repair: exploring emotional intelligence using the trait Meta-mood scale" in Emotion, disclosure, & health. ed. J. W. Pennebaker (Washington DC, USA: Am Psychol As), 125–154.

Sánchez-Pujalte, L., Mateu, D., Etchezahar, E., and Gómez Yepes, T. (2021). Teachers' burnout during COVID-19 pandemic in Spain: trait emotional intelligence and socioemotional competencies. *Sustain. For.* 13, 1–11. doi: 10.3390/su13137259

Scheirlinckx, J., Van Raemdonck, L., Abrahams, L., Teixeira, K., Alves, G., Primi, R., et al. (2023). Social–emotional skills of teachers: mapping the content space and defining taxonomy requirements. *Front. Educ.* 8, 1–15. doi: 10.3389/feduc.2023.1094888

Schonert-Reichl, K. (2017). Social and emotional learning and teachers. *Fut. Chil.* 27, 137–155. doi: 10.1353/foc.2017.0007

Schoon, I. (2021). Towards an integrative taxonomy of social-emotional competences. *Front. Psychol.* 12, 51–59. doi: 10.3389/fpsyg.2021.515313

Seiz, J., Voss, T., and Kunter, M. (2015). When knowing is not enough: the relevance of teachers' cognitive and emotional resources for classroom management. *Front. Learn. Res.* 3, 55–77. doi: 10.14786/flr.v3i1.141

Serrano-Díaz, N., Pocinho, M., and Aragón-Mendizábal, E. (2017). Competencias emocionales y síndrome de burnout en el profesorado de Educación Infantil. *J. Psychol. Educ.* 13, 1–12. doi: 10.23923/rpye2018.01.153

Shamay-Tsoory, S., Aharon-Peretz, J., and Perry, D. (2009). Two systems for empathy: a double dissociation between emotional and cognitive empathy in inferior frontal gyrus versus ventromedial prefrontal lesions. *Brain* 132, 617–627. doi: 10.1093/brain/awn279

Simon, K., Petrovic, L., Baker, C., and Overstreet, S. (2022). An examination of the associations among teacher secondary traumatic stress, teacher–student relationship quality, and student socio-emotional functioning. *School Ment. Health.* 14, 213–224. doi: 10.1007/s12310-022-09507-4

Soares, G., Santiago, P., Werneck, R., Michel-Crosato, E., and Jamieson, L. (2021). A psychometric network analysis of OHIP-14 across Australian and Brazilian populations. *JDR Clin. Trans. Res.* 6, 333–342. doi: 10.1177/238008442093993

Spitzberg, B. (1991). An examination of trait measures of interpersonal competence. *Com. Repo.* 4, 22–29. doi: 10.1080/08934219109367517

Taherdoost, H. (2016). Validity and reliability of the research instrument; how to test the validation of a questionnaire/survey in a research. *Intern. J. Ac. Res. Manag.* 5, 28–36. doi: 10.2139/ssrn.3205040

Wachs, S., Valido, A., Espelage, D. L., Castellanos, M., Wettstein, A., and Bilz, L. (2023). The relation of classroom climate to adolescents' countering hate speech via social skills: a positive youth development perspective. *J. Adolesc.* 95, 1127–1139. doi: 10.1002/jad.12180

Wentzel, K. (2022). Does anybody care? Conceptualization and measurement within the contexts of teacher-student and peer relationships. *Educ. Psychol. Rev.* 34, 1919–1954. doi: 10.1007/s10648-022-09702-4

Wilcox, R. (2012). Introduction to robust estimation and hypothesis testing. *3rd* Edn. Amsterdam, Netherlands: Elsevier.

Winczewski, L., Bowen, J., and Collins, N. (2016). Is empathic accuracy enough to facilitate responsive behavior in dyadic interaction? Distinguishing Ability From Motivation. *Psychol. Sci.* 27, 394–404. doi: 10.1177/0956797615624491

Wolcott, M., and Lobczowski, N. (2021). Using cognitive interviews and think-aloud protocols to understand thought processes. *Curr. Pharm. Teach. Learn.* 13, 181–188. doi: 10.1016/j.cptl.2020.09.005

Wubbels, T., and Brekelmans, M. (2005). Two decades of research on teacher–student relationships in class. *Int. J. Educ. Res.* 43, 6–24. doi: 10.1016/j.ijer.2006.03.003

Yoder, N. (2014). Self-assessing social and emotional instruction and competencies: a tool for teachers. Center on Great Teachers and Leaders. Available at: https://files.eric.ed.gov/fulltext/ED553369.pdf

Zhang, W., He, E., Mao, Y., Pang, S., and Tian, J. (2023). How teacher social-emotional competence affects job burnout: the chain mediation role of teacher-student relationship and well-being. *Sustain. For.* 15, 1–13. doi: 10.3390/su15032061

Zhou, M., and Ee, J. (2012). Development and validation of the social emotional competence questionnaire (SECQ). *Int. J. Emot. Educ.* 4, 27–42. Available at: https://www.um.edu.mt/library/oar/bitstream/123456789/6140/1/ENSECV4I2P2.pdf

Zych, I., Ortega-Ruiz, R., Muñoz-Morales, R., and Llorent, V. (2018). Dimensions and psychometric properties of the social and emotional competencies questionnaire (SEC-Q) in youth and adolescents. *Rev Latinoam Psicol.* 50, 98–106. doi: 10.14349/rlp.2018.v50.n2.3

Check for updates

An empirical study on the relationship between emotional labor and work performance among university teachers

Danna Hao*

College of Education Science, Weinan Normal University, Weinan, China

This study is based on the theory of emotional events and explores the relationship between emotional labor and the job performance of university teachers. Relevant data was obtained through a questionnaire, and a structural equation model was constructed for path analysis. The study found that the surface performance of university teachers has a significant negative impact on relationship performance and task performance; deep performance and proactive authenticity of university teachers have a significant positive impact on relationship performance, task performance, and adaptability performance, respectively; the passive reality of university teachers has a significant negative impact on relationship performance, task performance, and adaptability performance. Based on research findings, this study proposes suggestions for the performance evaluation mechanism of university teachers, including improving the recruitment methods, increasing the emotional labor assessment and incentive mechanism, focusing on alleviating negative emotions of teachers, strengthening the awareness guidance and education of school management and teachers on emotional labor, establishing training courses on emotional labor for teachers, arranging various activities reasonably, and creating a good working atmosphere. Ultimately, these suggestions aim to help university teachers recognize the significance of emotional labor, promote their educational and teaching work, and provide new methods and paths for improving the work performance of university teachers.

KEYWORDS

university teachers, emotional labor, work performance, empirical study, emotional event theory

1 Introduction

As an important carrier of knowledge innovation and dissemination, university teachers are the most important cornerstone of the higher education system. In the normal teaching and research process of university teachers, they often need to express emotions as required to achieve teaching goals, that is, to engage in emotional labor. College teachers, as natural persons, may experience personal emotions at any time during the teaching process. Unstable emotional labor can have an impact on their physical and mental health, and even seriously affect their work performance. Therefore, as the main body of highly emotional workers, how to maintain the stability of teachers' labor emotions to promote the continuous development of teachers' work performance has attracted much attention. From an academic research perspective, previous studies on job performance have mostly focused on task performance and relational performance, while relatively little attention

has been paid to the role of emotional labor in job performance. However, an increasing number of studies indicate that emotional labor has a significant impact on job performance in areas such as the service industry. The work of university teachers has a service-oriented nature to a certain extent, and their emotional labor may play an important role in performance indicators such as teaching effectiveness, student evaluation, and research output.

From an academic research perspective, early studies on emotional labor originated from a focus on service industry personnel (Jing, 2009), where organizations generally required employees to be friendly and smiling toward service recipients. As an important place for knowledge innovation and talent cultivation, universities have constantly raised their requirements for teachers. College teachers not only need to impart professional knowledge, but also pay attention to the comprehensive development of students, and engage in effective communication and interaction with students, colleagues, leaders, and others. With the updating of educational concepts, the emphasis on student-centered education requires teachers to be able to keenly perceive and respond to students' emotional needs, and create a positive learning atmosphere. This requires teachers to invest a significant amount of emotional resources and engage in emotional labor in their work. At the same time, universities are facing a fiercely competitive environment, including enrollment competition, research achievement competition, and so on. Teachers are under significant work pressure and need to maintain good work status and emotional performance in various tasks and challenges. Research has found that emotional labor can affect people's mental health (Hongxia, 2010), affect the relationship between teachers and students (Jianfeng and Xinbo, 2017), and affect innovative work performance (Shengnan, 2019). Hwang and Park's (2022) study found that different manifestations of emotional labor have varying degrees of impact on work performance. Therefore, in school teaching, the interactivity of teachers' teaching processes, emotional expression, and emotional influence have a significant impact on students.

Based on the above discussion, previous research on job performance has mainly focused on task performance and relationship performance, while relatively less attention has been paid to the role of emotional labor in job performance. However, an increasing number of studies indicate that emotional labor has a significant impact on job performance in fields such as the service industry. The work of university teachers to some extent has a service-oriented nature, and their emotional labor may play an important role in performance indicators such as teaching effectiveness, student evaluation, and research output. In addition, in the current era of digitization and globalization, university teachers are facing a more diverse student population and a more complex educational environment, and the ways and strategies of emotional labor may also change. Therefore, an in-depth exploration of the relationship between emotional labor and the job performance of university teachers is of great practical significance and urgency for understanding the work characteristics of university teachers, optimizing teacher management, and improving educational quality. This article aims to explore in depth the impact of emotional labor on the work of university teachers, to provide a reference for schools to propose better strategies for the performance management of university teachers.

2 Literature review

2.1 Theoretical basis

The theory of emotional events was proposed by Weiss and Cropanzano. This theory uses the chain of "event emotion attitude-behavior" to explain the mechanism by which individual emotions affect work processes and outcomes (Weiss, 1996). This theory proposes that emotional events in the workplace can be divided into two types: negative and positive (Brotheridge, 2004). Based on the theory of emotional events, scholars have conducted empirical research on the relationship between emotional commitment, organizational support, emotional labor, and job satisfaction among teachers (Andrew Richards et al., 2020). This study applies the theory of emotional events to further illustrate how the emotions of university teachers, under the influence of emotional events (emotional labor), will affect their work performance.

2.2 Definition and dimensional definition of emotional labor

2.2.1 Definition of emotional labor

Emotional labor is the process of modifying emotions to gain rewards, express the required emotions or feelings of work through bodily expressions (Hochschild, 1983). Ashforth and Humphrey (1993) consider emotional labor as an outward behavioral manifestation, which, influenced by external factors such as the environment and individuals, can have different effects on employee emotions. Emotional labor involves continuously adjusting and restraining emotions to display the expected emotional state of the organization during work and communication, with sources of emotional influences on employees stemming from their environment. Emotional labor refers to the behavior exhibited by employees when interacting with internal colleagues or external consumers, where they restrain or mediate their authentic emotions for related benefits (Jones, 1999). The focus of emotional labor lies in the psychological processes of individuals, involving self-regulation and adjustment of emotions in certain situations within the organization, aiming to align one's emotions with the organization's requirements, which is an ongoing process of adjustment and correction (Diefendorff and Gosserand, 2003). Chunxing (2005) suggests that emotional labor is the continuous adjustment of individual emotions within an organization to meet organizational needs, a process of emotional regulation that can influence the emotions of others and contribute to achieving organizational goals, views emotional labor as the integration of individual emotional expression with organizational needs, considering it a necessary process for communication. Chaoying and Lili (2011) argue that employees within organizations continuously adjust their emotions to meet the overall emotional needs of the organization due to the nature of their work. Grandey and Melloy's (2017) emotional labor model summarizes previous experiences, further describes and analyzes the complete process and mechanism of emotional labor, and further clarifies that emotional labor is the process of emotional regulation carried out to achieve interpersonal interaction goals. Refers to an individual's complex physiological evaluation and experience of something, including their connections with other individuals. It emphasizes inner and stable

psychological experiences (Xiaoan and Han, 2021). Jianwei et al. (2021) proposed that emotional labor is a dynamic process in which the labor subject consciously regulates and manages their own emotions to achieve the goal of "exchange" to effectively achieve their goals.

In summary, this paper defines emotional labor as the expression of emotions by individuals during labor processes to meet organizational requirements, facilitating individual development toward organizational goals, and exhibiting emotional behavior to meet organizational expectations and customer demands.

2.2.2 Dimensional definition of emotional labor

There are various interpretations of the content of emotional labor in existing studies, resulting in different dimensional perspectives. However, scholars generally agree that emotional labor is a multidimensional and multi-component concept. Hochschild (1983) identifies three dimensions of emotional labor: surface performance, proactive deep acting, and passive deep acting. Ashforth and Humphrey (1993) categorize emotional labor into surface performance, deep acting, and authentic emotions. Wharton and Erickson (1993) classify emotional labor into positive, negative, and neutral emotions. Morris and Feldman (1996) propose a four-dimensional theory of emotional labor, which includes the frequency of emotional labor, the level or degree of emotional expression, emotional demands at work, and the coordination between authentic emotions and organizational needs. Zapf and Holz (2006) suggests that emotional labor can be divided into the frequency of positive emotional expression, diversity of emotions in different scenarios, sensitivity to customer emotions, perspective-taking, emotional control, emotional expression driven by organizational needs, and interactive emotional control. Kruml and Geddes (2000) distinguish emotional labor into emotional effort and emotional dissonance. Diefendorff and Gosserand (2003) categorize emotional labor into surface performance, deep acting, and expression of authentic emotions, with five items under surface performance, six items under deep acting, and three items under expression of authentic emotions. Grandey (2003) categorizes emotional labor into surface performance and deep acting. Brotheridge (2002) divides emotional labor into the dimensions of emotional dissonance with 14 items and emotional effort with 5 items. Yanling (2007) categorizes emotional labor into surface behavior, active deep behavior, and passive deep behavior.

Based on the above discussion, this paper divides emotional labor into four dimensions: surface performance, deep acting, proactive authenticity expression, and passive authenticity expression. Surface performance, proactive authenticity expression, and passive authenticity expression draw from the scale developed by Diefendorff and Gosserand (2003), while the deep acting dimension adopts the scale developed by Taiwanese scholar Wu Peijun based on Grandey (2003), which includes six items. The descriptions of the items have been adjusted appropriately based on the research content. Surface performance refers to the expression of emotions in line with organizational requirements by changing external expressions or bodily language when an individual's emotions conflict with those expected by the organization, representing a pretense; deep acting involves individuals actively controlling their emotions through emotional regulation to meet organizational emotional needs when their emotions conflict with those of the organization; proactive authenticity expression refers to the natural expression of emotions

by individuals when their emotions align with organizational expectations. Passive authenticity expression occurs when individuals exhibit positive emotions required by the organization due to the influence of the surrounding environment, representing a direct response to positive environmental stimuli.

2.3 Definition and dimensional definition of work performance

2.3.1 Definition of work performance

Campbell et al. (1990) views work performance as the behaviors exhibited by employees to achieve organizational goals. Borman and Motowidle (1993) argue that work performance refers to the behaviors exhibited by organizational members in the process of work that are aligned with organizational goals and contribute to achieving these goals. These behaviors can be measured externally and evaluated based on the amount of contribution. Brumbrach (1988) suggests that performance consists of behaviors and results, where behaviors represent the degree of completion. Zeyan (2002) defines work performance as the process of evaluating and considering the behaviors, performances, and results of organizational members, the work performance as the content completed by organizational members within a specified time frame. Mathew et al. (2012) also argue through research that performance is a comprehensive assessment of individual behaviors and results.

In summary, this study adopts a comprehensive interpretation of performance and defines work performance as the actual behaviors exhibited by teachers to practice and achieve teaching goals, research tasks, social services, and other objectives, aligning individual actions with organizational goals and translating them into actions in practice.

2.3.2 Dimensional definition of work performance

Johnson (2001) further specifies adaptability performance as the proficiency level at which employees adjust their behavior in the face of changes in the environment, events, or new occupations. Jianmin and Changquan (2006) propose three dimensions of performance, including task performance, personal trait performance, and interpersonal relationship performance. Zhitong (2013) confirms through exploratory factor analysis that university teachers' work performance includes three dimensions: quality performance, innovation performance, and learning performance. Jianfeng and Xinbo (2017) suggest that research-oriented university teachers' work performance mainly includes task performance and contextual performance. Cao Zhifeng divides work performance into task performance, relationship performance, and adaptability performance. This study adopts Cao Zhifeng's viewpoint and divides work performance into three dimensions with a total of 20 items. Items 1–10 represent task performance, items 11–15 represent relationship performance, and items 16–20 represent adaptability performance.

2.4 Emotional labor and work performance

Adelmann (1995) found through empirical studies that emotional labor does not hurt, harm individuals' physical and mental health. Morris and Feldman (1997) found that emotional instability and incongruence can lead to feelings of fatigue, thereby affecting work

performance; increased emotional labor over time requires individuals to internalize more. Abraham (1999) demonstrated through research that emotional dissonance is negatively correlated with organizational commitment and work performance. Zapf and Holz (2006) found that positive emotional expression is positively correlated with performance and personal achievement. Totterdell and Holman (2003) found that expressing emotionally exhausting emotions can lead to emotional exhaustion in individuals, while the issuance of positive emotions has a positive promoting effect on organizational performance. Liu et al. (2004) found through research that emotional labor can lead to tense behaviors and feelings in the workplace. Brotheridge and Grandy (2002) found that work efficiency and satisfaction are influenced by emotional expression; positive emotions promote an individual's sense of achievement in work. Ashforth and Humphrey (1993) proposed through research that being adept at controlling one's emotions at work can enhance employees' work performance and ensure higher profits. Forced adaptation of emotional labor can reduce work performance (Fangmin, 2009). Emotional labor can cause work fatigue in employees, thereby affecting their work performance (Lihong, 2012). Qi and Yaoyu (2012) studied from the perspective of job satisfaction and found that emotional labor hurts, harms employees' job satisfaction, which in turn affects customer satisfaction, and thus affects the achievement of organizational goals and organizational performance. Kim et al. (2017) analyzed the relationship between emotional labor and work performance using airline employees as an example, and explored the moderating role of perceived leadership, colleague, and organizational support in the relationship between emotional labor and work performance. It was found that the relationship between the two was significant, and perceived leadership and colleague support enhanced the positive correlation between deep acting and work performance, while perceived leadership support also exacerbated the negative correlation between surface performance and work performance. Heydari et al. (2020) found that more emotional labor can lead to more emotional fatigue among employees and reduce their job satisfaction. Heydari et al. (2020) found that to improve employee satisfaction and performance, appropriate employee training and other measures can be taken to increase employee income, thereby enhancing their performance. Hwang and Park (2022) explored the relationship between emotional labor, job satisfaction, and work performance among nurses and found that surface performance is weakly correlated with work performance, while deep acting significantly predicts work performance positively. Yingji (2022) found that individuals with high emotional labor can autonomously regulate and control their emotions, and compared to individuals with passive emotional labor, those with high emotional labor have higher psychological resilience after self-motivation and therefore perform better at work. Aixiang (2023) found that employees' emotional labor affects their work performance based on continuously adjusting their states and emotions to guide them into work more rationally. Suzuki and Pitts (2023) believe that positive emotional expression and effective psychological support and intervention can help students discover more potential and achieve more success. Wibowo et al. (2024) found that sincere psychological support and emotional expression can help athletes develop psychological resilience and achieve better results in competitions. Stylos et al. (2024) demonstrated the crucial role of emotional responses and emotional labor in different life experiences or events.

Based on the above discussions, this study proposes the following hypotheses (Figure 1):

H1: The surface performance of university teachers hurts, harms task performance in work performance.

H2: Surface performance of university teachers has a negative impact on relationship performance in work performance.

H3: Surface performance of university teachers has a negative impact on adaptability performance in work performance.

H4: Deep acting of young teachers has a positive impact on task performance in work performance.

H5: Deep acting of university teachers has a positive impact on relationship performance in work performance.

H6: Deep acting of university teachers has a positive impact on adaptability performance in work performance.

H7: Proactive authenticity expression of university teachers has a positive impact on task performance in work performance.

H8: Proactive authenticity expression of university teachers has a positive impact on relationship performance in work performance.

H9: Proactive authenticity expression of university teachers has a positive impact on adaptability performance in work performance.

H10: Passive authenticity expression of university teachers has a negative impact on task performance in work performance.

H11: Passive authenticity expression of university teachers has a negative impact on relationship performance in work performance.

H12: Passive authenticity expression of university teachers has a negative impact on adaptability performance in work performance.
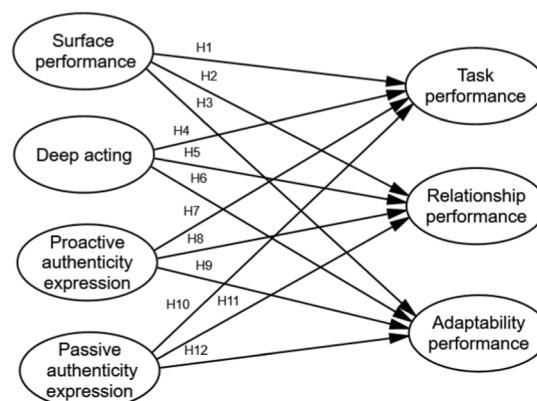

FIGURE 1
A Research model on the impact of emotional labor on job performance.

3 Research methodology

3.1 Research subjects

This study primarily focuses on the impact of emotional labor on the performance of university teachers. By analyzing the relationship between different aspects of teachers' emotional labor and performance, it aims to provide reference opinions for universities in mobilizing teachers' emotional labor. This study used convenience sampling to distribute questionnaires. Convenience sampling is a non-probability, non-probability sampling survey method that allows researchers to randomly select samples from colleagues and friends they can come into contact with based on their convenience (Coleman, 2009). Through this method, it is relatively easy and cost-effective to find in-service teachers in universities, thus achieving the survey objectives of this study. The main sample sources include teachers from affiliated universities, provincial universities, and private universities. Minglong (2009) believes that in general, a sample size greater than 200 can be considered a medium-sized sample. To pursue stable SEM analysis results, it is best to have a sample size of 200 or more. This study distributed a total of 300 questionnaires, with 255 returned and 241 deemed valid, resulting in an effective questionnaire rate of 94.50%. Among the respondents, there were 84 males and 157 females, 113 undergraduates, 92 master's students, and 36 doctoral students or above. Additionally, there were 91 individuals under 25 years old, 54 aged between 26 and 35, 63 aged between 36 and 45, 26 aged between 46 and 55, and 7 aged 56 or above (Table 1). For the sake of convenience in the study, surface performance is represented as BCBX, deep acting as SCBX, proactive authenticity expression as ZDZS, passive authenticity expression as BDZS, task performance as RWJX, relationship performance as GXJX, and adaptability performance as SYX (Table 1).

3.2 Research method

This study adopts a quantitative analysis approach, uses SPSS 26.0 and AMOS 26.0 statistical analysis software tools to preprocess and statistically analyze the collected questionnaire data, acquiring relevant data through questionnaires. Exploratory factor analysis is employed to test the reliability and validity of all measurement tools,

thereby verifying the practicality and effectiveness of statistical analysis software in this study. Subsequently, the analysis of composite reliability and discriminant validity is conducted to examine the correlation of the data. Finally, a structural equation model is established to validate the research hypotheses.

4 Research findings

The overall reliability coefficient of the scale is 0.915. Based on the CITC value of 0.4, items with CITC values below this threshold are removed. Specifically, item BCBX2 under the surface performance dimension has a CITC value of 0.388, item SCBX3 under the deep acting dimension has a CITC value of 0.383, and item GXJX3 under the relationship performance dimension has a CITC value of −0.005. After removing items with CITC values below 0.4, the reliability coefficients for each dimension are as follows: surface performance dimension 0.821, proactive authenticity expression dimension 0.767, passive authenticity expression dimension 0.834, deep acting dimension 0.767, task performance dimension 0.869, relationship performance dimension 0.717, and adaptability performance dimension 0.808. The KMO measure is 0.895, and Bartlett's test of sphericity yields a significance probability of 0.000, indicating that all scales have acceptable reliability and validity coefficients, thus ensuring the questionnaire's reliability (Table 2). These results suggest significant differences between items within dimensions, making them suitable for factor analysis (Table 2).

Exploratory factor analysis is conducted on each variable, and based on the total variance decomposition table, the eigenvalues of the first 7 principal components are all greater than 1, while those from the 8th onward are less than 1. Furthermore, the cumulative contribution rate of the first 7 principal components is 66.306%.

Finally, as the factor loadings of the 6th item in the task performance dimension and the 2nd item in the relationship performance dimension are both less than 0.5, these two items are deleted, resulting in the remaining 34 items (Table 3).

Based on the output data, the composite reliability (CR) values were calculated to assess the internal consistency of the indicators of the intrinsic motivation and task performance dimensions, as well as the discriminant validity between them. The composite reliability (CR) value represents the combination of the reliability of

TABLE 1 Descriptive statistics.

Category	Concrete content	Number of people	Percentage (%)
Gender	Males	84	34.85
	Females	157	65.15
Education	Undergraduates	113	46.89
	Master's	92	38.17
	Doctor	36	14.94
Age	Under 25 years old	91	37.75
	Between 26 and 35	54	22.41
	Between 36 and 45	63	26.14
	Between 46 and 55	26	10.79
	56 or above	7	2.90

TABLE 2 Reliability and validity test.

Factor	Item	Corrected item-total correlation	Cronbach's alpha if item deleted	Cronbach's alpha	KMO
BCBX (surface performance)	BCBX1	0.477	0.812	0.821	0.895
	BCBX3	0.561	0.798		
	BCBX4	0.677	0.778		
	BCBX5	0.641	0.784		
	BCBX6	0.621	0.788		
	BCBX7	0.581	0.795		
ZDZS (proactive authenticity expression)	ZDZS1	0.513	0.818	0.767	
	ZDZS2	0.635	0.657		
	ZDZS3	0.688	0.598		
BDZS (passive authenticity expression)	BDZS1	0.727	0.738	0.834	
	BDZS2	0.678	0.785		
	BDZS3	0.682	0.783		
SCBX (deep acting)	SCBX1	0.578	0.715	0.767	
	SCBX2	0.445	0.750		
	SCBX4	0.566	0.720		
	SCBX5	0.640	0.702		
	SCBX6	0.496	0.737		
RWJX (task performance)	RWJX1	0.656	0.851	0.869	
	RWJX2	0.561	0.859		
	RWJX3	0.537	0.861		
	RWJX4	0.613	0.857		
	RWJX5	0.628	0.855		
	RWJX6	0.567	0.858		
	RWJX7	0.658	0.852		
	RWJX8	0.487	0.869		
	RWJX9	0.658	0.851		
	RWJX10	0.613	0.855		
GXJX (relationship performance)	GXJX1	0.411	0.418	0.717	
	GXJX2	0.421	0.424		
	GXJX4	0.453	0.415		
	GXJX5	0.420	0.436		
SYX (adaptability performance)	SYX1	0.494	0.805	0.808	
	SYX2	0.678	0.745		
	SYX3	0.649	0.755		
	SYX4	0.677	0.746		
	SYX5	0.497	0.800		

all measured variables, indicating the internal consistency of the constructs. A higher CR value suggests greater internal consistency of the construct. Fornell and Larcker suggested that the acceptable threshold for average variance extracted (AVE) should fall between 0.36 and 0.5. In this study, all AVE values met the standard, and CR values were all greater than 0.7, indicating good test results (Table 4).

A structural equation model was constructed, with the following fit index values: goodness of fit index (GFI) = 0.911, adjusted goodness

of fit index (AGFI) = 0.914, normed fit index (NFI) = 0.933, and root mean square error of approximation (RMSEA) = 0.062, which is below the threshold of 0.08, indicating that the model is acceptable (Figure 2).

Through the study, it was found that surface performance (BCBX) has a p-value less than 0.05 on task performance (RWJX), with a path coefficient of −0.171, indicating a significant negative effect. Surface performance (BCBX) on adaptability performance (SYX) has a p-value more than 0.05, with a path coefficient of −0.153,

TABLE 3 Results of factor analysis.

	BCBX	ZDZS	BDZS	SCBX	RWJX	GXJX	SYX
BCBX1	0.560						
BCBX3	0.845						
BCBX4	0.716						
BCBX5	0.595						
BCBX6	0.839						
BCBX7	0.837						
ZDZS1		0.711					
ZDZS2		0.657					
ZDZS3		0.790					
BDZS1			0.650				
BDZS2			0.739				
BDZS3			0.581				
SCBX1				0.560			
SCBX2				0.504			
SCBX4				0.695			
SCBX5				0.793			
SCBX6				0.628			
RWJX1					0.583		
RWJX2					0.693		
RWJX3					0.562		
RWJX4					0.728		
RWJX5					0.734		
RWJX7					0.732		
RWJX8					0.764		
RWJX9					0.742		
RWJX10					0.679		
GXJX1						0.632	
GXJX4						0.651	
GXJX5						0.777	
SYX1							0.591
SYX2							0.632
SYX3							0.539
SYX4							0.553
SYX5							0.653

Surface performance is represented as BCBX, deep acting as SCBX, proactive authenticity expression as ZDZS, passive authenticity expression as BDZS, task performance as RWJX, relationship performance as GXJX, and adaptability performance as SYX.

Indicating that the hypothesis is not valid. Surface performance (BCBX) on relationship performance (GXJX) has a p-value less than 0.05, with a path coefficient of -0.218, indicating a significant negative effect. Deep acting (SCBX) on task performance (RWJX) has a p-value less than 0.05, with a path coefficient of 0.718, indicating a significant positive effect. Deep acting (SCBX) on adaptability performance (SYX) has a p-value less than 0.05, with a path coefficient of 0.581, indicating a significant positive effect. Deep acting (SCBX) on relationship performance (GXJX) has a p-value less than 0.05, with a path coefficient of 0.568, indicating a significant positive effect. Proactive authenticity (ZDZS) on task performance

(RWJX) has a p-value less than 0.05, with a path coefficient of 0.537, indicating a significant positive effect. Proactive authenticity (ZDZS) on adaptability performance (SYX) has a p-value less than 0.05, with a path coefficient of 0.484, indicating a significant positive effect. Proactive authenticity (ZDZS) on relationship performance (GXJX) has a p-value less than 0.05, with a path coefficient of 0.415, indicating a significant positive effect. Passive authenticity (BDZS) on task performance (RWJX) has a p-value less than 0.05, with a path coefficient of -0.651, indicating a significant negative effect. Passive authenticity (BDZS) on adaptability performance (SYX) has a p-value less than 0.05, with a path coefficient of -0.535, indicating a

TABLE 4 Composition reliability and discriminatory validity.

Factor	Average variance extracted (AVE) value	Composite reliability (CR) value
BCBX (surface performance)	0.472	0.838
ZDZS (proactive authenticity expression)	0.599	0.813
BDZS (passive authenticity expression)	0.648	0.846
SCBX (deep acting)	0.493	0.827
RWJX (task performance)	0.460	0.879
GXJX (relationship performance)	0.402	0.759
SYX (adaptability performance)	0.515	0.840

FIGURE 2
Hypothesis test. Notes: Surface performance is represented as BCBX, deep acting as SCBX, proactive authenticity expression as ZDZS, passive authenticity expression as BDZS, task performance as RWJX, relationship performance as GXJX, and adaptability performance as SYX.
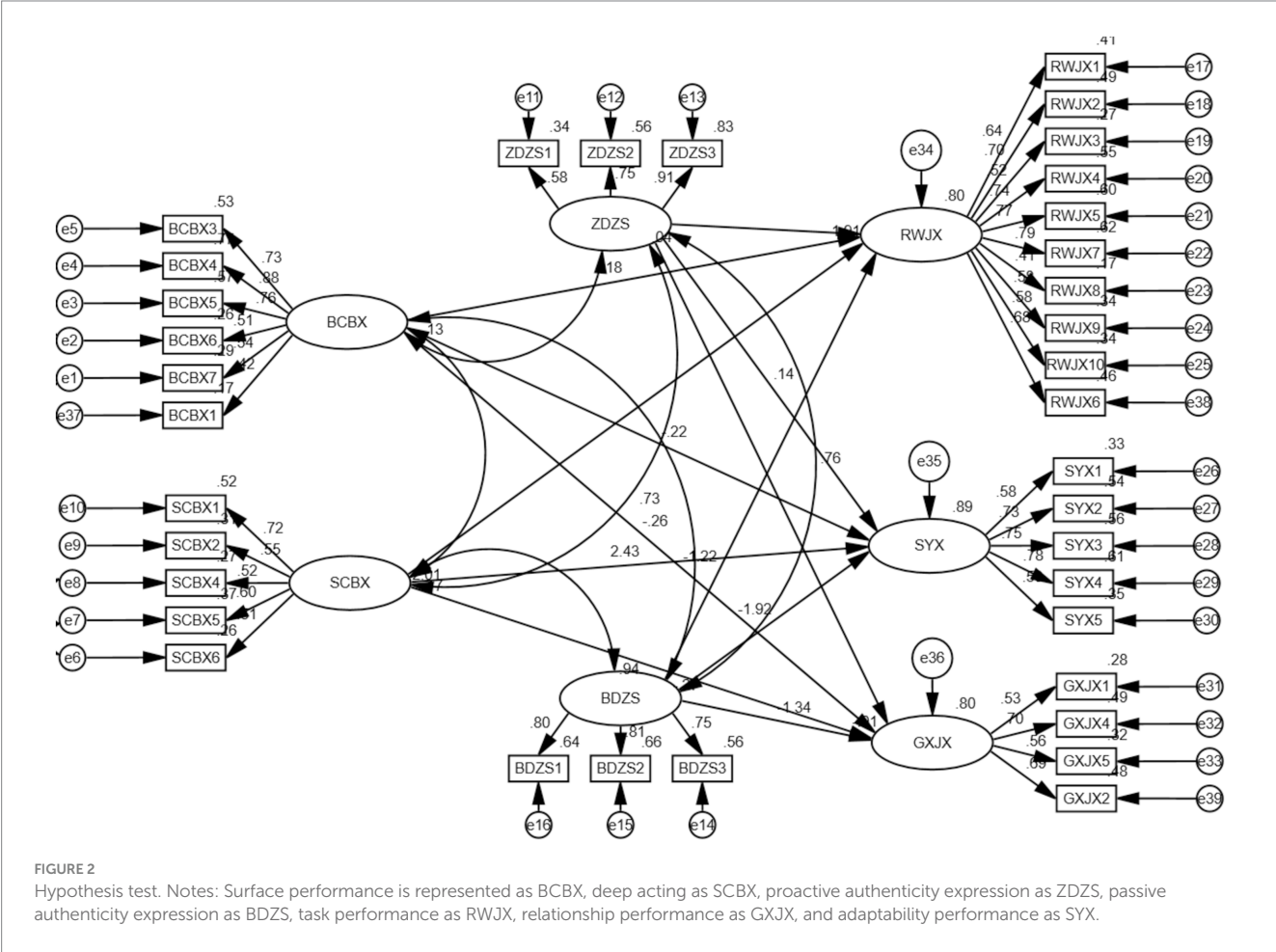
significant negative effect. Passive authenticity (BDZS) on relationship performance (GXJX) has a p-value less than 0.05, with a path coefficient of -0.546, indicating a significant negative effect (Table 5).

5 Analysis and discussion

Based on the data analysis conducted in this study, the following conclusions can be drawn:

(1) Surface performance of emotional labor has a significant negative impact on relationship performance and task performance, while its impact on adaptability performance is not significant. This is consistent with Miner and Miner (2006) viewpoint. This suggests that the surface performance of emotional labor significantly reduces both the relationship performance and task performance of teachers. Teachers may feel emotionally drained, leading to a need to allocate energy, which affects their relationships with others and their ability to accomplish tasks effectively. On the other hand, deep acting in emotional labor has a significant positive impact on relationship performance, task performance, and adaptability performance. Verified Kim's et al. (2017) viewpoint. This indicates that deep acting in emotional

TABLE 5 Research hypothesis test results.

			Estimate	S.E.	C.R.	P	
RWJX	<−··	ZDZS	0.537	0.094	5.717	0.000	True
SYX	<−··	ZDZS	0.484	0.084	4.934	0.000	True
GXJX	<−··	ZDZS	0.415	0.074	3.270	0.001	True
RWJX	<−··	BCBX	−0.171	0.102	−2.191	0.028	True
SYX	<−··	BCBX	−0.153	0.085	−1.918	0.055	False
GXJX	<−··	BCBX	−0.218	0.071	−2.217	0.027	True
RWJX	<−··	SCBX	0.718	0.134	6.597	0.000	True
SYX	<−··	SCBX	0.581	0.113	5.319	0.000	True
GXJX	<−··	SCBX	0.568	0.114	3.704	0.000	True
RWJX	<−··	BDZS	−0.651	0.065	−7.670	0.000	True
SYX	<−··	BDZS	−0.535	0.056	−5.749	0.000	True
GXJX	<−··	BDZS	−0.546	0.063	−4.381	0.000	True

Surface performance is represented as BCBX, deep acting as SCBX, proactive authenticity expression as ZDZS, passive authenticity expression as BDZS, task performance as RWJX, relationship performance as GXJX, and adaptability performance as SYX.

labor significantly improves teachers' relationship performance, task performance, and adaptability performance. By regulating their emotions in response to job demands, teachers can build better relationships, efficiently complete tasks, and enhance adaptability performance.

(2) Proactive authenticity in emotional labor has a significant positive impact on relationship performance, task performance, and adaptability performance. This is consistent with the research results of Hwang and Park (2022). This implies that demonstrating proactive authenticity significantly improves teachers' relationship performance, task performance, and adaptability performance. When teachers proactively regulate their emotions and engage in work with their best state of mind, they can effectively enhance relationships with colleagues, accomplish tasks efficiently, and better adapt to job requirements. Conversely, passive authenticity in emotional labor has a significant negative impact on relationship performance, task performance, and adaptability performance. This indicates that passive authenticity in emotional labor reduces teachers' relationship performance, task performance, and adaptability performance. When teachers display neutral emotions as a result of job demands or external stimuli, rather than expressing their true feelings, it can negatively affect their relationships and their jobs, possibly leading to difficulty in accepting the current situation and impacting work performance.

6 Conclusion and recommendations

6.1 Improvement of university teachers recruitment process

In the recruitment of teachers, attention should be paid to measuring emotional intelligence, which can be done through psychological assessments. Candidates with higher levels of emotional intelligence and psychological capital should be selected. This study found that individuals with higher surface performance

are more likely to experience emotional exhaustion, and their relationship performance is also lower. Therefore, organizations should place significant emphasis on the application of various psychological measurement tools to assess the individual skills and knowledge required for emotional labor. Methods such as group discussions, role-playing, and situational simulations can be used to select suitable employees for related tasks. Additionally, psychological tests should be conducted during the selection process to gain a basic understanding of candidates' psychological and personality traits. This approach helps identify individuals with traits such as enthusiasm, perseverance, teamwork, and interpersonal skills, which are conducive to emotional labor. By assessing candidates' emotional intelligence and psychological capital levels, organizations can select applicants with higher emotional labor capabilities, thus effectively enhancing their relationship performance.

6.2 Implementing incentive mechanisms for assessing teachers' emotional labor

Performance evaluation serves as a guiding and directional tool. Therefore, incorporating relevant indicators of emotional labor into the assessment of teachers can effectively encourage them to express the emotions required for their work, thus enhancing their emotional labor capabilities. When assessing teachers' emotional labor performance, a comprehensive evaluation of their overall qualities should be conducted. Additionally, attention should be given to emotional labor indicators for teachers from different academic backgrounds. Quantitative statistics should be applied to evaluate teachers' emotional labor, and the results should be linked to rewards and promotion criteria. This approach guides teachers to enhance their ability to autonomously regulate and adjust emotional labor, thereby improving their work performance. Furthermore, it is essential to uphold principles of fairness and impartiality and establish effective measurement indicators.

6.3 Addressing teachers' negative emotions

Negative emotions not only lead to a decline in work performance but also contribute to emotional exhaustion, potentially affecting teachers' psychological well-being. Therefore, universities should be adept at mitigating teachers' negative emotions and intervening and guiding them appropriately to reduce the adverse effects of negative emotions. Efforts should be made to actively understand the causes of negative emotions, identify underlying issues, and engage in regular communication with teachers. This communication should focus on understanding the relationships between teachers, work arrangements, and the fairness of performance distribution from the perspective of teachers. Subsequently, targeted adjustments can be made based on actual circumstances.

6.4 Strengthening awareness and education on emotional labor for university management and faculty

Currently, many university management teams and faculty members lack sufficient awareness of emotional labor, possibly because they are unaware of the positive and negative effects it can have. It is essential to enhance education and guidance on emotional labor for university management and faculty, making them aware of its importance in teaching, research, and community service. Encouraging the integration of positive emotions into daily work can improve the effectiveness of management across departments and positions, ultimately enhancing work efficiency. Additionally, increasing the understanding of emotional labor among management and faculty helps universities focus on teachers' emotional and psychological well-being. This, in turn, helps create a conducive work environment and fosters harmonious relationships among colleagues. Assisting management in establishing effective emotional management practices for teachers and raising awareness of emotional labor among faculty members helps them maintain appropriate emotions at work, thereby improving work efficiency. When negative emotions arise, teachers should be equipped to self-regulate effectively, mitigate negative emotions, avoid emotional imbalance, and complete work tasks, establish good working relationships, and better adapt to various work requirements.

6.5 Establishing training courses on teacher emotional labor

This study's analysis suggests that universities should assist teachers in enhancing their ability to express deep acting and proactive authenticity emotions, while minimizing surface performance and passive authenticity emotions. Systematic training programs can be implemented, utilizing methods such as role-playing and perspective-taking exercises to help teachers develop positive relationships with colleagues and students. When negative emotions arise, appropriate coping strategies should be employed to enhance teachers' management and control of emotional labor. Furthermore, through the study of emotional labor-related courses, teachers can gain knowledge and practical skills, integrating theory with practice to improve work performance.

6.6 Reasonably arrange activities to create a positive work atmosphere

A conducive teaching environment and atmosphere play a crucial role in facilitating teachers' emotional expression. Therefore, it is essential to create comfortable workplaces and environments, establish good work and teaching order, and foster harmonious internal relationships. This includes fostering harmonious relationships between management and teachers, teachers and students, and teachers and society. It is important to empower teachers to take the lead in their work, establish a relaxed work atmosphere, and maintain good professional ethics. Clear work tasks and objectives should be outlined, and excessive pressure on teachers should be avoided. Regularly organizing entertainment or sports activities, encouraging teachers to pursue hobbies and interests, and fostering a relaxed and comfortable atmosphere can help release emotions, thereby continuously improving work performance.

7 Research contributions and limitations

7.1 Research contributions

7.1.1 Theoretical contribution

The main contribution and innovation of this study lies in revealing the relationship between emotional labor and relational performance of university teachers, further expanding the extension of emotional event theory, and providing a theoretical basis for university managers to improve teachers' emotional labor and job performance. The theoretical contributions are specifically manifested in the following three aspects: ① enriching the research on the impact mechanism of teachers' emotional labor on work adaptation in the theory of emotional events and supplementing the lack of research on teachers' emotional labor and work adaptation under this theory; ② beneficial for expanding the academic community's understanding of the horizontal and vertical relationship between emotional event theory and teacher job performance; ③ further demonstrated the applicability of the relationship between emotional event theory and teacher job performance.

7.1.2 Practical contribution

The cross-sectional and longitudinal study on the relationship between teacher emotional labor and job performance has the following practical significance: ① previous research has mostly explored the negative outcomes of teacher emotional labor, with less attention paid to its positive functions. Exploring the positive functions of teachers' emotional labor is beneficial for teachers to recognize the significance of emotional labor, thus better implementing emotional labor and promoting their educational and teaching work; ② understanding the development trend and influencing factors of job performance can provide new methods and paths for scientific prevention and effective intervention of emotional labor affecting job performance.

7.2 Limitations of the study

There are still shortcomings in the research object and content of this study, and further research is needed to improve them.

Firstly, the sample size and scope of this study are not comprehensive enough, which to some extent affects the external validity of the research. Subsequent research can investigate a wider range of regions to further test the conclusions of this study.

Secondly, there are issues with the small sample size and concentrated sample sources in this study. Future research needs to further expand the sampling scope or focus on remote areas, teaching experience, school nature, and other aspects to understand their current situation and differences.

Finally, based on existing research and theories, this study investigates the impact of teacher emotional labor on job performance, but the mechanism of teacher emotional labor explored is still relatively simple. Further research will consider other variables to comprehensively explore the impact mechanism of teachers' emotional labor on job performance.

8 Epilog

In summary, based on the empirical investigation of emotional labor and work performance, this study identifies specific mechanisms through which emotional labor affects university teachers' work performance. Therefore, it is proposed that universities should focus on teachers' emotional labor characteristics, constructing an environment and management mechanism that enhances university teachers' emotions, ultimately leading to improvements in their work performance.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

DH: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration,

Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

Conflict of interest

The author declares 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

Abraham, R. (1999). The impact of emotional dissonance on organizational commitment and intention to turnover. *J. Psychol.* 133, 441–455. doi: 10.1080/00223989909599754

Adelmann, P. K. (1995). Emotional labor as a potential source of job stress. 10.1037/10173-000, 371–381. doi: 10.1037/10173-023

Aixiang, H. (2023). A study on the correlation between emotional labor of university teachers and student satisfaction. *J. Jiangsu Univ. Sci. Technol.* 23, 103–108.

Andrew Richards, K. R., Washburn, N., and Lee, Y. H. (2020). Understanding emotional labor in relation to physical educators' perceived organizational support, affective commitment, and job satisfaction. *J. Teach. Phys. Educ.* 39, 236–246. doi: 10.1123/jtpe.2019-0029

Ashforth, B. E., and Humphrey, R. H. (1993). Emotional labor in service roles: the influence of identity. *Acad. Manag. Rev.* 18, 88–115. doi: 10.2307/258824

Borman, W. C., and Motowidle, S. J. (1993). "Expanding the criterion domain to include elements of contextual performance" in Personnel selection in organizations. eds. N. Schmitt and W. C. Borman (San Francisco: Jossey-Bass), 34.

Brotheridge, C. M. (2004). Book review: emotions in the workplace: research, theory, and practice, managing emotions in the workplace. *Hum. Relat.* 57, 1334–1337. doi: 10.1177/001872670405701006

Brotheridge, C. M., and Grandy, A. A. (2002). Emotional labor and burnout: comparing two perspectives of "people work". *J. Vocat. Behav.* 60, 17–39. doi: 10.1006/jvbe.2001.1815

Brotheridge, C. M., and Lee, R. T. (2002). Testing a conservation of resources model of the dynamics of emotional labor. *J. Occup. Health Psychol.* 7, 57–67. doi: 10.1037/1076-8998.7.1.57

Brumbrach, (1988). Performance management. London: The Cronwell Press, 15.

Campbell, J. P., McHenry, J. J., and Wise, L. L. (1990). Modeling the performance prediction problem in industrial and organizational psychology. *Pers. Psychol.* 43, 313–575. doi: 10.1111/j.1744-6570.1990.tb01561.x

Chaoying, T., and Lili, Z. (2011). Research on customer satisfaction -the perspective of the harmonious perspective of employees' emotional labor and employee customers. Modern. *Manag. Sci.* 20, 93–95.

Chunxing, Z. (2005). Modern psychology: the science of modern people studying their own problems: Shanghai People's Publishing House Co., Ltd., 13.

Coleman, J. (2009). Relational analysis: the study on social organization with survey methods. *Hum. Organ.* 17, 28–36.

Diefendorff, J. M., and Gosserand, R. H. (2003). Understanding the emotional labor process: a control theory perspective. *J. Organ. Behav.* 24, 945–959. doi: 10.1002/job.230

Fangmin, J. (2009). On the emotional labor of teachers in private colleges and universities. *New Curric. Res.* 3, 51–53.

Grandey, A. (2003). When the show must go on: surface and deep acting as predictors of emotional exhaustion and service delivery. *Acad. Manag. J.* 46, 86–96.

Grandey, A. A., and Melloy, R. C. (2017). The state of the heart: emotional labor as emotion regulation reviewed and revised. *J. Occup. Health Psychol.* 22, 407–422. doi: 10.1037/ocp0000067

Heydari, M., Xiaohu, Z., Lai, K. K., and Yuxi, Z. (2020). Evaluation of organizational performance strategies. *Proc. Nat. Aviation Univ.* 82, 77–93. doi: 10.18372/2306-1472.82.14615

Heydari, M., Xiaohu, Z., Saeidi, M., Lai, K. K., Shang, Y., and Yuxi, Z. (2020). Analysis of the role of social support-cognitive psychology and emotional process approach. *Eur. J. Translat. Myol.* 30:8975. doi: 10.4081/ejtm.2020.8975

Hochschild, A. (1983). The managed heart: communication of human feeling. Berkeley and Los Angeles: University of California Press, 33.

Hongxia, Q. (2010). Emotional labor and its significance to maintaining mental health. *J. PLA Acad. Art* 12, 92–96.

Hwang, W. J., and Park, E. H. (2022). Developing a structural equation model from Grandey's emotional regulation model to measure nurses' emotional labor, job satisfaction, and job performance. *Appl. Nurs. Res.* 64:151–557. doi: 10.1016/j.apnr.2021.151557

Jianfeng, J., and Xinbo, S. (2017). Competency characteristics and performance of teachers in research universities. Beijing: China Science Publishing & Media Ltd, 63–139.

Jianmin, S., and Changquan, J. (2006). An exploratory study on the structure of managers' work performance Chinese social. *Psychol. Rev.* 6, 264–282.

Jianwei, L., Yang Mengjia, H., and Lingyan, (2021). The connotation, dimension and cultivation research of college teacher' emotional labor in the new engineering era. *J. Adult Educ. Hebei Univ.* 23, 5–11.

Jing, W. (2009). Role stress and emotional labor: the mediator effect of social support. Kaifeng: Henan University.

Johnson, W. (2001). The relative importance of task and contextual performance dimensions to supervisor judgments of overall performance. *J. Appl. Psychol.* 86, 984–996. doi: 10.1037/0021-9010.86.5.984

Jones, J. R. (1999). An examination of the emotional labor construct and its effects on employee outcomes. *ProQuest Informat. Learn.* 21, 12–15.

Kim, H. J., Hur, W. M., Moon, T. W., and Jun, J. K. (2017). Is all support equal? The moderating effects of supervisor, coworker, and organizational support on the link between emotional labor and job performance. *BRQ Bus. Res. Q.* 20, 124–136. doi: 10.1016/j.brq.2016.11.002

Kruml, S. M., and Geddes, D. (2000). Exploring the dimensions of emotional labor the heart of Hochschild's work. *Manag. Commun. Q.* 14, 8–49. doi: 10.1177/0893318900141002

Lihong, O. (2012). An empirical research on the relationship between emotional labor and performance. Chengdu: Southwestern University of Finance and Economics.

Liu, Y. M., Perrewé, P. L., Hochwarter, W. A., and Kacmar, C. J. (2004). Dispositional antecedents and consequences of emotional labor at work. *J. Leader. Organ. Stud.* 10, 12–25. doi: 10.1177/107179190401000402

Mathew, J., Ogbonna, E., and Harris, L. C. (2012). Culture, employee work outcomes and performance: an empirical analysis of Indian software firms. *J. Worle Bus.* 47, 194–203. doi: 10.1016/j.jwb.2011.04.006

Minglong, W. (2009). Operation and Application of Structural Equation Model -- Amos. Chongqing: Chongqing University Press, 32–99.

Morris, J. A., and Feldman, D. C. (1996). The dimensions, antecedents, and consequences of emotional labor. *Acad. Manag. Rev.* 21, 986–1010. doi: 10.2307/259161

Morris, J. A., and Feldman, D. (1997). C managing emotions in the workplace. *J. Manag. Issues* 20, 257–274.

Qi, Y., and Yaoyu, W. (2012). An exploration of emotional labor of tour guides in East China itinerary and its empirical enlightenment —application of structural equation model (SEM). *Tourism Tribune* 27, 78–83.

Shengnan, G. (2019). Research on the influence mechanism of emotional labor on the innovative performance of new generation knowledge workers. Beijing: Beijing University of Posts and Telecommunications.

Shulei, M., and Miner, H. (2006). Emotional Labor:Surface Acting and Deep Acting Which One is Better?. *Acta Psychol. Sin.* 38, 262–270.

Stylos, N., Bigné, E., and Bellou, V. (2024). The affective impact of sightseeing bus tour experiences: using affective events theory (AET) to examine length-of-stay and electronic word-of-mouth. *Tour. Recreat. Res.* 49, 740–756.

Suzuki, A., and Pitts, S. (2023). Toward effective performance psychology interventions in tertiary music education: an exploration of students' experiences, attitudes, and preferences. *Psychol. Music* 52, 438–454.

Totterdell, P., and Holman, D. (2003). Emotion regulation in customer service roles: testing a model of emotional labor. *J. Occup. Health Psychol.* 8, 55–73. doi: 10.1037/1076-8998.8.1.55

Weiss, H. M. (1996). Affective events theory: a theoretical discussion of the structure, causes and consequences of affective experiences and job beliefs on job satisfaction and variations in affective experiences over time. *Res. Organ. Behav.* 18, 1–74.

Wharton, A. S., and Erickson, R. I. (1993). Managing emotions on the job and at home: understanding the consequences of multiple emotional roles. *Acad. Manag. Rev.* 18, 457–486. doi: 10.2307/258905

Wibowo, D. S., Sulaiman, A., and Akbar, J. (2024). Psychological support for the mental toughness of Tae kwon do athletes. *JUMORA* 4, 98–109. doi: 10.53863/mor.v4i1.1145

Xiaoan, G., and Han, L. (2021). Emotional labor and affective labor: misuse, discrimination and cross-interpretation of concepts. *Press Circles* 12, 56–68.

Yanling, L. (2007). Research on Teacher's emotion work in elementary and middle school. Chongqing: Southwest University.

Yingji, L. (2022). Teacher emotional work: research reviews and outlooks. *J. Jilin Eng. Normal Univ.* 38, 80–83.

Zapf, D., and Holz, M. (2006). On the positive and negative effects work in organizations. *Eur. J. Work Organ. Psy.* 15, 1–28. doi: 10.1080/13594320500412199

Zeyan, L. (2002). System first —thoughts on human resource management in enterprises. *Chin. Foreign Corpor. Cult.* 7, 56–57.

Zhitong, D. (2013). A study on the dynamic mechanism of improving the performance of college teachers. Suzhou: Soochow University Press, 70.

Cracking the code of teacher burnout: the chain mediation of GPT integration degree through behavioral engagement and classroom atmosphere in a cross-level chain mediation model

Bingyue Chen[1], Binglian Chen[1], Shengtao Ren[1], Bin Li[1], Hui Liu[1] and Guoxin Jiang[2]*

[1]Taizhou Vocational College of Science and Technology, Taizhou, China, [2]Zhejiang Gongshang University, Hangzhou, Zhejiang, China

Chat GPT technology plays a pivotal role in global educational innovation and the enhancement of the quality of teaching and learning. In the field of education research, numerous studies have been conducted to investigate the effectiveness of GPT technology, teacher acceptance, and student engagement in depth. To date, few studies have considered the compounding effects of these factors on teacher burnout from the perspectives of psychology and behavioral sciences in conjunction with the dichotomous and complex relationship between teachers and students. Consequently, based on the findings of previous scholars, this study constructed a cross-layer chain mediation model based on the SOR and EASI models. This model was used to explore how different motivators affect the alleviation of teacher burnout through psychological and behavioral mechanisms. The study involved 47 teachers and 506 students from 10 universities. The findings of the study indicated that (1) the direct effect of GPT integration degree on teacher burnout was not statistically significant, and (2) the classroom atmosphere played a pivotal mediating role in the relationship between GPT integration degree and teacher burnout. (3) The degree of GPT integration degree exerts an indirect and orderly negative influence on teacher burnout through behavioral engagement and classroom atmosphere. The objective of this study is to further enhance our comprehension of the utilization of GPT technology in education and to provide strategic recommendations for its advancement in educational practice.

KEYWORDS

chat GPT, behavioral engagement, classroom atmosphere, GPT integration degree, teacher burnout

1 Introduction

On November 30, 2022, OpenAI, a U.S. artificial intelligence research laboratory, released its newest chatbot model, Chat GPT. This immediately caused a strong "surprise effect" in the tech and academic worlds, and was rapidly adopted in the Internet sector with more than 100 million users. Chat GPT has transformed the manner in which we interact with AI, and its exceptional capabilities have also had a profound impact on the education sector, with the

potential to drive significant shifts in educational concepts and practices. Chat GPT's language model assists students in a variety of ways, such as providing information resources, helping to improve language skills, improving learning efficiency (Fauzi et al., 2023), and There are also untapped potential benefits in streamlining enrollment, improving student services, enhancing instruction, research assistance, and increasing student retention (Dempere et al., 2023). At present, the integration of Chat GPT with the education field has achieved fruitful practical results: educators try to use GPT for personalized tutoring, content generation and intelligent feedback mechanisms to help students learn according to their own learning needs (Jafarzade, 2023). In language learning, some students preparing for IELTS and TOEFL exams use GPT to simulate real conversation scenarios and interact with the models to practice grammar, expand vocabulary and improve fluency. At the same time, GPT has a superior role to play in facilitating the transformation of educational practices (Grassini, 2023); supporting the potential of self-determined learning (Baskara, 2023), and so on.

The extensive application of GPT technology in the field of education has led to a situation in which teachers, as core participants and irreplaceable players in the educational process, benefit from the convenience offered by educational innovations. At the same time, however, they are on the front line of a profound transformation of the educational model. In the face of profound changes to the teaching model, an ever-increasing teaching load, and the accumulation of psychological pressure, teachers are also subjected to the impact of technological change, which can lead to a deep sense of burnout. In light of these developments, it has become increasingly clear that teacher burnout represents a significant issue in the field of education that cannot be overlooked. Teacher burnout is characterized by three main symptoms: extreme fatigue, indifference to work, and decreased self-efficacy. These symptoms not only cause teachers to suffer personally but also affect their enthusiasm and efficiency in the classroom. This, in turn, affects students' interest in learning and academic achievement (Oliveira et al., 2021). Given the significant impact of teacher burnout on teachers' psychological well-being and professional satisfaction, as well as its direct negative effect on the quality of education and student learning outcomes, it is crucial to gain a deeper understanding of this phenomenon and develop effective responses to improve the overall performance of the education system. In response, academics have initiated research on the topic with great alacrity, as educators and researchers have begun to focus on studies of teacher burnout, exploring ways to alleviate or even eradicate the problem. These explorations included the implementation of strategies such as the expansion of professional development opportunities for teachers and the provision of mental health support. However, these solutions are often characterized by fragmentation and a lack of systematicity, and fail to demonstrate sufficient foresight and adaptability when considering new changes triggered by technological advances (Appendix Table 1).

During the data survey phase, it was discovered that there are already teachers who are able to use Chat GPT's various plug-ins in a flexible manner to assist in the creation of lesson planning PowerPoints as well as the writing of lesson plans. According to an anonymous respondent, "Since we are afraid of AI replacing us, we might as well learn to take control of them." In light of the rapid advancement of AI technologies such as GPT modeling, it is reasonable to posit that the convergence of technologies may

open up new avenues and strategies for mitigating teacher burnout. Although research in this area is still in its infancy, there is a notable absence of systematic exploration into the impact of GPT technology integration on alleviating teacher burnout. Against this background, it is an urgent and unanswered question to explore whether and how GPT technology can effectively reduce teacher burnout and improve the quality of education accordingly.

Existing research on the impact of Chat GPT and others on the education sector often focuses only on the teacher side alone (Montenegro-Rueda et al., 2023) or the student side alone (Thong et al., 2023), with little research perspective that encompasses both the teacher and student sides. The Cross-level Chained Mediation model is one of the few models in the field of quantitative social sciences that can quantify the bi-lateral aspects, and it is also a mediation model that exchanges data or information in multi-layer architectures, which can effectively communicate and coordinate between different systems or network layers. In contrast to traditional mediation models that typically operate within a single layer, with each layer handling only the information directly relevant to it, the cross-layer chained mediation model allows information to be passed directly between different layers (Chen et al., 2024). Thanks to the advantages of cross-layer chain mediation, this paper breaks the limitations of traditional SEM and constructs a cross-layer chain mediation model based on the perspectives of both teachers-students to provide new kinetic insights into the link between GPT integration degree and teacher burnout, and to provide suggestions for educational practitioners and administrators with a fresh perspective.

2 Literature review and hypotheses

2.1 GPT integration degree and teacher burnout

With the publication of the first research article on burnout, the concept was formally recognized in psychology as a field. Burnout was initially described as the state of exhaustion among workers in helping professions (Schwab, 1996). As researchers delved deeper into burnout across various fields, a theoretical framework emerged. Chemiss, representing the organizational perspective, systematically analyzed the impact of environmental factors on burnout through an organizational science lens (Pines, 1993), attributing the main influencing factors to organizational and socio-cultural backgrounds. On the other hand, Maslach and her colleagues categorized burnout into three dimensions—emotional exhaustion, depersonalization, and low achievement—from a social psychological standpoint (Maslach et al., 1996), developing a burnout assessment questionnaire based on these dimensions. Researchers have expanded their study of burnout beyond the clinical realm to encompass social history, organizational science, and social psychology. Despite these varied perspectives, they can be broadly summarized into two points: first, burnout arises within specific contexts, including high work intensity and self-expectations; second, burnout is a negative individual state, manifested in symptoms such as emotional exhaustion, a sense of loss, and low achievement. These symptoms not only affect the physical and mental health of teachers and the quality of their work but also indirectly impact students' academic performance and overall development.

In the realm of software and technology, "integration" refers to the extent to which a particular technology or software is harmonized with existing systems. In environmental science, "integration" may refer to the extent to which a specific policy or practice is integrated within a broader environmental management system (Persson and Gerger Swartling, 2002). Based on our literature review, the term "GPT integration degree" lacks a clear and consistent definition in academia, with differing opinions among experts and scholars. Fadel considers GPT integration degree as its potential application in education, discussing the benefits and challenges of integrating AI technologies (Holmes et al., 2019), while Zawacki-Richter's systematic review evaluates Artificial Intelligence in Higher Education, providing a comprehensive view of AI technologies, including GPT integration degree and practical effects (Zawacki-Richter et al., 2019). Based on this, this paper defines GPT integration degree as the proficiency of an individual or organization in understanding and utilizing generative pre-trained transformer (GPT) models, encompassing their broad application capabilities and technical depth. This includes a comprehensive understanding of how GPT functions, including its capabilities and limitations, and how to apply this technology across various scenarios, such as text generation, information retrieval, and automated dialog. It also includes innovative applications of GPT in non-traditional contexts, proficiency in using relevant plugins and tools, and the ability to provide flexible instructions to GPT models based on specific information needs, among other things.

Classroom teaching is the primary responsibility of teachers, and the application of new technology such as GPT to education aims to enhance the efficiency of education and teaching, reduce teachers' workload, and ultimately decrease burnout. Jacques suggests a close relationship between technology and efficiency (Ellul, 2018), highlighting that the essence of technology lies in the pursuit of efficiency. GPT, as a new type of technological intelligent agent, can effectively lessen the burden on teachers' time, physical and cognitive stamina, and emotions. This reduction in workload can enhance teachers' work and teaching efficiency in both the classroom and after-school activities, reflecting in their behavior, discourse, and professional relationships. GPT can be utilized not only in classroom teaching but also in after-school feedback and teaching evaluation, greatly reducing teachers' repetitive and mundane tasks and, consequently, reducing their sense of burnout (Hakanen et al., 2006; Chaudhry and Kazim, 2022; Ming, 2005). Additionally, using GPT as an AI tool allows for qualitative assessment of students, further easing teachers' workload (Samarakou et al., 2014). GPT can swiftly and accurately complete evaluations, improving efficiency and overcoming the shortcomings of traditional manual evaluation methods, which are time-consuming and labor-intensive. Moreover, GPT can objectively evaluate the quality of teachers' teaching through big data analysis, providing teachers with a more objective understanding of their teaching level and avoiding the influence of personal bias on evaluation results. This can help prevent personal negative emotions from affecting the teaching environment, which can lead to harmful effects and burnout. In conclusion, GPT plays a crucial role in reducing teachers' workload, fostering teaching innovation, enhancing teachers' enthusiasm for teaching, and improving teaching quality, ultimately reducing burnout. GPT, as a new technological innovation, can be applied in teachers' daily teaching environments to reduce their time, physical strain, cognitive load, and emotional stress, thus alleviating burnout. Based on this, this paper proposes the following hypothesis:

> *H1*: GPT integration degree has a negative inhibitory effect on teacher burnout.

2.2 Behavioral engagement, GPT integration degree, and teacher burnout

Engagement refers to a positive state exhibited by individuals in all aspects of mind and body during an activity. Behavioral engagement, specifically in educational settings, pertains to students' interactions and responses, including adherence to rules, and active involvement in academic and extracurricular activities (Ladd and Dinella, 2009). It is considered a prerequisite for good academic performance (Fredricks et al., 2004). A high level of behavioral engagement can enhance students' motivation to learn, increase their classroom attention, and improve their academic performance (Reschly and Christenson, 2012). In this paper, behavioral engagement is defined as the psychological state and behavioral tendency that students exhibit in activities. It significantly influences teachers' psychological state during classroom interactions. When students show enthusiasm and interest in learning, teachers perceive their teaching as effective, receiving positive feedback. This feedback enhances teachers' professional self-esteem and satisfaction, reducing burnout and improving students' academic achievement (Maslach and Jackson, 1981). Highly engaged students facilitate a smoother teaching process, reducing the pressure on teachers to manage the classroom, allowing them to focus more on content deepening and innovation (Skinner and Belmont, 1993). Conversely, a lack of student engagement may lead teachers to question their teaching abilities and career choices, contributing to emotional exhaustion and burnout. As Friedman discusses, low student engagement can cause teachers to feel conflict and frustration in their professional roles (Friedman, 1995; Covell et al., 2009).

The theory of embodied behavior emphasizes that an individual's cognition and behavior are shaped through direct interaction with the social environment (Glenberg, 2010). In daily classrooms, students can enhance their participation and embodied experiences through interactive teaching methods, such as hands-on, demonstrative, and experiential learning activities. Such engagement not only stimulates students' enthusiasm and curiosity, improving learning outcomes, but also increases teachers' professional satisfaction and motivation, fostering a positive teacher-student relationship, and reducing burnout (Lindgren and Johnson-Glenberg, 2013). Thus, this paper concludes that students' behavioral engagement significantly affects teacher burnout, with high engagement levels leading to reduced burnout. Effective mastery and application of GPT technology in teaching can impact students' learning status. It enhances classroom interaction by enabling teachers to provide targeted content, meeting students' needs, and increasing interactivity (Holmes et al., 2019). Additionally, GPT provides real-time feedback according to students' learning progress and performance, allowing for independent learning while providing specific behavioral feedback to teachers. This feedback loop enables teachers to adjust teaching strategies in real time (Baker, 2016). Based on this, the paper proposes the following hypothesis:

H2: Behavioral engagement mediates the relationship between GPT integration degree and teacher burnout.

2.3 Classroom atmosphere, GPT integration degree, and teacher burnout

Classroom atmosphere encompasses all the elements within the classroom environment that students can sense and which influence their learning experiences. A positive classroom atmosphere is a key indicator of effective teaching, and assessing this atmosphere can serve as a valuable tool for evaluating classroom quality. Educational research consistently shows that a supportive and engaging classroom atmosphere can boost student involvement, ignite their motivation to learn, and significantly improve educational outcomes (Yan-chu, 2013; Shernoff et al., 2017). For instance, Weinstein's research indicates that classroom atmosphere is influenced not just by the physical arrangement and visual appeal of the classroom, but also by the interactions between teachers and students, as well as the emotional expressions observed during the teaching process. These factors collectively impact students' emotional well-being and their motivation to learn (Weinstein, 1991). This paper provides a summary of recent studies, dividing classroom atmosphere factors into four distinct categories: physical environment factors (Oliveras-Ortiz et al., 2021), teacher-student interaction factors (Luo et al., 2022), teaching strategies factors (Li and Xue, 2023) and technology application factors. This paper concentrates on the technology application factor: As educational technology advances, integrating technology into the classroom environment has emerged as a new area influencing student engagement. Research demonstrates that employing technology tools, such as smart classroom technology and online learning platforms, can improve the classroom atmosphere, particularly in distance learning settings (Luo et al., 2022). Moreover, the manner in which teachers utilize technology for pedagogical innovation is equally vital. Effective use of technology can enhance both cognitive and affective student engagement. The synergy of technology and interactivity in the classroom plays a crucial role. Learning outcomes can be significantly improved by optimizing classroom design, incorporating modern technology, and enhancing teacher-student interactions.

In recent years, the increasing use of AI technologies, particularly GPT, in education has prompted concerns about their impact on the teaching environment and teachers' professional well-being. AI tools like GPT are credited with optimizing the teaching and learning process, reducing teachers' daily instructional burdens, and lessening their workload through automated content generation and management. However, the classroom atmosphere, which encompasses student engagement, the quality of teacher-student interactions, and the effective use of teaching resources, plays a critical role in influencing teacher-student dynamics, student motivation, and teachers' job satisfaction and burnout. Optimizing the classroom atmosphere not only enhances teaching effectiveness but also alleviates the pressures teachers face. A dynamic classroom environment directly boosts student engagement. A lively and inclusive classroom atmosphere fosters students' interest and motivation, encouraging more active participation in classroom activities. Moreover, the implementation of GPT tools in the classroom, such as real-time interactive quizzes and personalized learning suggestions, has the

potential to significantly enhance student engagement. This, in turn, can reduce the demands on teachers to maintain classroom order and boost student involvement.

This paper outlines four specific real-life impacts of using GPT in education: First, it enhances teaching effectiveness and teacher satisfaction. Teachers who utilize GPT can significantly improve the classroom atmosphere by providing personalized learning experiences and boosting student engagement. Second, it helps alleviate teachers' emotional exhaustion. For instance, REEM's study investigated the efficacy of Chat GPT as a teacher's assistant in reducing workload and preventing burnout. The findings suggest that incorporating AI tools in the classroom can optimize teachers' planning and resource allocation, potentially reducing job stress and burnout (Hashem et al., 2024). Third, it fosters positive teacher-student interactions. Chang et al.'s research demonstrated that teachers' cognitive assessments of student behaviors and their strategies for regulating emotions are crucial in managing burnout (Chang, 2013). GPT tools can assist teachers in better responding to students' needs and interests by generating customized feedback and interactive content. This enhanced interaction not only improves students' learning experiences but also boosts teachers' pedagogical satisfaction and reduces burnout. Fourth, GPT facilitates the optimization of teaching resources. For instance, it can be used to create interactive courseware and simulation experiments, enriching the teaching content. These resources improve classroom dynamics and pedagogical variety, making the environment more engaging and supportive, and reducing the pressure teachers face due to classroom preparation and content updating. In summary, an excellent classroom atmosphere not only fosters student learning but also significantly alleviates teacher stress and burnout. Teachers' adept use of tools like GPT can further enhance the classroom atmosphere, creating a more productive and satisfying teaching and learning environment for both teachers and students. In light of the aforementioned evidence, the following hypotheses are put forth in this paper:

H3: Classroom atmosphere mediates the relationship between GPT integration degree and teacher burnout.

2.4 GPT integration degree, behavioral engagement, classroom atmosphere, and teacher burnout

The significance of classroom atmosphere in an educational setting is paramount for the quality of teaching and learning outcomes. A positive classroom atmosphere not only boosts student motivation and academic achievement but also profoundly influences teachers' professional satisfaction and enthusiasm (Reyes et al., 2012; Dorman, 2003). However, teachers frequently encounter a range of challenges in their careers, including student behavioral issues and overloaded curricula. These challenges can often lead to negative moods and a diminished sense of accomplishment (Hastings and Bham, 2003), which together constitute the core manifestations of teacher burnout. However, if the classroom atmosphere is positive, students are performing well, and teachers effectively manage the classroom, this not only enhances teaching effectiveness but also significantly reduces teacher stress, thereby decreasing the risk of burnout (Conroy et al., 2009). Additionally, an

improved classroom atmosphere enhances teacher-student interactions, which further boosts student motivation and engagement in the classroom. This improvement in the educational environment not only elevates teaching quality but also helps in reducing teacher burnout.

GPT has emerged as a pivotal technology in today's rapidly evolving educational landscape, driving innovation by increasing the accessibility and personalization of educational content. This enhances the overall student learning experience. By offering real-time, interactive learning support, GPT technology can significantly boost students' behavioral engagement, thereby fostering greater motivation and involvement in the learning process (Adıgüzel et al., 2023; Rejeb et al., 2024). Embodied cognition theory highlights the significant role of physical state and environmental context in shaping cognitive processes, suggesting that learning and cognition extend beyond the brain to interactions with the physical environment. Applying this theory to assess the educational impact of GPT technology offers a deeper insight into its benefits on student behavioral engagement, classroom atmosphere, and teacher burnout. Specifically, GPT technology enhances students' interactive experiences, aligning with the "experiential learning" concept from embodied cognition theory. The personalized feedback and interactive simulations provided by GPT enable students to acquire knowledge through concrete actions and experiences. This approach emphasizes the role of physical actions and sensory experiences in enhancing cognitive processes, thereby enriching the learning environment and effectiveness (Hashem et al., 2024; Wang et al., 2015). Second, as students achieve higher levels of behavioral engagement through GPT technology, their physical and emotional engagement also intensifies. This heightened engagement directly enhances the classroom atmosphere. According to embodied cognition theory, physical and emotional states can significantly influence cognitive states. The active participation of students energizes the entire classroom environment, creating a dynamic atmosphere that is conducive to improved learning outcomes. In such an environment, students engage with the content not just intellectually but also on emotional and physical levels, which amplifies the learning effects and deepens their understanding (Wang et al., 2015; Conroy et al., 2009). Finally, by enhancing the classroom atmosphere and fostering students' active participation, GPT technology indirectly alleviates the teaching pressures faced by educators. Embodied cognition theory posits that teachers' cognitive and emotional states are influenced by the physical environment. A positive classroom environment can lessen teachers' physical and psychological burdens, allowing them to feel more relaxed and content. This reduction in stress helps mitigate teacher burnout, enabling educators to engage in teaching activities with more positive attitudes. This not only elevates the quality of teaching but also boosts teachers' overall job satisfaction, creating a more fulfilling and effective educational setting (Amin, 2023). Therefore, enhancing students' behavioral engagement through the application of advanced technologies like GPT not only improves students' learning outcomes but also positively impacts the entire educational ecosystem by enhancing teaching efficiency and teachers' job satisfaction. Based on these insights, the following hypotheses are proposed in this paper:

> *H4*: GPT integration degree indirectly ordered to negatively influence teacher burnout through behavioral engagement and classroom atmosphere.

3 Study design

3.1 Sample and data collection

The research data in this paper comes from students and teachers of 10 universities, including Taizhou Institute of Vocational Technology, Zhejiang Gongshang University, and Xi'an Jiaotong University in China, covering a wide range of different majors in literature, engineering, and science. The selection of schools includes colleges and universities in eastern, central and western China, which can reflect the characteristics of teaching time limits in different regions. Before distributing the questionnaires, the researchers conducted short interviews with university teachers to determine the new changes brought by Chat GPT technology to teaching and learning in universities. In order to minimize bias, the questionnaire was distributed in three stages and all data were collected under the guidance of the researcher. The questionnaires returned at each stage were utilized to exclude outlier cases using SPSS 26. 0. In the first stage, teacher burnout was first assessed. A total of 103 questionnaires were distributed and 96 questionnaires were returned with a return rate of 93.2%; in the second phase, one week after the first questionnaire was distributed, the researcher distributed another questionnaire on GPT integration degree to 557 students (The group of students studied were the students taught by the group of teachers in the first phase, in other words, the sample of students in the second phase were taught by the sample of teachers in the first phase), and this time 524 valid questionnaires were returned with a validity rate of 94.1%; in the third phase, one week after the second questionnaire was distributed, 524 of the students who responded effectively, a questionnaire on behavioral engagement and classroom atmosphere was distributed, returning 506 valid questionnaires with a validity rate of 96.6%. Therefore, this paper uses survey data from 47 teachers with 506 students as the sample for analysis. Because this paper's research strictly follows the teacher-student correspondence, the sample collection process meets the needs of cross-level analysis for the nested nature of the data. In terms of sample size, the N: q rule can be used to roughly determine the required sample size. Where N is the sample size and p is the parameter to be estimated in the model, the recommended ratio is 20:1, which can be relaxed to 10:1. In this study, a total of 22 variable measurement items were finally determined, and there were about 45 parameters to be estimated. Therefore, the sample size of 47 + 506 in this article is greater than the required sample size, and the sample size in this article is of analytical significance.

3.2 Measurement of variables

Each of the main variables addressed in this paper were drawn from and measured using established and proven scales developed by previous scholars. As a cross-level analysis, this study employed different data collection methods at the teacher level and student level, respectively. This article adopts the "two-way translation" procedure. Two graduate students and two undergraduate students in education independently translated the English version of the scale into Chinese. After summarizing and discussing, a first draft was determined. Then, two English experts translated the Chinese draft back into English, comparing sentence by sentence the degree of consistency between the Chinese translation and the original English questionnaire. Finally,

after repeated comparisons and discussions with education experts, it was confirmed as a measurement tool. The variables were measured on a 5-point Likert-typed scale, where 1 means "totally disagree or totally disagree" and 5 means "totally agree or totally agree."

This paper's measure of teachers' Ghat GPT integration degree draws on the scales used by Kerckaert et al. (2015), Compeau and Higgins (1995), and Davis (1989) in their previous studies of teachers' use of information technology, and this paper focuses on the attitudes toward technology use and technology self-efficacy dimensions of the previous studies, culminating in the 5-item questionnaire of this paper, such as "In the next time, I do not think I will give up using Chat GPT technology in my teaching as an aid." This paper uses the School Engagement Scale developed by Fredricks et al. (2004) to measure the degree of students' behavioral engagement, on the basis of which appropriate changes are made according to the characteristics of the research subjects in this paper, and finally forms a quasi 5-item questionnaire on students' behavioral engagement, such as "Teachers using Chat GPT technology to assist in teaching in the classroom will make me feel fresher".

Most of the research on classroom atmosphere is based on the variable of learning atmosphere, based on this, this paper draws on the "Adolescents' Perceived School Atmosphere Scale" compiled by Jia et al. (2009). The scale includes three dimensions of teacher support, peer support, and opportunities for autonomy, and this paper is based on the teacher support part of the three dimensions matching the content of this paper, and modifies part of the expression by adding some Chat GPT has brought new changes to classroom teaching, and finally formed a four-question questionnaire for classroom atmosphere, such as "Watching the teacher's new form of GPT courseware makes me enjoy discussions with my classmates more." In this paper, we draw on the MBI Educator Survey (MBI-ES), a scale developed by Maslach (1981) and Maslach et al. (1996) that is specifically designed to test for teacher burnout, to measure teacher burnout. The scale is now widely used in burnout correlation studies and has good cross-cultural reliability and validity. The scale contains three dimensions of emotional exhaustion, depersonalization, and low personal accomplishment, with a total of 22 questions. Among them, there are 9 questions in the emotional exhaustion dimension, 5 questions in the depersonalization dimension, and 8 questions in the low personal accomplishment dimension, all of which are based on a 5-point Likert scale. On this basis, this paper also draws on the question-asking method of the BM scale compiled by Pines and Aronson (1988), which is applicable to different occupational groups, with a total of 21 question items containing three aspects of burnout in the individual's physiological, emotional, and mental aspects, and each subscale has 7 question items, with the higher the score, the higher the level of burnout in the individual. In this paper, the scale is streamlined and processed to finally form the 8-item scale of teacher burnout in this paper, such as "I often have a sense of frustration in my teaching work."

4 Data analysis and results

4.1 Data aggregation test

The intra-team member consistency coefficient Rwg, the within-group degree of difference value ICC (1), and the between-group difference value ICC (2) were used as indicators of data aggregation tests at the teacher and student levels. The Rwg mean, Rwg median, ICC (1), and ICC (2) for each variable were GPTID (0.809, 0.915, 0.589, and 0.939), BP (0.899, 0.922, 0.662, and 0.955), and CA (0.840, 0.904, 0.596, and 0.941), respectively. The Rwg median, the mean, and the ICC were all were higher than the recommended value of 0.7, and both ICC (1) and ICC (2) were also greater than the critical values of 0.12 and 0.7, respectively. Therefore, the student-level data can be aggregated and averaged to aggregate to the classroom level.

4.2 Analysis of common method bias and validation factors

In order to avoid common methodological biases, this paper measured independent and dependent variables from different sources and at different time points, and a precautionary treatment was done beforehand to reduce survey respondents' motivation to fill in the questionnaire in a consistent manner. However, because the questionnaire is self-assessed and subjective, the possibility of homogeneity bias still exists. Therefore, this paper conducted a Harman one-way test, drawing on the method of Podsakoff and Organ (1986). The results show that there is more than one factor with an eigenroot greater than 1 and none of the factors has a variance explained greater than 40%, which suggests that there is no serious problem of homophily bias in this paper.

Among the variables addressed in this paper, GPT integration degree and teacher burnout are high-level (between-groups) variables, and behavioral engagement and classroom atmosphere are covariant at both low (within-groups) and high (between-groups) levels. According to previous studies, it is possible that scores on different dimensions of a high-level variable, which serve as measures of latent variables, are covariant, due to the fact that their covariances may originate from other antecedent variables. Therefore, this paper applies the multilevel validated factor analysis (MCFA) method to explain the group-level effects while validating the individual level. The MCFA results show that the hypothesized model has a good fit ($\chi 2 = 76.94$, df = 53, CFI = 0.982, TLI = 0. 975, RMSEA = 0.03, SRMR (within-group) = 0.04, and SRMR (between-group) = 0. 064), and all indicators of latent variables were significant. Therefore, the scale measures in this paper have good discriminant validity and the hypothesized model is supported.

4.3 Descriptive statistics of variables, correlation analysis and reliability and validity tests

Table 1 presents the results of descriptive statistics and correlation coefficients for each of the study variables, reflecting the mean, standard deviation, and correlation coefficient matrices for student-level and teacher-level variables. The results of the consistency test for each variable showed that the Cronbach's alpha values for GPT integration degree, behavioral engagement, classroom atmosphere, and teacher burnout were 0.900, 0.894, 0.868, and 0.927, respectively. and the joint reliabilities (CR values) were greater than 0.7 (see Table 2 for more details), indicating that each scale in the present study had good reliability (Figure 1).

	Average value	Standard deviation	BP	LC	GPTA	TB
Personal level						
BP	3.311	0.952	1			
CA	3.239	0.964	0.605**	1		
Team level						
BP	3.311	0.79	1			
CA	3.239	0.764	0.865**	1		
GPTID	3.329	0.746	0.508**	0.521**	1	
TB	3.033	1.018	−0.496**	−0.453**	−0.223**	1

$*p < 0.05$, $**p < 0.01$, $**p < 0.001$.

Factor	Cronbach's alpha coefficient	Mean variance extraction AVE value	Combined reliability CR
GPTID	0.900	0.643	0.900
BP	0.894	0.629	0.894
CA	0.868	0.622	0.868
TB	0.927	0.615	0.927

Validated factor analysis was conducted using Mplus 8.3 software and the results showed that the factor loadings of all the items reached the level of 0.7 or more and were significant at the 0.001 level of significance, which indicates that there is statistical significance between the indicators and the variables being measured. The AVE estimates of the four variables were calculated to be higher than the squared value of their correlation coefficients, and the measurements of the constructs in this study satisfy convergent validity and have good discriminant validity.

4.4 Analysis of cross-layer chain mediation effects

The relationships between the independent variables, mediator variables, and dependent variables at different levels of the hypothesized model are shown in Figure 2. The MSEM can simultaneously estimate: the "top-down" influence relationship between teachers' GPT integration degree and student behavioral engagement and classroom atmosphere; the influence relationship between student behavioral engagement and classroom atmosphere at different levels (student level and teacher level); and the "bottom-up" influence relationship between student behavioral engagement, classroom atmosphere and teacher burnout. "Bottom-up" relationships between student behavioral engagement, classroom atmosphere, and teacher burnout.

This study follows the recommendation of Preacher et al. (2010) to examine the chain relationship between latent variables and latent group means at the between-group level. In this paper, we use Mplus 8.3 software to apply Robust Maximum Likelihood (MLR) method to analyze the data for multilevel path analysis, which tests multiple

paths while taking full account of the nested nature of the data, and the MLR method has strong utility for multilevel mediator analysis (Preacher et al., 2011). In this paper, the potential predictors, the potential group means of the two mediators and the three path coefficients between the potential outcome variables are multiplied to calculate the chain mediation effect, and the point estimates and confidence intervals of this chain mediation effect are obtained based on the unstandardized coefficients, and the model test results are shown in Table 3.

As shown in Table 3, GPTID→BP was significantly positively correlated ($\beta = 0.471$, $p < 0.05$), GPTID→CA was significantly positively correlated ($\beta = 0.382$, $p < 0.05$), BP → CA was significantly positively correlated under both intergroup and intragroup levels, ($\beta = 0.170$, $p < 0.05$; $\beta = 0.480$, $p < 0.001$), and GPTID→ TB did not significantly affect the relationship ($\beta = -0.042$, $p > 0.05$, confidence intervals including 0), and hypothesis H1 was not valid.

BP was significantly negatively correlated with TB ($\beta = -0.455$, $p < 0.05$), CA was significantly negatively correlated with TB ($\beta = -0.472$, $p < 0.05$), GPTID→BP → CA → TB confidence interval excluding 0 chain mediation was significant ($\beta = -0.103$, $p < 0.05$), GPTID→BP → TB confidence interval excluding 0 mediation effect was significant ($\beta = -0.214$, $p < 0.05$), GPTID→CA → TB confidence interval does not include 0 mediated effect is significant ($\beta = -0.181$, $p < 0.05$), hypotheses H2, H3, and H4 are valid, see Figure 3 for details.

5 Conclusion and discussion

5.1 The direct effect of GPT integration degree on teacher burnout is not valid

Despite the increasing use of GPT in education, the degree of integration did not significantly impact on the direct reduction of teacher burnout. This finding highlights the complexity of integrating GPT into educational settings and its limitations in managing teacher mental health. Teacher burnout is a complex issue influenced by multiple factors, including job stress, lack of resources, job satisfaction, and student behavior. While GPT integration improves technical support and instructional content innovation, it does not directly address the primary stressor in teachers' work—student engagement and interaction. Insufficient student engagement can lead to poor GPT adoption outcomes, an issue that is currently underappreciated in technology deployment strategies.

FIGURE 1
Proposed model diagram.

FIGURE 2
Cross-layer chain mediation between variables.
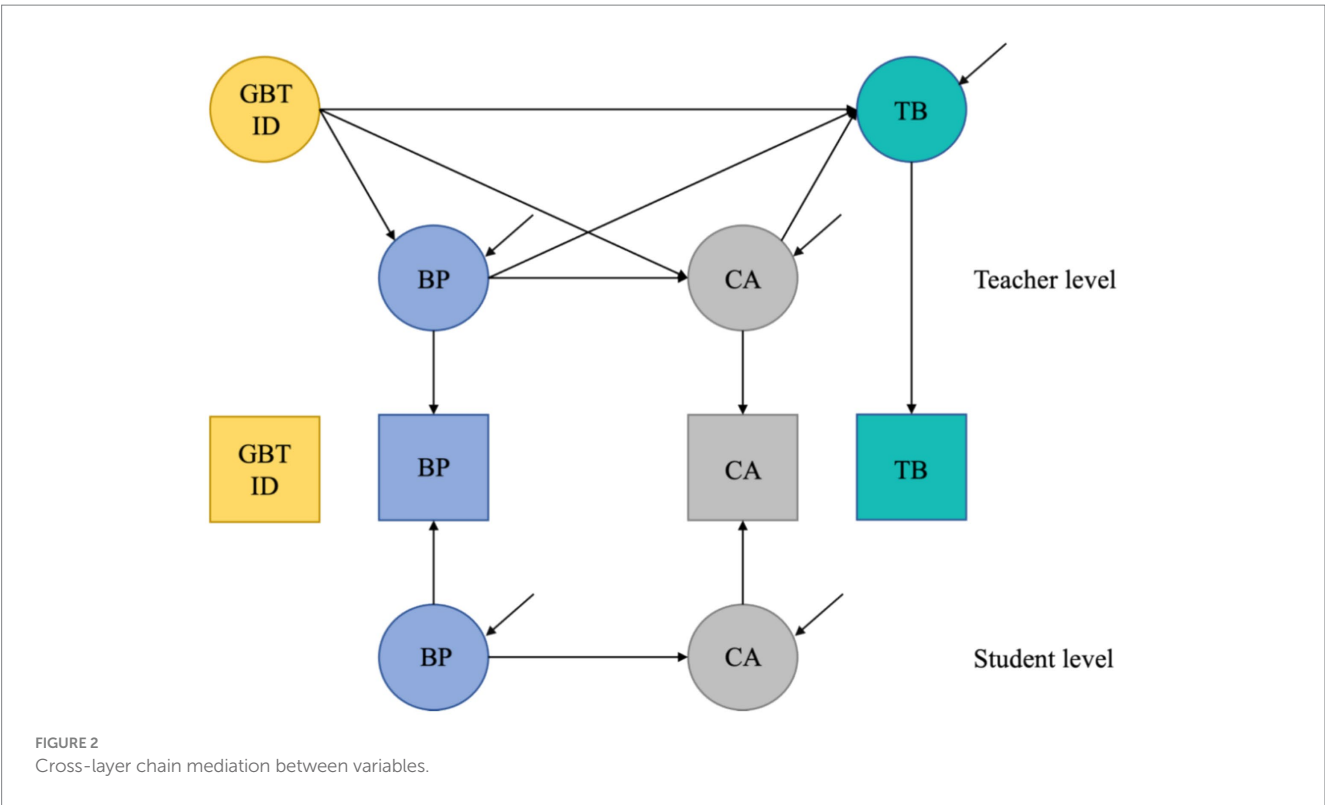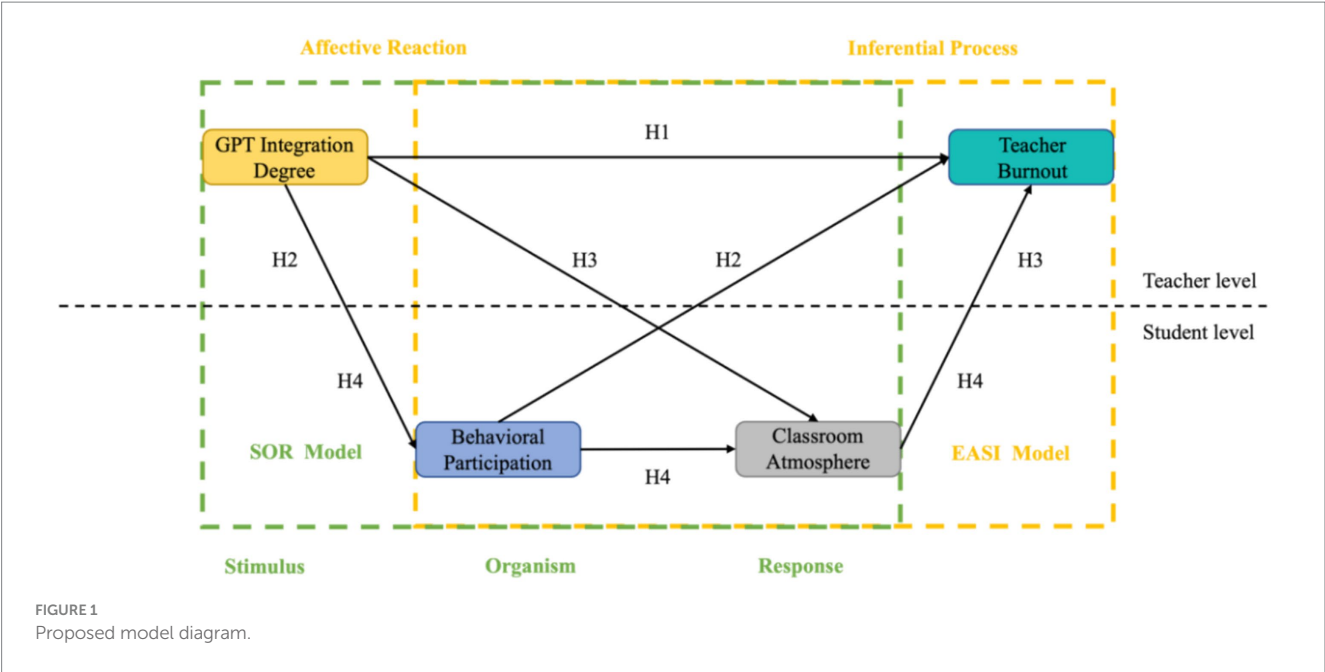
First, GPT technology in education is primarily used to improve the quality of instructional content and teaching methods, including creating personalized learning paths and automatically grading assignments. However, authentic learning engagement requires greater interactivity and personal connection, which current technology cannot directly provide. While systems using GPT technology can generate tailored teaching content, this does not guarantee increased student engagement if the content does not captivate or resonate with

students. If teachers are not aware of this disconnect, they may persist with ineffective teaching strategies and materials, which may exacerbate feelings of frustration and burnout. Furthermore, the efficacy of educational technology depends on the quality of the support measures it provides (Dowling and Barry, 2020). Integrating GPT technology often requires a degree of technological proficiency on the part of teachers, which in itself can become a source of new stress. If technical training is insufficient or support systems are inadequate, additional

TABLE 3 MSEM analysis results.

	Efficiency value	SE	p	95% confidence Interval
GPTID→BP	0.471	0.139	0.001	[0.199, 0.743]
GPTID→CA	0.382	0.142	0.007	[0.104, 0.660]
BP→CA (within group)	0.170	0.076	0.025	[0.021, 0.319]
BP→CA (intergroup)	0.480	0.132	0.000	[0.220, 0.739]
GPTID→TB	−0.042	0.114	0.712	[−0.266, 0.182]
BP→TB	−0.455	0.149	0.002	[−0.746, −0.164]
CA→TB	−0.472	0.153	0.002	[−0.772, −0.172]
Indirect relationship test				
GPTID→BP→TB	−0.214	0.087	0.014	[−0.386, −0.043]
GPTID→CA→TB	−0.181	0.06	0.003	[−0.298, −0.063]
GPTID→GP→CA→TB	−0.103	0.046	0.025	[−0.193, −0.013]

FIGURE 3
Diagram of model results. *p < 0.05, **p < 0.01, **p < 0.001.
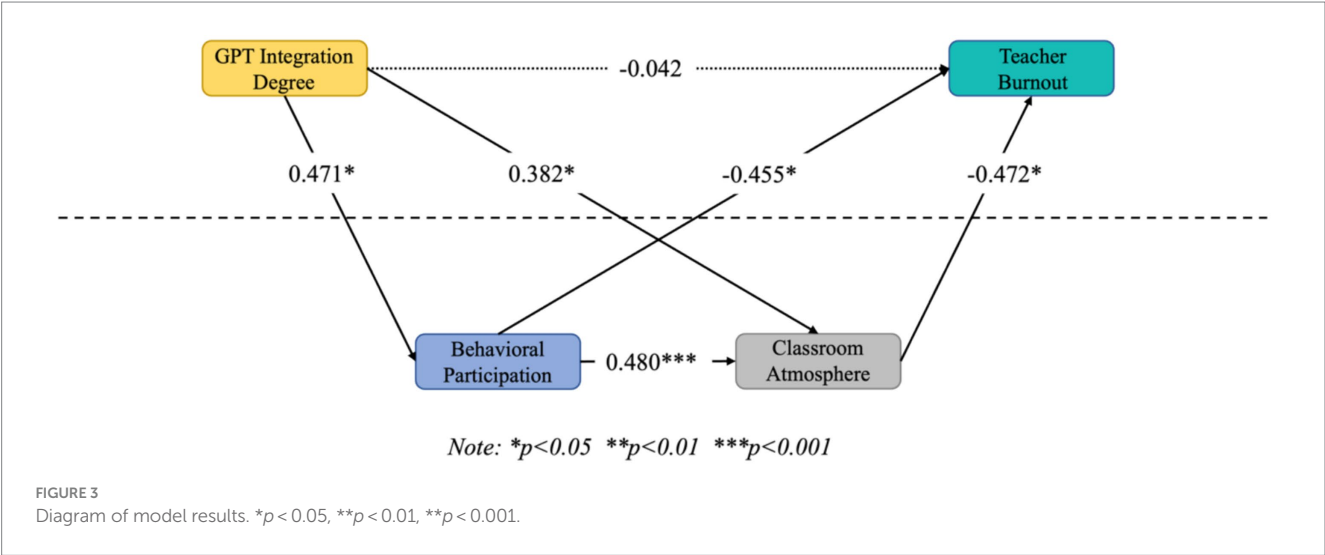
technical tasks will increase teachers' workload. Over time, this burden can lead to increased teacher burnout rather than decreased. Therefore, the provision of adequate and effective technical support is crucial to ensure that the implementation of educational technology achieves the desired pedagogical outcomes.

At the same time, the generalizability of research results across different educational contexts needs to be further explored. Different types of schools may face different challenges and opportunities in the application of GPT. Urban schools usually have better technical equipment and training resources, and teachers may be more willing to integrate GPT. However, the lack of technical infrastructure in rural schools may hinder the integration process and cause teachers to face more technical pressure (Hashem et al., 2024). Different education stages also affect the effectiveness of GPT integration. Students in higher education have stronger self-directed learning abilities, so the effect of GPT on improving the classroom atmosphere is more significant. However, in primary schools, teachers need to devote more energy to managing student behavior, and the integration of GPT may not significantly reduce their workload (Ali et al., 2024). In addition, differences in cultural backgrounds are also important factors

affecting the effectiveness of GPT integration. In a cultural context that values teacher-student interaction (such as East Asian cultures), students may rely more on teacher guidance than on adaptive technology, so GPT may have less of an immediate effect on reducing teacher burnout (Mai et al., 2024). In a cultural context that emphasizes student self-directed learning (such as North America, Northern Europe, etc.), GPT technology may be more helpful in reducing teacher workload and improving teaching efficiency. The resources and support systems of different schools also affect the effectiveness of GPT integration. Schools with a well-developed technical support system can provide teachers with more training opportunities and reduce the pressure caused by technological ineptitude. In schools with insufficient technical support, teachers may feel more pressure due to the difficulties encountered in integrating GPT, which in turn affects the degree of burnout. Finally, students' technological literacy and learning habits also affect the effectiveness of GPT integration. Students with higher technological literacy can better use GPT to improve learning engagement, while students with lower technological literacy may need additional guidance from teachers, which in turn increases the workload of teachers.

5.2 Classroom atmosphere plays an important mediating role in GPT integration degree influencing teacher burnout

We can find that GPT, an emerging technology, can greatly enhance students' internal motivation to learn by providing personalized learning experience, instant feedback mechanism and improving learning efficiency, which makes students' mentality turn from "I want to learn" to "I want to learn, I want to learn! ", specifically externalized to actively participate in the classroom, creating a proactive classroom atmosphere, thereby reducing teacher burnout. Specifically, the following three aspects can be used to understand the role of classroom atmosphere in bridging the gap between GPT integration degree and teacher burnout. (1) Increase interactivity and participation: By interacting with GPT, students can practice and ask questions in a real-time feedback environment, increasing learning motivation and efficiency, reducing delays and absences caused by teacher distraction, and solving problems and acquiring knowledge in the first time. (2) Customized teaching: GPT not only allows teachers to adjust the teaching progress according to the characteristics of each student, to carry out characteristic teaching, and to reduce the negative emotions caused by a single repetitive work. At the same time, it can also be tailored to the individual, tailor-made learning plans for students, answer questions, improve performance, and create a personalized classroom atmosphere. For example, researchers at Stanford University have used GPT to develop a series of educational tools that personalize student learning, especially in programming and engineering courses. These tools help students understand complex concepts by analyzing student input and providing targeted feedback. In this way, students receive immediate and specific feedback, which not only helps them improve their individual learning, but also strengthens their understanding and mastery of the course, further reinforcing learning outcomes (Aftabi et al., 2024).(3) Improved learning efficiency: With the introduction of GPT as an AI, students can learn in a more challenging and interactive environment, which has been proven to increase student engagement and learning outcomes, while teachers can devote more time and energy to curriculum design and high-value classroom interactions, rather than being physically and mentally exhausted by answering the same questions over and over again. This increased efficiency has a direct impact on the classroom atmosphere, making it more focused and productive, and ultimately reducing teacher workload and burnout (Markel et al., 2023).

5.3 GPT integration degree indirectly ordered to influence teacher burnout through behavioral engagement, classroom atmosphere

Rooted in the Chinese tradition, the fundamental task of teachers from ancient times is to "preach, receive and explain," so education is not a one-man show for teachers, and the ultimate purpose of the teaching profession is ultimately reflected in the students (Chen, 2015). In the field of education, GPT's high level of integration firstly promotes students' behavioral engagement directly by providing personalized learning paths and interactive learning platforms. This behavioral engagement effectively enhances student motivation and classroom effectiveness by increasing interactivity and engagement in the classroom. Through automatically generated interactive questions and simulation activities, students are able to explore subject matter content in greater depth, thereby increasing classroom activity and instructional interactivity. And as student behavioral engagement increases, the classroom atmosphere becomes more dynamic and vibrant as a result. This improved classroom atmosphere helps to reduce teacher stress and burnout because teachers are able to observe positive student responses and learning outcomes, which provides positive feedback and a sense of accomplishment. Teachers can thus reduce the one-way knowledge transfer that is common in traditional teaching and instead facilitate and guide the students' learning process more (Harini, 2023).

However, there are also limitations to the use of GPT, which may affect its long-term effectiveness in educational settings. For example, Albadarin's study points out that although GPT can generate personalized learning content, there is uncertainty about the quality and accuracy of this content generation, which may lead to students receiving incorrect or insufficient information (Albadarin et al., 2024). In addition, AI-generated feedback is still no substitute for face-to-face communication between teachers and students in terms of emotional support and in-depth interaction, which is particularly obvious in educational and cultural contexts that place a particular emphasis on student-teacher interaction. Teaching with GPT also risks de-professionalizing teachers. Teachers may become over-reliant on AI tools for lesson planning and content delivery, reducing their development of pedagogical skills and strategies. This dependency may in the long term undermine teachers' autonomy and even leave them feeling overwhelmed when faced with complex teaching situations. For example, research has shown that teachers may feel at a loss when faced with non-standardized problems or students who need emotional support when AI tools take up a large proportion of the classroom (Ali et al., 2024).

In addition, the integration of GPT technology may also lead to issues of technological burden. Teachers need technical training and support systems when using these tools. If this support is inadequate, it can increase teachers' workload and create new sources of stress (Bettayeb et al., 2024). In educational environments with limited resources, such as some rural schools or areas with scarce educational resources, the technical threshold for integrating GPT is relatively high, which may also exacerbate the imbalance of educational resources. For example, in a computer science course at Case Western Reserve University, the professor used GPT to supplement teaching by generating programming problems in real time and answering programming challenges posed by students. In this way, students can get instant feedback, which motivates them to try more programming exercises. Course feedback shows that the use of GPT significantly improves student engagement, as they discuss problems with professors and classmates more frequently and the classroom atmosphere becomes more active (Cipriano and Alves, 2023). However, the successful application of this technology requires strong technical support and a high level of teacher engagement. Otherwise, it may be difficult to promote it in under-resourced environments.

In summary, although the integration of GPT technology indirectly reduces teacher burnout through behavioral

engagement and classroom atmosphere, its use in education also faces challenges such as content quality, changes in the professional role of teachers, and technology burden. Therefore, in the future, when promoting GPT technology, it is necessary to focus on maintaining the professional autonomy of teachers while providing adequate technical support, and to strengthen ethical and educational fairness considerations in the use of technology.

6 Shortcomings and prospects

Although this paper addresses the role of GPT integration degree, classroom atmosphere, and behavioral engagement on teacher burnout, there are still some shortcomings that need to be further explored in future studies. Firstly, in terms of the choice of research methods, this study employs quantitative methods, such as structural equation modeling. Future research could consider adopting qualitative analysis methods as the main research method, or alternatively, utilize multiple research methods, such as mixed methods combining qualitative and quantitative methods, in order to enhance the rigor and logical coherence of the article. Secondly, in the process of selecting variables, we selected a limited number of variables that were closely related to the topic of this study. In this process, we inevitably neglected the influence of other factors on teacher burnout, which is limited and subjective. In future studies, it would be beneficial to consider formulating the variables from a more diversified perspective, including factors such as career satisfaction, social support, family responsibility, and so forth. This would enable a more comprehensive and perfect analysis and discussion of the issue.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

References

Adıgüzel, T., Kaya, M. H., and Cansu, F. K. (2023). Revolutionizing education with AI: Exploring the transformative potential of chat GPT. *Contemp. Educ. Technol.* 15:13152. doi: 10.30935/cedtech/13152

Aftabi, E., Shirazi, B. N., Safavi, A. A., Salimi, G., and Aftabi, H. (2024). A framework for customized course design and personalized learning with AI. 2024 11th international and the 17th National Conference on E-learning and E-teaching (ICeLeT) (pp. 1–6).

Albadarin, Y., Saqr, M., Pope, N., and Tukiainen, M. (2024). A systematic literature review of empirical research on ChatGPT in education. *Discov. Educ.* 3:60. doi: 10.1007/s44217-024-00138-2

Ali, D., Fatemi, Y., Boskabadi, E., Nikfar, M., Ugwuoke, J., and Ali, H. (2024). ChatGPT in teaching and learning: a systematic review. *Educ. Sci.* 14:643. doi: 10.3390/educsci14060643

Amin, M. (2023). AI and chat GPT in language teaching: enhancing EFL classroom support and transforming assessment techniques. *Intern J High Educ Pedag* 4, 1–15. doi: 10.33422/ijhep.v4i4.554

Baker, R. S. (2016). Stupid tutoring systems, intelligent humans. *Int. J. Artif. Intell. Educ.* 26, 600–614. doi: 10.1007/s40593-016-0105-0

Baskara, F. (2023). The promises and pitfalls of using chat GPT for self-determined learning in higher education: an argumentative review. *Prosiding Sentikjar* 2, 95–101. doi: 10.47435/sentikjar.v2i0.1825

Bettayeb, A. M., Abu Talib, M., Sobhe Altayasinah, A. Z., and Dakalbab, F. (2024). Exploring the impact of ChatGPT: conversational AI in education. *Front. Educ* 9:1379796. doi: 10.3389/feduc.2024.1379796

Chang, M. (2013). Toward a theoretical model to understand teacher emotions and teacher burnout in the context of student misbehavior: appraisal, regulation and coping. *Motiv. Emot.* 37, 799–817. doi: 10.1007/s11031-012-9335-0

Chaudhry, M. A., and Kazim, E. (2022). Artificial intelligence in education (AIEd): a high-level academic and industry note 2021. *AI Ethics* 2, 157–165. doi: 10.1007/s43681-021-00074-z

Chen, J. (2015). Teachers' conceptions of approaches to teaching: a Chinese perspective. *Asia Pac. Educ. Res.* 24, 341–351. doi: 10.1007/s40299-014-0184-3

Chen, S., Hou, Y., Zhang, Y., Yao, Z., Shen, X., Cao, L., et al. (2024). The multilevel chain mediating mechanism of college faculty's felt responsibility on students' engagement in green building learning. *Buildings* 14:659. doi: 10.3390/buildings14030659

Cipriano, B., and Alves, P. (2023). GPT-3 vs Object Oriented Programming Assignments. Lisbon: Lusófona University.

Compeau, D. R., and Higgins, C. A. (1995). Computer self-efficacy: development of a measure and initial test. *MIS Q.* 19, 189–211. doi: 10.2307/249688

Conroy, M., Sutherland, K., Snyder, A., Al-Hendawi, M., and Vo, A. (2009). Creating a positive classroom atmosphere: Teachers' use of effective praise and feedback. *Beyond Behav.* 18, 18–26.

Covell, K., McNeil, J., and Howe, B. (2009). Reducing teacher burnout by increasing student engagement. *Sch. Psychol. Int.* 30, 282–290. doi: 10.1177/0143034309106496.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q.* 13, 319–340. doi: 10.2307/249008

Dempere, J., Modugu, K., Hesham, A., and Ramasamy, L. (2023). The impact of ChatGPT on higher education. *Front. Educ.* 8:1206936. doi: 10.3389/feduc.2023.1206936

Dorman, J. (2003). Relationship between school and classroom environment and teacher burnout: a LISREL analysis. *Soc. Psychol. Educ.* 6, 107–127. doi: 10.1023/A:1023296126723

Dowling, K., and Barry, M. (2020). The effects of implementation quality of a school-based social and emotional well-being program on Students' outcomes. *European J. Invest. Health Psychol. Educ.* 10, 595–614. doi: 10.3390/ejihpe10020044

Ellul, J. (2018). The technological system. Wipf and Stock Publishers.

Fauzi, F., Tuhuteru, L., Sampe, F., Ausat, A., and Hatta, H. (2023). Analysing the role of chat GPT in improving student productivity in higher education. *J. Educ.* doi: 10.31004/joe.v5i4.2563

Fredricks, J. A., Blumenfeld, P. C., and Paris, A. H. (2004). School engagement: potential of the concept, state of the evidence. *Rev. Educ. Res.* 74, 59–109. doi: 10.3102/00346543074001059

Friedman, I. A. (1995). Student behavior patterns contributing to teacher burnout. *J. Educ. Res.* 88, 281–289. doi: 10.1080/00220671.1995.9941312

Glenberg, A. M. (2010). Embodiment as a unifying perspective for psychology. *Wiley Interdiscip. Rev. Cogn. Sci.* 1, 586–596. doi: 10.1002/wcs.55

Grassini, S. (2023). Shaping the future of education: exploring the potential and consequences of AI and ChatGPT in educational settings. *Educ. Sci.* 13:692. doi: 10.3390/educsci13070692

Hakanen, J. J., Bakker, A. B., and Schaufeli, W. B. (2006). Burnout and work engagement among teachers. *J. Sch. Psychol.* 43, 495–513. doi: 10.1016/j.jsp.2005.11.001

Harini, H. (2023). The role of ChatGPT in improving the efficiency of education management processes. *Indo-MathEdu Intellectuals J.* 4, 255–267. doi: 10.54373/imeij.v4i2.199

Hashem, R., Ali, N., El Zein, F., Fidalgo, P., and Abu Khurma, O. (2024). AI to the rescue: exploring the potential of ChatGPT as a teacher ally for workload relief and burnout prevention. *Res. Pract. Technol. Enhanc. Learn.* 19:19023. doi: 10.58459/rptel.2024.19023

Hashem, R., Ali, N., El Zein, F., Fidalgo, P., and Khurma, O. A. (2024). AI to the rescue: exploring the potential of ChatGPT as a teacher ally for workload relief and burnout prevention. *Res. Practice Technol. Enhanced Learn.* 19.

Hastings, R., and Bham, M. (2003). The relationship between student behaviour patterns and teacher burnout. *Sch. Psychol. Int.* 24, 115–127. doi: 10.1177/0143034303024001905

Holmes, W., Bialik, M., and Fadel, C. (2019). Artificial intelligence in education: Promises and implications for teaching and learning. Boston, MA: Center for Curriculum Redesign.

Jafarzade, K. (2023). The role of GPT models in education: challenges and solutions. 2023 5th international conference on problems of cybernetics and informatics (PCI), 1–3.

Jia, Y., Way, N., Ling, G. M., Yoshikawa, H., Chen, X., Hughes, D., et al. (2009). The influence of student perceptions of school climate on socioemotional and academic adjustment: a comparison of Chinese and American adolescents. *Child Dev.* 80, 1514–1530. doi: 10.1111/j.1467-8624.2009.01348.x

Kerckaert, S., Vanderlinde, R., and van Braak, J. (2015). The role of ICT in early childhood education: scale development and research on ICT use and influencing factors. *Eur. Early Child. Educ. Res. J.* 23, 183–199. doi: 10.1080/1350293X.2015.1016804

Ladd, G. W., and Dinella, L. M. (2009). Continuity and change in early school engagement: predictive of children's achievement trajectories from first to eighth grade? *J. Educ. Psychol.* 101, 190–206. doi: 10.1037/a0013153

Li, J., and Xue, E. (2023). Dynamic interaction between student learning behaviour and learning environment: Meta-analysis of student engagement and its influencing factors. *Behav. Sci.* 13:10059. doi: 10.3390/bs13010059

Lindgren, R., and Johnson-Glenberg, M. (2013). Emboldened by embodiment. *Educ. Res.* 42, 445–452. doi: 10.3102/0013189X13511661

Luo, N., Li, H., Zhao, L., Wu, Z., and Zhang, J. (2022). Promoting student engagement in online learning through harmonious classroom environment. *Asia Pac. Educ. Res.* 31, 541–551. doi: 10.1007/s40299-021-00606-5

Mai, D. T. T., Da, C. V., and Hanh, N. V. (2024). The use of ChatGPT in teaching and learning: a systematic review through SWOT analysis approach. *Front. Educ* 9:1328769. doi: 10.3389/feduc.2024.1328769

Markel, J. M., Opferman, S. G., Landay, J. A., and Piech, C. (2023). GPTeach: interactive TA training with GPT-based students. Proceedings of the tenth ACM conference on learning@ scale (pp. 226–236).

Maslach, C. (1981). The measurement of experienced burnout. *J. Occup. Behav.* 2, 99–113. doi: 10.1002/job.4030020205

Maslach, C., Jackson, S. E., and Leiter, M. P. (1996). Maslach burnout inventory: Manual. *3rd* Edn. Palo Alto, CA: Consulting Psychologists Press.

Ming, L. S. (2005). Reduction of teacher workload in a formative assessment environment through use of online technology. 2005 6th international conference on information technology based higher education and training, F4A/18–F14A/21.

Montenegro-Rueda, M., Fernández-Cerero, J., Fernández-Batanero, J., and López-Meneses, E. (2023). Impact of the implementation of ChatGPT in education: a systematic review. *Computers* 12:153. doi: 10.3390/computers12080153

Oliveira, S., Roberto, M., Veiga-Simão, A., and Marques-Pinto, A. (2021). A Meta-analysis of the impact of social and emotional learning interventions on Teachers' burnout symptoms. *Educ. Psychol. Rev.* 33, 1779–1808. doi: 10.1007/s10648-021-09612-x

Oliveras-Ortiz, Y., Bouillion, D., and Asbury, L. (2021). Learning spaces matter: student engagement in new learning environments. *J. Educ.* 201, 174–182. doi: 10.1177/0022057420908062.

Persson, M., Gerger Swartling, Å., (Eds.). (2002). Environmental policy integration in practice: Shaping institutions for learning. M. Nilsson, and , and K. Eckerberg, (eds). Environmental Policy Integration in Practice: Shaping Institutions for Learning. London: Earth Scan.

Pines, A. M. (1993). "Burnout: an existential perspective" in Professional burnout: Recent developments in theory and research. ed. W. B. Schaufeli (Washington, DC: Taylor & Francis), 33–52.

Pines, A., and Aronson, E. (1988). Career burnout: causes and cures. *J. Prof. Nurs.* 5, 351–352.

Podsakoff, P. M., and Organ, D. W. (1986). Self-reports in organizational research: problems and prospects. *J. Manag.* 12, 531–544. doi: 10.1177/014920638601200408

Preacher, K. J., Zhang, Z., and Zyphur, M. J. (2011). Alternative methods for assessing mediation in multilevel data: the advantages of multilevel SEM. *Struct. Equ. Model.* 18, 161–182. doi: 10.1080/10705511.2011.557329

Preacher, K. J., Zyphur, M. J., and Zhang, Z. (2010). A general multilevel SEM framework for assessing multilevel mediation. *Psychol. Methods* 15, 209–233. doi: 10.1037/a0020141

Rejeb, A., Rejeb, K., Appolloni, A., Treiblmaier, H., and Iranmanesh, M. (2024). Exploring the impact of chat GPT on education: a web mining and machine learning approach. *Int. J. Manag. Educ.* 22:100932. doi: 10.1016/j.ijme.2024.100932

Reschly, A. L., and Christenson, S. L. (2012). Moving from "context matters" to engaged partnerships with families. *J. Educ. Psychol. Consult.* 22, 62–78. doi: 10.1080/10474412.2011.649650

Reyes, M. R., Brackett, M. A., Rivers, S. E., White, M., and Salovey, P. (2012). Classroom emotional climate, student engagement, and academic achievement. *J. Educ. Psychol.* 104, 700–712. doi: 10.1037/a0027268

Samarakou, M., Papadakis, A., Fylladitakis, E. D., Hatziapostolou, A., Tsaganou, G., and Früh, W. G. (2014). An open learning environment for the diagnosis, assistance and evaluation of students based on artificial intelligence. *Int. J. Emerg. Technol. Learn.* 9, 36–44. doi: 10.3991/ijet.v9i3.3367

Schwab, R. L. (1996). "Teacher stress and burnout" in Handbook of research on teacher education. ed. J. Sikula (Berlin: Springer).

Shernoff, D., Ruzek, E., and Sinha, S. (2017). The influence of the high school classroom environment on learning as mediated by student engagement. *Sch. Psychol. Int.* 38, 201–218. doi: 10.1177/0143034316666413

Skinner, E. A., and Belmont, M. J. (1993). Motivation in the classroom: reciprocal effects of teacher behavior and student engagement across the school year. *J. Educ. Psychol.* 85, 571–581. doi: 10.1037/0022-0663.85.4.571

Thong, C. L., Butson, R., and Lim, W. (2023). *Understanding the impact of ChatGPT in education: Exploratory study on students' attitudes, perception and ethics.* ASCILITE Publications. 234–243.

Wang, M. T., Chow, A., Hofkens, T., and Salmela-Aro, K. (2015). The trajectories of student emotional engagement and school burnout with academic and psychological development: findings from Finnish adolescents. *Learn. Instr.* 36, 57–65. doi: 10.1016/j.learninstruc.2014.11.004

Weinstein, C. (1991). The classroom as a social context for learning. *Annu. Rev. Psychol.* 42, 493–525. doi: 10.1146/annurev.ps.42.020191.002425

Yan-chu, F. (2013). On the importance of classroom atmosphere in college English teaching of minor National Preparatory Undergraduate: Journal of Inner Mongolia University of Finance and Economics.

Zawacki-Richter, O., Marín, V. I., Bond, M., and Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators? *Int. J. Educ. Technol. High. Educ.* 16. doi: 10.1186/s41239-019-0171-0

Appendix

TABLE A1 Questionnaire.

Variant	Subject	Mark
GPT integration degree	I can basically teach myself how to use Chat GPT technology by watching instructional videos and other methods.	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	I do not think I'm going to give up on supplementing the use of Chat GPT technology in my teaching for the rest of my life!	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	I'm willing to try to explore new features and uses for Chat GPT technology-assisted instruction	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	I have experimented with using Chat GPT technology to assist in my teaching tasks at the moment	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	I am passionate about Chat GPT technology and would love to learn it!	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
Behavioral engagement	Classroom teachers using Chat GPT technology to assist with instruction would be more refreshing to me	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	I was even more intrigued when I learned that teachers were using Chat GPT as a technology aid.	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	When learning that teachers use Chat GPT as a technology-assisted instruction will enhance my classroom engagement ideas	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	I will be more proactive in working with teachers to use Chat GPT as a technology aid for instruction	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	Teachers using Chat GPT technology in class to assist with instruction would be more likely to pique my interest in learning	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
Classroom atmosphere	Watching the new form of classroom work done by the instructor using Chat GPT technology made me enjoy the discussion with my classmates even more!	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	Having Chat GPT technology in the classroom is more likely to keep me focused	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	The addition of Chat GPT technology in the classroom will make me more willing to interact with the teacher	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	I feel that my students are more engaged in class when Chat GPT technology is present in their teaching activities.	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
Teacher burnout	I often get frustrated in my teaching job	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	I feel like I'm working too hard.	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	I'm afraid this job will make me emotionally numb.	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	I felt that when problems arose in the educational process students blamed me for everything that went wrong with them	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	Dealing with people in the school (students, other teachers, etc.) stresses me out	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	When I wake up in the morning and think about facing a day of teaching, I feel so exhausted	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	I do not think I'll have a better teaching career.	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree
	Many times I feel like I'm in a state of mindlessness at work	1 Strongly disagree 2 Quite disagree 3 Fairly agree 4 Quite agree 5 Strongly agree

Turning stories into learning journeys: the principles and methods of Immersive Education

Riccardo Brunetti[1,2]*, Silvia Ferrante[2,3], Anna Maria Avella[2], Allegra Indraccolo[1] and Claudia Del Gatto[1]

[1]Experimental and Applied Psychology Laboratory, Department of Human Sciences, Università Europea di Roma, Rome, Italy, [2]Project xx1, Rome, Italy, [3]Department of Developmental Psychology and Educational Research, 'Sapienza' University of Rome, Rome, Italy

This paper describes the theoretical and practical aspects of Immersive Education, an educational methodology based on interactive narratives, articulated as emotional journeys, to develop competencies. It has been developed throughout three school years (2021−2024) with more than 400 students (8−12 years old) in Public Schools in Italy and Spain. Immersive Education can be integrated with curricular school activities and can be used to target both curricular and transversal learning objectives, specifically the ones connected with the Personal, Social and Learning to learn Key Competence (LifeComp European framework). The paper describes the inspirations that led to the creation of the methodology, including similar experiential learning approaches. It then analyses the theoretical principles of the methodology, dividing them in four key-concepts, along with psychological evidence supporting them. The four key-concepts describe how immersive education aims at being a motivation trigger, featuring a dramatic structure, how it is based on the involvement of the self, and how it focuses on fostering a continuous engagement. It continues with a detailed analysis of implementation strategies, specifically about the management of emotional triggers and reactions, enriched by numerous examples taken from the projects implemented with the students. The conclusions open the way to future research directions to measure the impact of this approach on the development of transversal and specific competences.

KEYWORDS

narrative-based education, experiential learning, immersive theatre, psychological foundations, pedagogical theory, simulation

1 Introduction

Stories are ubiquitous in our daily life: most of the time we speak, perceive, read, and even think, we organise information in an ordered sequence. Such relevance has been the basis to consider narratives as one of the primary mechanisms to build and communicate meaning (Bruner, 1991, 2004). Some authors (Schank, 1982; Schank and Abelson, 1977) have proposed that a significant part of our knowledge about life situations and events is represented mentally in a story-like framework (e.g., a *script*). This knowledge is used to orient in known situations and to understand novel ones.

A 'story', intended as an ordered sequence of events, can be the basis for different 'narratives', how that specific sequence of events is presented (Abbott, 2020): different narratives are able to generate different meanings, even if based on the same story. The potential of narratives as teaching tools has been leveraged since the dawn of mankind. There are countless examples of the use of narratives in education, recent and old, for different kinds of learners: in science for youngsters (Prins et al., 2017), in foreign language learning for kids (Fojkar et al., 2013), across different subjects for convicts (Butcher, 2006), in morals for the general population (King, 2008; Potter,

2023), just to name a few examples of the pervasiveness of the phenomenon. Narratives provide an effective means to organise information, while stimulating the imagination of the listener. This increased engagement could generate the feeling of an 'immersion', not only in environments, conditions and situations, but in semantics, emotions, and activities. The connection between *experience* and *learning* is a central theme of what has been called the 'Copernican revolution' of education (Rosenthal, 2009), between the XIX and the XX centuries: the shift of the educational perspective from the focus on the teacher and the subject, to the focus on the learner. It is Dewey (1938/1963) pedagogical activism that will set the basis for such a revolution, setting its foundations in the simple but powerful idea that 'all genuine education comes about through experience' (p. 25).

More recently, the pedagogical reflection embraced the idea that teaching, instead of simply offering knowledge to learners or aiming at changing their behaviour, should facilitate the learning process by shaping the learners' experience itself (Morris, 2020). This way of approaching the learning process appeared in synergy with other recent changes. The focus on competences (Le Boterf, 2000; McClelland, 1973), defined as an underlying set of personal characteristics that facilitate superior performance (e.g., Boyatzis, 1982, 2008; Wong, 2020) in specific domains, gradually gained momentum in the education system internationally, calling for a change in educational strategies to make them more experience-based. Another aspect of this approach was a change of focus, from teacher-or content-centred approaches to theories centred on the learner, pointing out how knowledge of the learning process itself may guide us towards better teaching strategies. Among all the theories linking experience to learning, one of the most influential is the *Experiential Learning Theory* (ELT) (Kolb, 1984, 2015). For the ELT, life experience is a central and necessary part of the learning process, where '*knowledge is created through the transformation of experience*' (Kolb, 2015, p. 49; original emphasis).

The methodology presented here as *Immersive Education* is a direct expression of the synergy between many of the approaches briefly outlined above and is connected to what has been defined as *Immersive Learning*: 'Immersive Learning is not simply 'learning with immersive media' but Immersive Learning means learning with artificial experiences' (Dengel, 2022, p. 2). In the case of the Immersive Education methodology, these artificial experiences are not set up in virtual learning environments (e.g., VR, AR, XR, etc.), but in different natural spaces in the school (classrooms, halls, storage rooms, offices, etc.) turned, often thanks to a set-up, into settings for the development of the narrative. Technology can be certainly integrated in this process, but it is not a central feature of the methodology. Immersive Education is a term describing strategies to *facilitate learning through the interaction with a narrative where the students play a central active role*. More specifically, the term indicates several strategies used to give to the narrative a transmedial,[1] lifelike,

---

1 *Transmedia* (Rajewsky, 2002; Wolf, 2015), refers to 'phenomena that appear in more than one medium without being (viewed as) specific to, or having an origin in, any of them' (Wolf, 2015, p. 461). In storytelling, it refers to a story spanning across different media: notorious examples are the *Star Wars* and the *Matrix* sagas. In this context it refers to a narrative built across different media such as audio, video, scenography, text, theatre, music, and different kinds of structured activities. Every element adds to the story itself rather than re-telling the same story in different ways.

deeply interactive character, triggering agency in the students. In other words, Immersive Education is a rich and believable journey based on a narrative, calling for a direct and active participation from the pupils as if it was actually true. The account presented in this contribution is based on the application of Immersive Education in several projects, spanning three school years (2021–2022, 2022–2023, and 2023–2024) in Italy and Spain, for more than 400 hundred pupils, ranging from 8 to 12 years old.

The use of interactive narratives as a stimulus for experiential education aims at producing deeper, long-lasting learning outcomes, compared to more passive, traditional teaching methods. Both direct experience and narratives are able to create more connections to long-term meanings, also thanks to the structured involvement of emotions in the learning process. By using the joint potential of experiential learning and narratives, Immersive Education's general goal is to reach more learners and generate better quality learning.

The rest of this paper will firstly examine the theatrical origin of the term 'Immersive'; then it will delve in describing the four key-concepts guiding the methodology of Immersive Education; and finally will analyse several of the strategies used to design and implement an *Immersive Education Experience*, along with numerous examples.

2 Experiential theatres

The expression 'Immersive Theatre' has been used as an umbrella-term to describe several different forms of interactive theatre focused on audience agency and multisensory storytelling (Alston, 2013; White, 2012). While this term has been undergoing a commercial and artistic explosion in its use during the last 20 years, its exact definition has always been debated; Lewis and Bartley (2023) recently proposed to include Immersive theatre inside the broader category of *Experiential Theatre*.[2] This latter term describes theatrical practices that focus on audience involvement, defined as interacting with the event through a fully embodied act of perception (Nelson, 2010) and where specific forms of agency are allowed (White, 2013). Experiential Theatres implement different strategies including, among others: multisensory engagement, participation, game-play, and role-play. This kind of theatre alters the traditional spectatorship conventions (e.g., sit quietly in a dim lit room, to listen and watch what is put in front of you, etc.), to stimulate different kinds of interaction with a performance, through specific operations of experiential design.

This approach, based on the idea of art as experience, developed throughout the XX century, stemming again from Dewey's ideas (Dewey, 1934/1980). During the last 20 years there were numerous examples of these kinds of Experiential Theatres, ranging from Bond and Lloyd's *You Me Bum Bum Train* (2004); through Punchdrunk's *Sleep No More*, NYC (2011), *The Drowned Man* (2013) and *The Burnt City* (2022); to Enrique Vargas' *El hilo de Ariadna* (many versions, from 1993 to 2018). All these productions feature multisensory storytelling and the possibility for the participant to interact with the performance itself, through different kinds of engagement. Audience

---

2 This term also avoids the ambiguity of the term "immersive" as used by approaches based exclusively on digital technology, such as Virtual or Augmented Reality.

participation has been described as a choice with aesthetic effects (White, 2013, p.40–44) and has been categorised into four main kinds: *overt* (e.g., addressing spectators directly, making it clear they are being asked to respond in some way), *implicit* (e.g., an open possibility for interaction without an explicit invitation, as in leaving a phone ringing without anyone answering), *covert* (e.g., when it is not clear for the participants that they are involved in a theatre play, as in Boal's 'Invisible Theatre'; Boal and Epstein, 1990), and *accidental* (e.g., when no invitation is present, but the spectators misread what is happening as one, or interject deliberately with a performance).

One of the common features of experiential theatres is the 'immersion' of the participants in the experience of participation itself, a concept that has been carefully shaped and touches different layers of meaning (see Punpeng and Yodnane, 2023). The kind of strategic planning and writing in these types of theatres is different from more traditional, non-interactive performances, and the role and training of the actors/performers should make them responsive to any interaction that may arise with the audience (Brunetti, 2017). The author of interactive narratives has been defined as a *procedural author* (Murray, 2017; White, 2013), namely an author who is able to create the conditions to welcome the potentially unknown contribution of the audience as a part of the art piece itself. The performers of experiential theatre must therefore be trained in a different way than traditional actors, as they must be able to embrace, stimulate, develop, and strategically hold in check audience participation (see Lewis and Bartley, 2023).

Experiential theatres expand the notion of spectatorship, along the lines suggested by Rancière (2009, p.3) ('active participants as opposed to passive voyeurs', *The emancipated spectator*) and Bourriaud (2002, p.99) ('the beholder is the joint creator of the work' *Relational aesthetics*; see also Machon, 2013), by focusing on audience *agency* (the ability to influence, change or impact the situation, Breel, 2023; see also Nelson, 2010). This focus allowed performances to venture into the territories of intimacy, immediacy, direct contact, multisensoriality (Machon, 2013), and caught the interest of large portions of spectators, all around the globe. The success of this kind of theatre has been previously linked to the necessity of contemporary audiences for 'an antidote to the alienating experiences of globalisation and virtual socialising and networking' (Machon, 2013, p. 121), to specific contemporary business practises or political values (Alston, 2013), or to the fact that participation is a crucial part of theatre practises since ancient times (Lewis and Bartley, 2023), just to name a few. What is certain is that audiences are now more used to browse the internet and actively look for information and entertainment, rather than passively receiving what is provided by a few outlets (e.g., tv channels, newspapers, etc.); they are used to play video games—an art form based on agency; they are constantly managing multiple communication streams through digital channels.

Any kind of artistic expression must take into account their target, and the contemporary target are the people living through our times (Brunetti and Ferrante, in press). Similarly, the target of any contemporary educational activity is a sample of a population with the same features (e.g., living through our current times), susceptible to the same experiential dynamics as the audiences that populate Immersive Theatre performances. The application of the Experiential Theatre *dispositive* (Agamben, 2006; Foucault, 2004) can be thus useful also in educational endeavours, with the objective of captivating attention and triggering active participation.

3 Immersive learning projects

The term *Immersive Learning* refers to an educational experience based on eliciting immersion by inviting participants in virtual or physical spaces (Dengel and Mägdefrau, 2018). When these spaces are based on narratives, the 'immersion' fosters diegetic concern within the contextual meanings and narrative and, when narratives are made interactive, facilitating the psychological absorption with the challenges and tasks (Nilsson et al., 2016). The idea of teaching through collective imaginary situations can be traced back to 'playworld', an aesthetic play pedagogy firstly proposed by Lindqvist (1995), and further developed, among others, by Fleer (2018) into 'Conceptual Playworlds'.[3]

The use of interactive narratives for educational purposes has been experimented several times in schools, in the last years, in different countries. While a complete survey of such experiences falls outside the purposes of this paper, we may annoverate among these the educational projects proposed by the organisation known as Punchdrunk Enrichment (Higgin, 2018a; Osborne, 2023) in the United Kingdom; by the collective Coney, with their 'Adventures in Learning' (Bowtell, 2015) in the United Kingdom; and by the organisation Project xx1, in Italy and Spain. This paper is based on Project xx1's projects and experiences.

While these organisations develop immersive learning projects according to different frameworks, objectives, and targeting different kinds of students (e.g., of different ages) in different schools, the strategies at the base of these interventions are somewhat similar. All of these projects are based on the use of a fictional narrative that turns the pupils into the protagonists (or co-protagonists) of a bespoke adventure, created with the collaboration of teachers, headteachers, and school staff, hinged on the materialisation of particular objects or installations in the school itself. In this way, these experiences introduce an element of adventure (or 'magic', as Peter Higgin from Punchdrunk Enrichment describes it; Higgin, 2018b), born out and fitting into the everyday reality of schools (Higgin, 2018a), open to student participation, without role-play: the pupils are usually not assigned any specific role other than themselves (Osborne, 2023). The participation is usually facilitated by the realism and detail of the stories and installations: even if the experience is based on fictional characters and stories, even including 'magical' and supernatural elements, the implementation features detailed lifelike interactions,

---

3 'In a CPW [Conceptual PlayWorld], the imaginary play usually follows a known fairy tale or children's book with dramatic moments, that enables the children and teachers to build empathy with the characters (Fleer, 2019). Following the storyline, teachers and children enter an imaginary space full of dramatic problems that need to be solved using conceptual knowledge. Having empathy with the characters motivates children to help the characters' (Wang, 2024, p.524). While the premise of Conceptual PlayWorld is similar to other Immersive Learning approaches based on narratives, including Immersive Education, this specific methodology has been developed for younger participants, usually pre-school or 1st-2nd graders. This makes many of the aspects connected to the use of fictional aspects, the overall structure and implementation of an intervention obviously very different than working with older participants.

painstakingly built sets and props (see Figure 1), and a believable integration with the ordinary school routine.

Creating these kinds of learning environments offers the possibility of an engaging experience, created to fulfil learning needs, and open to different types of active participation. These experiences have been especially precious in deprived areas and to foster the inclusion and participation of children and youngsters with learning disabilities (Ogwuegbu et al., 2023).

The narratives at the base of these educational projects provide an alternative way to deliver the school curriculum (Bowtell, 2015), along with the active practise of soft skills including teamwork, creativity, problem solving, critical thinking, discussion, and emotional intelligence. The apparent 'rebellious' streak of these kinds of propositions allows for pupils who tend to challenge traditional schoolwork to participate in, without feeling inconsistent (Bowtell, 2015). There is something substantially different between doing grammar exercises on a school desk or helping a genie ('Arabian Night Adventure', Coney, 2015), discovering a clandestine radio broadcast studio inside the school ('Changing voices', Project xx1, 2022), or helping two characters escaped from a book to return safely inside its pages ('A small tale', Punchdrunk Enrichment, 2016).

In Immersive Learning, agency and narrative are deeply linked: the learners' possibility to interact with what is happening is scripted

in the process itself (see Roth, 2019, for an analysis of an interactive piece aiming at *transformative learning*). Sometimes, in projects based on interactive theatre, the learning space is co-created with the learners themselves (Siciliano, 2022).

These mechanisms generate a learning process which can be included in the framework of Kolb's Experiential Learning. Kolb (1984) provides a definition of learning that integrates the main ideas of Dewey, Lewin, and Piaget: 'Learning is a form of transformational process whereby knowledge is converted into experience' (Kolb, 1984, p. 38). In Kolb's explanation of learning, two notable aspects emerge: the significance of the learning process itself; and that knowledge undergoes continuous creation and recreation through the process of transformation. Despite being one of the most influential models regarding experiential learning theory, Kolb's approach has been criticised (e.g., Garner, 2000). Morris (2020), starting from a lack of clarity in Kolb's definition of a *concrete experience*, proposes additional, useful specifics. Originally, Kolb's framework includes four Learning modes: 'This process is portrayed as an idealised learning cycle or spiral where the learner 'touches all the bases'—experiencing (CE), reflecting (RO), thinking (AC), and acting (AE)—in a recursive process that is sensitive to the learning situation and what is being learned' (Kolb, 2015, p. 51). Revision of Morris (2020), specifies that experience should be *contextually rich* (whereas Kolb idea of

FIGURE 1
'The Guest' set by Donato Marrocco, Martina Giannico, and Gianluca Pozzo, Project xx1, 2022. Primary School 'Rosetta Rossi', Rome, Italy. The set-up was created in a traditional classroom.

experience was not specifically situated in contexts), reflection should be *critical,* thinking should be *contextual-specific*, and acting should be a *pragmatic test* of what is learned in context. As explained in detail throughout this paper, Immersive Education includes all these specifics, following all phases described by Kolb, along with the specifics proposed by Morris.

4 Immersive education key-concepts and their psychological bases

The development of a Project xx1's Immersive Education project stems from some basic principles that inspire and instruct all of its phases, from planning, through implementation, to evaluation. Because of their pervasive influence throughout all the phases of an Immersive Education intervention, we prefer to think about these points as key-concepts, working synergically in interaction with each other, guiding the whole process. The four key-concepts at the basis of Project xx1's approach will be described, along with a brief explanation of the psychological mechanisms that can account for their effectiveness.

4.1 *Motivation trigger*

A crucial element in education and school performance has traditionally been motivation (Ryan and Deci, 2020). In pedagogy and psychology, motivation is usually divided in *intrinsic motivation*, the drive to engage in activities 'for their own sake', for their inherent interest and enjoyment (Deci and Ryan, 2000), and *extrinsic motivation,* the drive to engage in activities because of external reasons, not inherent in the activities themselves (e.g., for rewards, approval, or instrumental reasons). While educational endeavours are often based on reward-and-punishment systems, school achievement has been demonstrated to be connected mainly to intrinsic motivation (Froiland and Worrell, 2016; Taylor et al., 2014). As Ryan and Deci (2017) point out, intrinsic motivation is likely responsible for the preponderance of human learning across the life span, as opposed to externally mandated learning and instruction.

Immersive Education revolves around the key-concept of being a motivation trigger: Every element of its implementation is developed as an opportunity to enhance both intrinsic and extrinsic motivation. Extrinsic motivation is stimulated by an articulated justification for all the activities that should be performed: Every single proposition to the students is presented as necessary for specific reasons, consistent with the narrative. Specific examples may be: helping someone asking for assistance, solving a problem to unfold a sequence of events, or investigating a mystery. Moreover, every activity is followed by a reinforcement—a specific effect that propels the narration forward, rewarding the efforts of everyone. School activities are often justified by the generic need to acquire competences to play a role in society, to learn skills for future work, or simply invoking some broad moral obligation (e.g., 'it must be done'). However, many pupils are not stimulated by these kinds of justifications, with the result of making them feel that several school-related activities are pointless. By using narratives to justify activities, Immersive Education offers very different, concrete and straightforward extrinsic motivations that make sense in the context immediately surrounding the participants.

Intrinsic motivation is stimulated by including many different forms of activities in an intervention, spanning from creative tasks to game-like interactions, from group collaborations to individual work. Moreover, every activity is usually achievable in different ways, in order to meet the individual preferences of diverse students. This feature makes Immersive Education projects generally more inclusive than usual school work: they offer a wide range of activities, more prone to capture the interests and the potential of pupils with learning difficulties. The *provision of choice* has been highlighted as an aspect crucial to boost ownership of the activities and greater autonomy: when students experience a *sense of choice* their intrinsic motivation is enhanced (Ryan and Deci, 2020, p. 3–4).

One of the most influential theories of motivation in recent literature is the *Self Determination Theory* (SDT) (Ryan and Deci, 2017). The SDT points out 3 basic psychological needs (Ryan et al., 2019), believed to be essential to support learning processes: autonomy, competence, and relatedness. Immersive Education is designed to contribute to the fulfilment of all three needs. *Autonomy*, as the sense of initiative and ownership in one's actions (Ryan and Deci, 2020), is supported by making the pupils one of the main characters of the experiences included in an Immersive Education intervention. The choices offered by the multiple ways in which something could be achieved (e.g., creative work), and the fact that all these ways are equally welcome in an Immersive Education project, are functional towards a feeling of interest and value in the experience. *Competence*, defined as the feeling of the possibility that one can succeed and grow, is provided through narrative rewards (e.g., every achievement propels the story forward) and the balance between inclusive and challenging activities, appropriate for the specific age-group. Lastly, *relatedness*, concerning a sense of belonging and connection, is touched by the personal involvement and the fact that Immersive Education experiences are largely group adventures, fostering collaboration based on mutual respect, inclusion, and care.

Immersive projects also specifically stimulate the *Sense of Agency* (Hon and Yeo, 2021), the feeling that something is under our control, based on how the outcomes of an action follow what we expect. The Sense of Agency has been recently connected with better attentional and mnemonic performances (Zou et al., 2023). Immersive projects take advantage of these effects by designing its experiences and activities to give the participants the sense of being the main agents of the events, valuing personal initiatives, ideas, and actions. This is achieved by making the participants play a central role in the story (Osborne, 2023). In other words, the participants are put in a position where they can clearly perceive a sense of *responsibility*—e.g., something is asked from them, and they are the only ones that can provide help—that makes them feel central to the unfolding of the experience.

Whereas Immersive Education often integrates game-like activities, its approach is different from pure *gamification* (Sailer and Homner, 2020). Gamifying an experience means using game design elements (such as points, badges, or leaderboards), in non-game contexts. While gamification is usually hinged on contingent and performance-based rewards, Immersive Education is an approach more akin to *game-based* learning (Qian and Clark, 2016), where games are used as problem-solving spaces and challenges, thus rewarding more basic needs such as autonomy, competence, and relatedness (see also Krath et al., 2021). Crucially, in Immersive Education, learning is the goal, but not the focus (Ryan and Rigby,

2019): every activity and learning process is instrumental to explore the situation at hand, to unravel narrative content or to live through an experience; in this sense, every substantial learning is *incidental* from the pupil's point of view.[4] This strategy has been repeatedly proven to be more effective than making the learning process the focus of a gamified activity (Ryan and Rigby, 2019, p.168–170).

4.2 *Dramatic structure* and flow

A compelling story is a crucial backbone for any Immersive Education project, as for other kinds of educational projects based on participation (e.g., Slota and Young, 2017). The main storyline is created taking into account several constraints: the specific learning objectives; the resources at hand in terms of actors/educators, technical staff, scenography; the duration of the project; the availability of spaces; the age and background of the participants. Moreover, the specific narrative should be based on interactive elements: the participants should be involved in it from the start, often strategically being the agents that are able to propel the story forward. Triggering a sense of responsibility, as mentioned above (see § 4.1), is achieved with a dramatic mechanism where the participants are made the protagonists or co-protagonists of the events (Osborne, 2023). However, in this mechanism, the participants are not playing a role other than themselves:[5] Immersive Education creates extraordinary circumstances around them, to stimulate them to experiment their own behaviour and initiative while living through unusual events (*ibidem*).

The extraordinary elements are a crucial contribution to the stories used in Immersive Education interventions and their balance is extremely relevant to enhance the engagement of the pupils. Every Immersive Education activity usually starts with an incursion of extraordinary inciting events in the daily routine. These elements are capable of opening the landscape of possibilities, elicit reactions and initiative from the pupils, and create a new 'space' for interaction. Nevertheless, these elements should be appropriate for the age and background of the participants. For instance, when working with younger pupils, the use of supernatural elements (e.g., aliens, parallel dimensions, magic, see Appendix 1) is potentially effective, while older participants are more probable to be engaged by dynamics and forces more connected to real-life experiences (e.g., unlikely, but still possible, events, see Appendix 2). As Slota and Young (2017) pointed out, a narrative should not only be created to convey a message

---

4 'People can easily sniff out when someone is trying to manipulate them by mixing unappealing goals and tasks into a game' (Ryan and Rigby, 2019, p.168). We believe that this kind of observation applies especially in a school context.

5 While many of the dynamics created in Immersive Education can remind of Role Playing Games (RPG) or, better, Live Action Role Playing (LARP), there are two crucial differences between this approach and role playing. The first, as mentioned in the text, is the fact that the situations do not demand the participants to play a role other than themselves—they are certainly stimulated to participate and react in specific situations, but without pretending to be someone else. The second is that while RPGs and LARPs are games and generally have recreational objectives, Immersive Education's ultimate goal is to stimulate a learning process.

(Narrative-as-Designed), but it should also take into account the response and interpretation of the recipients (Narrative-as-Perceived). The understanding of this bi-directionality is not only essential to establish a creator-recipient relationship, but is crucial when the story develops with the active involvement of the participants themselves. Since the participants must be immersed in a narrative, the narrative should be detailed, life-like and resonate well with their own personal real-life experiences and emotions. In this sense, the dramatic flow of the events should be built using all the traditional narrative strategies used in writing (*cf.* Herman, 2009)—e.g., an Aristotelian 3-acts structure, a triggering event, different characters (either present or evoked), antagonists, a climax, resolution, open ending, plot twists, surprise revelations, etc.—to carry the participants themselves through a cognitive, physical, and emotional journey. The flow of events should be arranged following *necessity* and *logic*: Instead of organising what happens as a function of the learning process alone (e.g., explanation followed by exercises), the elements should be concatenated in such a way that every event is the cause (or contains the seed) of the subsequent ones. The sequence thus built should be *meaningful* and able to be understood as a whole story. The inspiration for the narrative can come from books, movies, comic books: it can be faithful to the original, modified, or created as a completely new narrative.

Narrative messages have been found effective in influencing individuals' beliefs, attitudes, and behaviours (Ma and Nan, 2018a, 2018b; Ma et al., 2018; Murphy et al., 2011; So and Shen, 2016). This effectiveness arises from individuals' engagement with the narrative as a whole and with its characters (Green and Brock, 2000). The literature suggests two main mechanisms for narrative influence: narrative involvement and character involvement (Green and Brock, 2000; Moyer-Gusé, 2008; Slater and Rouner, 2002). Narrative involvement refers to individuals' focus on story events, leading to temporary disconnection from the real world, while character involvement refers to the connection and resonance we may find with specific characters of a story (Busselle and Bilandzic, 2009; Green and Brock, 2000; Slater and Rouner, 2002). Green and Brock (2000) define *transportation* as a unique mental process involving the integration of attention, imagery, and emotions. This concept aligns with narrative presence, including losing self-awareness and mentally entering another world, similar to spatial presence from immersive media literature (Tukachinsky, 2014).

The interactive elements of the narrative should be conceived as spaces open to accommodate different responses, initiatives, and creative ideas, without disrupting the general direction of the story. The ability to do so while maintaining an organic flow of events is the primary objective of the Experiential Theatre's procedural author (Murray, 2017; White, 2013).

One open question is if the participants of an Immersive Learning experience do actually believe the events of the experience as true (Osborne, 2023). While some accounts suggest some youngsters do come to believe in the production as real (Bowtell, 2015), others claim that the participants 'perform' belief together as a group in order to unlock the affective power of the experience (Colvert, 2018, p. 58). In Project xx1's experience, every unusual event will always stimulate a certain amount of disbelief: the way in which this disbelief should be dealt with depends on the learning objectives of the project, the participants' age, and several other factors. Project xx1 applies specific strategies when such natural disbelief appears: namely, instead of

directly focusing on the actual truth of what is happening, it is possible to interrogate the participants about what they would do *if* the unfolding events were actually true, or to invite them to focus on the common experience they are actually living together as a group, concentrating on the actual reactions and emotions they feel in that precise moment. This also works as a covert invitation to 'play along' with the adventure they are facing.[6]

However, calling for a simple 'suspension of disbelief' may not be sufficient since, as Murray (2017, p.107-109) points out, when we get engaged in a narrative, we are *actively creating belief*. The dramatic structure of an Immersive Learning activity should call for such availability, should generate the enthusiasm for an active creation of belief, adjusting its content to the specific context and target group.

The dramatic structure and flow of an Immersive Education project should be able to facilitate and foster the participation in the activities, to resonate with the learning objectives, to stimulate curiosity, and to provide a captivating track for the unfolding of the events.

4.3 Touching the *self*—involvement, personalisation, and embodiment

It has been demonstrated experimentally countless times that when something involves our *self*, we are better at processing it than when it does not: this is known as the *Self-Reference Effect* (Beggan, 1992; Belk, 1988, 1991). The simple perception of owning something makes it significantly easier for us to remember it (the *Mere Ownership Effect*; Cunningham et al., 2008). Other effects are connected with better memories for self-chosen materials or activities (the *Self-Choice Effect*; Takahashi, 1989; Takahashi and Umemoto, 1987) or better value attributed to things we contribute to create personally (the *IKEA Effect*; Norton et al., 2012). For example, in a recent research study conducted by Leshikar et al. (2015), participants were asked to evaluate either the personal significance of positive and negative adjectives or the semantic meaning of these terms. The study revealed that individuals exhibited better memory recall for items judged in relation to themselves compared to those evaluated solely based on their meaning. Moreover, participants showed a higher retention of episodic details when items were judged in relation to their own selves rather than for their semantic significance. These findings not only suggest an enhancement in overall memory recall but also emphasise the increased integration of perceptual detail in memory through self-referential processing. Research in the field of perception has also demonstrated a similar effect. For instance, Sui et al. (2012) implemented a task where participants had to rapidly judge whether shape/label pairs corresponded to a previously learned relationship. Initially, participants learned to associate simple shapes with labels representing the self, a familiar other, or an unfamiliar other. Following this learning phase, participants completed trials where they were presented with a shape and a label for a brief period and had to judge whether they matched the learned relationship. Sui and colleagues found that participants were

faster and more accurate in perceiving matches involving the self-compared to matches involving unfamiliar others. This effect, replicated multiple times (e.g., Sui and Humphreys, 2015), underscores the influence of self-representation on perception.

Other studies indicate that the Self-Reference Effect (SRE) is also influenced by the emotional valence of the stimuli. Specifically, research has shown that positive information, such as trait adjectives like 'kind' or descriptions of behaviours indicating care for others, is more effectively remembered when processed in relation to oneself compared to negative information, such as adjectives like 'dishonest' or descriptions of behaviours indicating neglect of obligations to friends. This difference in recall is particularly noticeable when information is self-referenced, as opposed to being referenced to another person or processed for its general meaning (Denny and Hunt, 1992; Sanz, 1996; Sedikides and Green, 2000). The impact of emotional valence on memory for self-related information is likely driven by self-enhancement motives, reflecting individuals' preference to process positive rather than negative information about themselves, such as information indicating competence, likability, or attractiveness (Taylor and Brown, 1988). In other words, when individuals encounter new self-referential information, they tend to prioritise positive aspects and may overlook negative aspects, resulting in better retention of positive information compared to negative one. Thus, personal involvement is undoubtedly capable of enhancing our cognitive and emotional processing.

Personal involvement is a key-process in Immersive Education: what is happening is happening *to* the participants (e.g., as opposed to *in front* of them), it demands *their* attention, *their* skills, *their* actions. Storywise, this is exactly what it means to make the participants one of the main *protagonists* of the narrative—without their involvement, nothing would happen. Their participation is constantly rewarded by the consequences of their actions—these consequences are well visible, tangible, and significant. The fact that results in an Immersive Education project are achievable in different ways, allows for everyone to be able to choose the course of actions that better suits them. This makes the participants' selves absolutely central in the process, personalising the experience, adapting to the circumstances as they see fit. When the participants feel that what is happening is about themselves, they are much more available to face difficulties, show initiative, and be creative.

Personal involvement is especially intensified in Immersive Education through a constant stimulation of the body. The props used are real objects that can be touched, manipulated, and explored; smell and taste are evoked or directly stimulated; visual images and rich sounds are used; several sections are based on kinesthetics, inviting participants to move, explore, or physically behave in specific ways (e.g., move silently). This multisensory stimulation is accomplished through specific activities, but its primary source are the installations that house the core elements of the interventions. Space is transformed through a detailed setup, enriched by specific lighting and sound, to shape the experience. It is usual for participants to link the most captivating elements of the projects exactly to the set up spaces.

Presenting stimuli across different sensory modalities at the same time shows enhancements in memory (Delogu et al., 2009; Thelen et al., 2014), learning (Shams and Seitz, 2008), attention (Santangelo and Spence, 2007; see also Lunn et al., 2019), reaction times (Hecht et al., 2008), and perception (Pannunzi et al., 2015). Multisensory stimulation showed enhanced experiences for users of immersive

---

6   As one of the children involved in Coney's 'Adventures in Learning' programme commented: 'I do not think the talking cat is real, but Miss seems to totally believe it, so let us go along with it as it's better than doing work' (Bowtell, 2015).

technology as well (Melo et al., 2020). The use of different sensory modalities has been found to be especially effective to amplify emotions (Jeong et al., 2011).

Physical and motor experiences have been found to be essential in shaping our mental states and processing, to the point that in psychology it is now common to refer to *embodied* (Shapiro, 2019) or *grounded cognition* (Barsalou, 2008). This approach studies exactly how bodily experiences can influence cognition and how this connection between body and mind is significant for education (Shapiro and Stolz, 2019). The Immersive Education methodology is crucially based on continuous and varied physical experiences and multisensory stimulations, to offer several opportunities to affect the mind through the body.

4.4 Multifaceted, *continuous engagement* and accessibility

School activities can often be repetitive and tiresome: the exercise of competences, if not constantly varying in form, can easily turn an initial captivating interest into deep boredom. Several techniques have been developed to try and keep pupils engaged: e.g., connecting teachings to the real world, intercept students' interests, using mixed media, offering opportunities to develop and share students' ideas, and the aforementioned gamification (Krath et al., 2021). School engagement is seen, among other things, '[…] as an antidote to low achievement, high levels of student boredom and disaffection, and the high dropout rates in urban areas' (p. 305, Fredricks et al., 2005).

School engagement has been described as a multidimensional construct providing a rich picture of learning, including behavioural, emotional, and cognitive aspects (Fredricks, 2011). *Behavioural engagement* is related to attendance, participation, and positive conduct; *emotional engagement* focuses on the extent of positive and negative reactions to the school, teacher, activities, including feelings of belonging and valuing of school (e.g., Voelkl, 1997); *cognitive engagement* focuses on the level of investment in learning, including being purposeful and willing to exert the effort necessary for the comprehension of cognitively complex ideas and the acquisition of difficult skills.

Immersive Education methodology is designed and articulated to enhance all three kinds of engagement. All these kinds of engagement are stimulated *in primis* by the involvement in the narrative, not only as passive recipients but as co-creators.

This practise hinges on the concept of *narrative co-construction*: inviting, implicitly or explicitly, participants to co-create a narrative by putting forward ideas, providing solutions, or simply by welcoming and sharing their reactions to it. The outcomes of co-construction may be unpredictable but they support creativity, critical thinking, and problem solving in ways not typically seen (individually or collaboratively) in traditional instruction (Slota and Young, 2017).

More specifically, behavioural engagement is fostered in Immersive Education by providing a wide range of activities: pupils are invited to investigate, share ideas, create original materials, collaborate together, solve problems and puzzles, move, etc. All these activities are planned (and justified) according to the developments of the narrative and are organised avoiding repetitions and dead time. Emotional engagement is one of the main aspects of Immersive Education projects: all the activities are orchestrated with the narrative in order to articulate an effective journey for all participants. The experiences are strategically populated with several elements eliciting positive emotions such as surprise,

happiness, intrigue, and fun, as well as some parts evoking more challenging emotions such as suspense, misgiving, and apprehension. The involvement of emotions necessitates the ability to welcome and process them by the personnel involved in every project: the actors/educators that give life to Immersive Education must be carefully trained to manage the emotional responses of the students, in order to integrate them in the experience flow. This ability includes giving opportunities to address emotions, to share them, to process them individually or collectively, and to regulate the activities accordingly, up to the point of suspending them to work on specific emotional responses.

Finally, cognitive engagement is obtained by specific dynamics, such as the use of mysteries to be uncovered, creative opportunities, the feeling that the events are dependent on participants' decisions and actions (even if the result is pre-planned to an extent; see also Osborne, 2023). The cognitive aspects are also particularly stimulated by the interaction between participants and with the characters. The participants are often put in situations where they need to understand a character's intentions, feelings, or behaviour, even when the characters themselves are trying to hide them. This represents an opportunity to practise interpersonal cognitive skills such as intuition, interpretation, communication, empathy, mentalisation, and perspective-taking (e.g., Carlson et al., 2013; Leslie et al., 2004).

The focus on engagement allows also for an increased accessibility of the activities. The variety of activities, the possibility to value the creative participation of pupils, and the possibility of participating in different ways to the narrative are all features that facilitate the participation of everyone. Moreover, the work with a class often is carried out in small working groups (e.g., creative activities, investigations on clues, exploration of complex environments, etc.), hence fostering the inclusion of pupils with special physical, emotional, or cognitive needs.
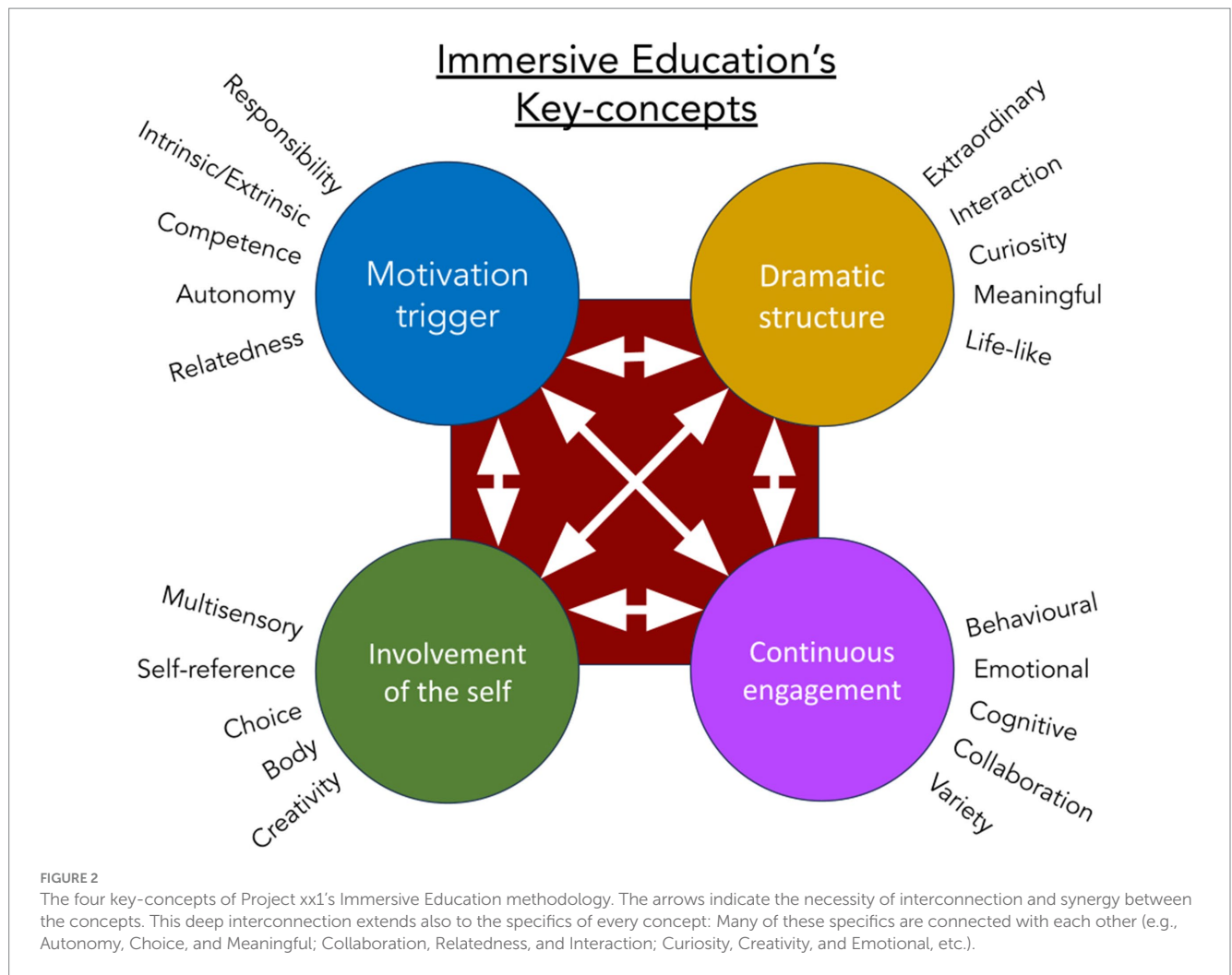
5 Designing the learning experience and implementing the key-concepts

All the key-concepts at the root of Immersive Education (see Figure 2) are deeply connected and support one another. However, all of these ideas risk amounting to nothing if they are not implemented skillfully. The following section provides several examples of how the concepts illustrated above can be turned into significant learning experiences.

5.1 Setting the learning objectives and the topic

Every planning of an Immersive Education intervention begins by setting specific curricular and extracurricular learning objectives. These objectives are set beforehand by the authors of each project, in close collaboration with the headteacher, the teachers, and other teaching staff, according to the general learning programme and to specific class, or sometimes even individual, needs. Immersive Education projects are usually custom-made or adapted to specific contexts; moreover, the definition of precise requirements is of great benefit for the activities, as it helps the whole operation to fit in the specific school context by focusing on appropriate goals.

The dynamics put in motion by this methodology are apt to tackle with both curricular and transversal competences. Contentwise, the

FIGURE 2
The four key-concepts of Project xx1's Immersive Education methodology. The arrows indicate the necessity of interconnection and synergy between the concepts. This deep interconnection extends also to the specifics of every concept: Many of these specifics are connected with each other (e.g., Autonomy, Choice, and Meaningful; Collaboration, Relatedness, and Interaction; Curiosity, Creativity, and Emotional, etc.).

specific themes and topics touched by a bespoke Immersive Education project can be not only akin to school subjects, but they can often exactly overlap with them. The specific subject elements can be embedded in the narrative, along with sensible justifications for their presence. The curricular elements can thus be an essential part of the dramatic structure and flow. On the other hand, the mechanics of interaction and co-creation are particularly appropriate to exercise and practise soft skills. Transversal competences such as negotiation, teamwork, communication, discussion, and problem solving are by definition at the heart of the methodology: The narrative comes alive exactly by fostering interaction and collaboration with the story elements and between the participants. More specifically, thanks to its essential features and dynamics, Immersive Education seems especially suitable to enhance the Personal, Social and Learning to learn Key Competence, as described in the European LifeComp framework (Sala et al., 2020). Finally, more domain-general cognitive and affective abilities such as logic, emotional intelligence/regulation, and creativity are also addressed through this methodology.

To provide an example, *The Guest* (2021, see Appendix 1) was created for 3–4 graders starting from several learning objectives: these included the curricular 'learn to recognise and compose different types of texts' and the transversal skills 'communication' and 'teamwork', among others. Moreover, the classes included several pupils for whom Italian was a second language and their skills in reading, writing, and communicating verbally in Italian were still developing to reach the level of their fellow students. These specific needs were used to define several elements of the narrative and the activities. Specifically, the choice of making one of the main protagonists of the story a *gardener of words* allowed for a metaphorical approach able to deliver some core principles such as *words are nourishment, words need care, words can be 'grafted' to create neologisms, words are powerful*, etc.

Moreover, the activities included several moments when the pupils were invited to work in small groups and then communicate to the others the results of their common work. For instance, among the first activities there was the analysis of several peculiar objects found by the school janitor: small groups were formed, to observe them closely and discuss the meaning of one object for each group. The objects were carefully created to hide common meanings, so that when the groups shared their findings, their discoveries would be confirmed by others. To fulfil the curricular objective, different types of texts were used for activities throughout the project: letters, forms of poetry, word games, etc.

Every time a specific project must be repeated for different pupils, an adaptation is planned by working initially with the teachers and the teaching staff. For instance, in the case of *The Guest*, the activities needed to be attuned to the age and level of the participating classes: The activities were made more challenging for fourth graders and less so for third graders, along with changes in the specific forms of text

used, their length, etc. This strategy is implemented to stimulate *motivation* and maximise the *engagement* (see § 4.1 and 4.4).

Every project may be characterised by a general *topic*, an issue or issues around which all of the activities revolve. However, differently from other educational projects, while the topic surely plays a central role in the narrative, it is not immediately addressed directly, but rather it emerges during the activities. Ideally, the topic should be uncovered by the participants themselves, during the activities, as a central pivotal point of what is happening. For example, in *Changing Voices* (Appendix 2) all the project revolved around the topics of *Bullyism* and *Inclusion*. Nevertheless, these topics were not introduced explicitly before the third meeting, when the participants discover the secret broadcasting station. While hints about unfair treatments and exclusion were disseminated during the first two meetings, it was only when they uncovered the secret radio that these issues became gradually evident.

5.2 Writing, composition, and interactive elements

On the basis of the established learning objectives, the narrative and the general structure of the activities can be planned. The writing process is faced starting from the idea that the narrative should be appropriate for the age and cultural background of the participants (see § 4.2) and should be interactive in all of its elements. This calls for the skills of *procedural authors*: writers competent in educational matters, able to craft a narrative that allows for active discovery and participation instead of passive fruition. The narrative elements should stimulate curiosity and should allow for a significant role for the participants. This significant role is created by giving the participants a protagonist role in the events, by welcoming certain degrees of freedom for interactions, without allowing for this freedom to derail the main storyline, and finally by planning several moments of co-creation in the narrative.

As an example, in *Changing voices* (2022, see Appendix 2) the participants were allowed to look for information about the founders of the secret broadcasting radio. This information was scattered all around the secret broadcasting studio and included the founders' identities, their interests, their ideas, their physical appearance, their roles in the broadcast, etc. The search was mostly left to the responsibility of the participants and, if some essential information for the narrative should have not been found through their effort, one of the actors/educators involved would have filled the missing information by passing it as their own discovery.

The elements allowing for a creative input during the experience are another essential element in the process. Every participant should feel that the experience, in specific moments, welcomes their own contribution using their own ideas and their own style: by reflecting real-world dynamics, the effectiveness of their contribution will be tested during the application of their ideas by the situations themselves or by the other participants. The goal of the writing itself and of the actors/educators during the implementation is to maintain a solid chance for everyone's initiative: all participants must be continuously included and have a shot at creating materials, solutions, or proposing ideas, no matter if their previous contributions were not effective or did not meet the favours of the others. This specific aspect aims at maintaining a continuous engagement in the activities for everyone (see § 4.4).

For instance, the climax of *Changing voices* (2022, see Appendix 2) was represented by the broadcast of a radio programme created and performed by the participants. Every participant was asked to contribute creatively to the programme, following the sections that constituted the original broadcast of the founders of the secret radio. This allowed for proposing comments, anecdotes, opinions, and even music to be included in different sections of the programme. While everyone was encouraged to perform in the broadcast as a speaker, by including both individual and choral moments, this kind of participation was not mandatory, as some participants' contribution could be also simply as authors of the programme itself.

Lastly, keeping an eye on the whole structure is essential in writing an Immersive Education intervention. The sequence of events should be carefully scripted, ensuring an alternance between different kinds of activities, with carefully planned timing for each one. The procedures should also allow for on-the-fly adjustments by the actors/educators, as the planned activities can be easily deformed by contingencies. The overall result of the writing process should create a compelling unravelling of information and events, featuring mysteries, surprises, plot twists, and discoveries; where participants' contributions are central and rewarded, culminating in a climax that must be as satisfying as any good story deserves.

5.3 Multisensoriality and media

During an ordinary day, we are constantly stimulated by a plethora of stimuli. The life-like character of Immersive Education is achieved with an approach that mimics this richness, by using multisensory elements, spatial installations, and multimedia content. These features implement the principle of personalisation and involvement of the *self* (see § 4.3), by offering the opportunities for an embodied experience. To put in practise this key-concept, all the elements of the experience should have a multisensorial nature. A critical aspect of the 'immersion' is the articulation including haptic, visual, auditory, olfactory, and sometimes even gustatory elements, along with kinetic components (e.g., body movement and orientation in space). In order to provide a personal, 'immersive' experience, the more of these channels are used, the better.

Space itself is shaped and populated by many of these elements, creating explorable installations with a relevant narrative function. These installations are not a simple theatrical 'backdrop', but host part of the activities and they act as a relevant part of the projects themselves. They are created to transport the participants into a parallel, extraordinary dimension, where the narrative is able to surround them. This is achieved by using set-ups, props, light and sound design, specific smells. The explorable installations are able to add to the projects a dimension and feeling of wonder and reality at the same time: the spaces are clearly extraordinary (sometimes even 'magical', e.g., appearing out of nowhere, from the point of view of the pupils) but they are concrete, real, tangible, and offer a venue where the participants are invited to perform activities, by using the elements they find inside.

The first contact with such an immersive space during *The Guest* (2021, see Appendix 1) is when the participants are invited to explore a large, dark, and apparently empty room with the help of flashlights. Afterwards, this same room will be completely transformed, by turning into the gardener's home and laboratory (see Figure 1), featuring scenic lights, a soundscape provided by hidden speakers, and specific smells (e.g., provided by a large amount of soil, ready to plant

words, in a domestic small indoor greenhouse). The threshold to these spaces is usually marked by a specific way to enter them: the gardener's home in *The Guest* was accessible through a glowing 'portal'; the secret broadcast studio in *Changing voices* was accessible through a secret passage through a bookshelf, etc.

The narrative itself is developed over different media: spoken word, written texts, digital content such as audio excerpts or videos, physical objects, drawings, photographs, live interactions with characters, etc. This *transmedial* delivery (see § 1 and footnote 1) has several advantages. Firstly, it fosters *personalisation* (see § 4.3) and accessibility by offering different stimuli, able to meet different attitudes and natural inclinations: some participants will be facilitated by the use of written texts, while others will be more sensitive to digital contents; some will be more attentive to physical objects, while others will captured by speaking and interacting with an actor, and so on. Secondly, since life itself is profoundly transmedial and multisensory, this approach helps in rendering the experience life-like. We are so used to jumping from one stimulus to another that we seldom realise how many sources of information we constantly use in real life: namely, even going to a restaurant involves spatial information (reaching the restaurant), written text and pictures (the menu), interaction with others (the waiting staff, our tablemates), smell and taste (eating), specific codes (numbers to indicate prices or to pay the bill), etc. By providing rich multimedia contents, our *self* gets involved in different ways and multiple levels, encouraging a holistic approach to learning. Lastly, the variation between different sources of information provides an opportunity to renew the participants' focus and *engagement* (see § 4.4).

5.4 Emotional journey

As mentioned above (§ 4.4), emotional engagement is an essential aspect of every Immersive Education project. Shared emotions are able to create bonds between participants, or to create individual long-lasting memories. Emotional experiences are well supported by a dramatic structure and, on the other hand, are capable of making the narrative itself more compelling. Emotions play a crucial role in learning, as numerous studies have demonstrated that human cognitive processes are influenced by emotions, including attention (Vuilleumier, 2005), learning and memory (Phelps, 2004; Um et al., 2012), reasoning (Jung and Hamburger, 2014), and problem-solving (Isen et al., 1987). Moreover, the attentional and motivational components of emotions have been linked to enhanced learning and memory (Pekrun, 1992; Seli et al., 2016). Therefore, emotional experiences/stimuli tend to be remembered vividly and accurately, exhibiting considerable resilience over time. Some studies suggest that positive emotions facilitate learning and contribute to academic achievement, mediated by levels of self-motivation and satisfaction with learning materials (Um et al., 2012). In addition, emotionally enhanced memory functions have been reported in relation to selective attention elicited by emotionally salient stimuli (Vuilleumier, 2005; Schupp et al., 2007).

Since emotions are powerful elements in a life-like experience, their potential must be treated with great care. In Project xx1's practise, nothing should happen too suddenly: every event that could generate intense emotions is introduced gradually and gently, leaving all the participants time to prepare or adapt to it. Moreover, the intense emotional events are always experienced as a group and are always followed by an opportunity to share and understand what happened and how everyone experienced it. This process allows the participants to connect with their fellows while experiencing emotions, along with the possibility to observe the extent of how emotions are processed by different people. Every perplexity, quandary, or uneasiness is supported through the possibility to express it, explain it, and understand it together. This process is made possible by the close collaboration with the teachers and the teaching staff, since the echo of emotional experiences can sometimes emerge even days after the meetings.

For instance, the first encounter with the gardener in the project *The Guest* (Appendix 1) was created to foster curiosity and a sense of discovery. The participants had to help a man in distress, trying to understand the best ways to support him. Later in the project, finding how their word-seeds grew into word-plants or the demonstration of how the Machine can turn texts into energy, triggered a sense of wonder and excitement. At the end, finding out that the gardener and his laboratory successfully travelled back to their home dimension, by witnessing the now empty room, generated both melancholy and happiness at the same time.

In *Changing voices* (Appendix 2), the final radio (fictional) broadcast was reached after a build-up of several meetings and generated the typical trepidation of a live performance. While the programme was actually only recorded, in the narrative the secret radio was again fully functional and a big 'On air' sign lit up as a signal that the broadcast was active. The group was silent, focused, and everyone waited their turn following the script they created: A big release of tension celebrated the end of the performance, with a shared sense of accomplishment.

In the feedback collected after the projects, the emotional journey is usually highlighted by participants and teachers as one of the most intense and memorable features of Immersive Education projects.

5.5 Reflection and creativity

Every step in an Immersive Education project must be followed by reflection and abstract conceptualisation, following the inspiration provided by Kolb's ELT (Kolb, 1984, 2015). It is of utmost importance to provide an appropriate time and space to allow the participants to share and reflect on their personal insights and doubts. These sections provide 'breathing' moments that should be embedded in the structure, with a proper integration (e.g., justification) in the dramatic flow. They should not be perceived as suspensions from the sequence of events, but as moments necessary to re-organise thoughts and decide on the following course of action.

One of the essential aspects of the reflection is to allow everyone to participate, with their own thoughts and feelings. Very often, these moments were precious to include participants that were less active during the more intense phases of the activities, or to capture the attention of the less involved, or to clarify something that was not understood by everyone. The moderator of these moments, usually one of the characters leading the experience, must not impose a specific point of view or a fixed interpretation of the events, but should guide the participants through a fruitful confrontation. These are the spaces where the individuals can really express their thoughts and feelings, without any obligation. A special attention during these sections is usually devoted to analyse group dynamics—how the participants feel working with the others, in relation to the events.

Another specific activity often integrated in several kinds of Immersive Learning approaches (see Osborne, 2023) is a creative

effort by the participants. The events demand a creative approach to solve a problem or to navigate a specific section of the experience. As an example, in *The Guest* (Appendix 1) the pupils were asked to compose texts for the Machine, or to write a letter to an unknown recipient through an interdimensional mailbox. In *Changing voices* (Appendix 2) they were asked to write a radio programme, following the structure defined by the old founders of the secret radio.

These creative moments can be individual (as the composition of texts for the Machine in *The Guest*) or group activities (as the development of each section of the radio programme in *Changing voices*); while they can be more structured, with some constraints, or unbound, they should be always linked to and justified by the narrative. Every creative endeavour by the participants must be followed by a reward of some kind: e.g., the Machine whirling into life after being fed a textual composition, or the call of an enthusiastic listener after a radio broadcast.

5.6 Reality and fiction

An Immersive Education project is an elaborate adventure, created to stimulate participation: it is a work of fiction, used to achieve accessible learning. Despite its fictional nature, one of the most effective features of this methodology is its believability, its complexity, and its life-like features. The theatrical setup—the plot, the script, the characters, the installations, the props, the planned interactive activities—must be developed to integrate perfectly, at least at the beginning of the project, with the daily school routine. This plausibility must be at its maximum at the project inception, in order to facilitate the gradual journey towards more extraordinary features during its development. The activities are thus not presented as school-related work, but as actual events that are happening to the participants. The characters (see § 5.7) with whom the participants interact are usually characters that could be met in a school context, and their presence is not declared as 'special' or 'fictional'. For example, the first character they meet in *The Guest* is a (fictional) school janitor, while in *Changing voices* they are a (fictional) technician and a (fictional) school teacher.

The main reason for this 'benign deception' is participants' motivation and ensuing engagement. If something is presented as an actual event, and not a fictional one, the participants are naturally motivated to understand it fully and prone to engage in investigating what is happening; they value their own initiative and participation as something that can steer the course of events; they apply to their choices and engagement the same rules and determination they apply to real-world decisions; they connect emotionally with what is happening. If we would declare the fictional nature of what happens right away (e.g., 'let us play together'), this would have the participants treat the activities as any other school-related matter, reacting with known dynamics and attitudes. This initial plausibility soon turns towards magical, extraordinary, or unusual events, giving away the fictional nature of the narrative. However, many participants declare that they were not completely sure about the reality of what was happening, sometimes till the end of the project.[7]

─────────

7 See above, § 4.2, for information about how to deal with disbelief.

This life-like quality is obtained by a great level of detail in every aspect of the narrative. As an example, in *Changing voices*, the secret radio was founded by four characters around 20 years before, who the participants would never meet in person. These characters were the original founders of the radio broadcast and their example was meant to inspire and guide the participants in their present endeavours. Even if absent, countless clues about the personality of these characters, their appearance, their passions, their problems, and their achievements, were scattered in recordings, props, writings, nicknames, and even caricatures. The 4 characters were developed as all-round people, with their peculiarities, complexities, and emotions. This was done because most of the information about these central characters was to be discovered autonomously by the participants: to ensure a proper reward to a participatory effort, it is important to make sure that every search would find something.

The fictional nature of the project is established with the collaboration of the principal, the teachers, and the school staff. Precise instructions must be followed by all the parties involved, such as the non-disclosure of the narrative as fictional, the restriction of not using the activities as bases for homework or traditional schoolwork (e.g., reports, essays, questionnaires, etc.), and the collaboration on specific turning points in the narrative. When the project is over, the fictional nature of the narrative is confirmed to everyone and the experience of the activities can be used, if needed, as the basis of other schoolwork.

5.7 Immersive live educators

All the implementation aspects above must be delivered by professionals who are aware of the principles, the purpose, the characteristics, and the development of an Immersive Education project. There are different categories of Live Educators in Project xx1 interventions: the *inhabitants* (in character), the *bridges* (in character), and the *supporting staff* (as themselves). Each category follows the narrative with specific goals connected to the storyline, and to the educational objectives. Their goals are revealed gradually and are subject to adaptation, following the evolution of the project and the participants' reactions. The *inhabitant,* being completely part of the narrative, guides the participants into the exploration of it. The *bridge* is usually a character that could belong both to the narrative and the real world, with the task of ferrying the participants from their daily school reality into the narrative. For example, the *inhabitant* could call for help, and the *bridge* could guide the group into the investigation that will lead them to meet the *inhabitant* in person. Finally, the *supporting staff* are all the other people (school staff, other teachers, older students, etc.) that will put interest and belief in the narrative, supporting its development without being directly involved in it.

All of these roles could be covered by educators, teachers, actors, facilitators, trainers, with more or less acting skills according to the specific role and the competences to facilitate individual and group learning processes. Usually, the *bridge* requires a facilitator, an educator with acting skills, while the *inhabitant* could have a more pronounced theatrical background along with pedagogical sensitivity. Both the *bridge* and the *inhabitant* require to fully support the narrative through acting and reacting according to the script, while adapting it to the student's reactions and needs. The *bridge* becomes a point of reference by leading participants from one phase to the other and supporting their journey. To fully play her role, the *bridge* acts as

if she does not know anything about the narrative, the discoveries, the tasks and the whole development of the journey.

The required acting skills, essential for both the *inhabitant* and the *bridge*, can be found either in professionals or amateurs with acting experience in interactive theatre. These skills include sensitivity to modulate their physical and vocal expression to engage their audience by creating suspense or mystery, by eliciting excitement or curiosity or by highlighting pathos or fun; to be ready to improvise consistently with their character if unpredictable questions, or other potential issues, arise; to be as authentic and believable as possible in order to facilitate the immersion in the narrative.

Regarding competences in facilitating individual and group processes, Kolbs' Facilitator Profile suggests that '[…] educators help learners get in touch with their personal experience and reflect on it. They adopt a warm affirming style to draw out learners' interests, intrinsic motivation, and self-knowledge. They often do this by facilitating conversation in small groups. They create personal relationships with learners' (Kolb et al., 2014, p. 220). In Immersive Education, the *bridge* as facilitator entails to provoke group discussions and reflections with the aim of fostering students' critical thinking, guiding their insights, organising their actions, or stimulating their creativity. The *bridge* should be able to create profound relationships with learners where emotional skills like empathy, non-judgmental attitude, and an inclusive approach are promoted and shared. They must also support the process without interfering excessively with the participants' experience and autonomy (see § 4.3). All Immersive Live Educators should also leverage their communication and collaboration skills, enabling them to work with each other and with the school staff external to the project.

5.8 The process of creating immersive education interventions

By following all the implementing strategies described so far, it is possible to organise them in a step-by-step sequence, illustrated in Figure 3. While the steps are rather straightforward, there are some general criteria that need to be kept in mind while moving through the process of creating an Immersive Education intervention.

Firstly, all of these steps should be guided by the four key-concepts: e.g., in defining a narrative (step 2), the *Dramatic Structure* principle may seem to be the main one instructing the choices, but all the other principles should be guiding this step as well. The *Motivation Trigger* principle should be taken into account, by choosing, creating, or modifying a narrative in ways that get to touch significant issues for the specific target group we are planning to work with. Moreover, the *Involvement of the self* principle must be respected, by choosing or creating a narrative where the pupils can play a relevant role. Finally, the *Continuous Engagement* principle must be kept in mind by exploring a narrative that can include a variety of activities, generating a cognitive, behavioural, and emotional engagement.

Secondly, all the previous steps must be considered when working on a subsequent step. For instance, to set monitoring and reflection components (step 5), it is necessary to keep well present the learning objectives (e.g., to make the monitoring and reflection relevant), the specific narrative and the script (e.g., to avoid interrupting relevant story beats), and the participants' role (e.g., to make the reflections consistent with their interaction with the story).

Thirdly, the most relevant aspects immersive-wise are what is defined in steps 3 and 4. These are the steps where the principles of

Immersive Education can really take shape: in defining the interactions and composing the script, we structure how the participants will be involved and engaged in the events. These are also the steps where most of the opportunities for inclusion are created.

Finally, this whole process should rely on the teachers and their knowledge of the target group itself. The teachers are the main source of information about the curriculum, the specific learning objectives, the target group, and the general context of the school/institute. The whole creation can greatly benefit from a specific knowledge of the target group (e.g., the class or classes that will participate in the intervention): their dynamics, the needs of its members, their internal balances and comfort zones, etc. This knowledge should be used to tailor the intervention (or adapt an already existing one) to the specific group, to maximise their learning opportunities.

6 Limitations

While the Immersive Education methodology can surely provide unique features to motivate, engage, and include several kinds of pupils, it certainly presents limitations that need to be addressed.

The first general limitation is that Immersive Education projects are usually costly and need a close collaboration between teachers, writers, scenographers, prop-makers, technicians, IT experts, school staff, theatre artists, and educators. This calls for a network effort, involving several kinds of professionals and community resources. This creates obvious limitations in terms of scalability—applying it to several schools at once and with a large number of participants. However, this kind of limit can be mitigated in at least two ways. The first is by considering that the larger costs and intense collaborations are mainly linked to the creation and the first implementation of a new project, while the subsequent implementations need significantly lower resources. Hence, this problem could be partially solved by applying an intervention to as many pupils as possible, to minimise the cost of the most resource-demanding phases, namely the conception and writing (steps 1 to 5, Figure 3) and the set-up (step 6, Figure 3). The second strategy could be to use the principles at the heart of this methodology to develop simpler, teacher-led initiatives (see Osborne, 2023).

The second limitation is linked to the difference that this approach has to traditional school activities. School systems and whoever works in them have been developed around specific methodologies and approaches—everything that is different, needs a considerable amount of accommodation. More specifically, Immersive Education hinges on maintaining a consistent fictional narrative also between the sessions, and it is based on setting up spaces with installations for several weeks (making thus these spaces not accessible for other activities).[8] Since school institutes are usually accustomed to work in different ways,

---

8 It can be very tricky to ask to some teachers to not to use the experience as a basis for traditional school work while the specific project is still ongoing (e.g., asking the pupils to write a report or an essay on a specific experience they had between the sessions of an ongoing Immersive Education project), as this may hijack the believability of the fiction (e.g., if something 'secret' happens, it is not believable that you are asked to write a report about it); or ask to school staff that a specific space (e.g., a 'hidden' hideout) should not be left open for other classes to use.

FIGURE 3
The process of designing, implementing, and evaluating an Immersive Education intervention. These steps may be carried out by the teachers themselves or by external educators, in close collaboration with teachers and school staff.

sometimes the difference between new approaches and the usual daily practise can be problematic.

Finally, another limitation is about the current state of validation of the methodology. While Immersive Education projects have been implemented in Italy and Spain several times, in different institutes, the data gathered in these occasions is currently under analysis. The data has been used locally, within a single project, to monitor and evaluate the process during the implementations to adjust the interventions where and when needed. However, in order to properly evaluate the impact, the effectiveness, and the efficiency of these projects, a more systematic general analysis is necessary. This analysis, guided by the theoretical framework proposed here, would be crucial to modify the methodology according to the actual results obtained across different projects.

7 Conclusion and future research

Immersive Education is a methodology characterised by the use of a participatory narrative to facilitate inclusive learning. It can be used in the form of shorter (e.g., 3–4 sessions) or longer (e.g., spanning several months, with more than 10 sessions) projects, integrated with curricular school activities. Different learning objectives can be achieved with it, both curricular and transversal. The approach is based on four interconnected defining principles (key-concepts) and is guided in its implementations by several aspects. This approach, akin to other Immersive Learning techniques (Bowtell, 2015; Higgin, 2018a; Osborne, 2023), is based on Experiential Theatre practises (Lewis and Bartley, 2023).

This methodology is inspired by and fitting in Kolb's Experiential Learning theory (Kolb, 1984, 2015; Morris, 2020), as it recursively

offers opportunities to practise and develop abilities related to the *contextually rich* experience they have lived (CE), the *critical* reflection on it (RO), thinking together as group on the *contextual-specific* phenomenon encountered (AC) and *pragmatically* experimenting in their daily life with this new learning (AE). It fosters a hands-on approach to problems, providing engaging learning opportunities to pupils with different preferences, talents, and peculiarities. While this methodology has been presented here regarding its applications to children and youngsters, Project xx1 has already successfully applied these principles, *mutatis mutandis*, to adult training as well.

As mentioned in §6, one of the first directions for further research is to assess how Immersive Education impacts on learning, inclusion, and engagement, also beyond the timeframe of a specific project, with validated tools and measures. Currently, the data gathered during the period 2021–2024 are being analysed, but even more direct comparisons with traditional teaching methods would be necessary to highlight the impact of the methodology. Future research could thus benefit from between-subject study designs or longitudinal studies that track students' progress over time and compare their performance with control groups in traditional educational settings. Moreover, these assessments and data collection should happen in ways that do not disrupt the flow of the narrative and do not put the participants in the position of evaluating the experience before it is completed (e.g., with a between-sessions questionnaire, or similar).

Another future direction for research could deal systematically with the different strategies and effects that Immersive Education has when working with learners of different ages. This kind of research should help identify necessary adaptations to ensure Immersive Education is engaging for both younger and older students. Similarly, research should explore how this method can minimise teachers' workload, by integrating these kinds of projects with existing curricula.

Finally, future research could explore how this framework can be adapted and expanded. For instance, the element of competition could be integrated in the model to enhance motivation and sustaining interest (Cagiltay et al., 2015; Xu et al., 2022; but see also Hanus and Fox, 2015 for opposite effects): competition should not here be intended solely as between different participants, as it can easily be integrated in the narrative as a fictional element (e.g., the group of participants is competing with another fictional group that they will never directly meet). The role of self-expression (see §5.5) can certainly be expanded in future projects, as it can lead to deeper emotional engagement and personal relevance in learning experiences. Furthermore, the dynamics of Immersive Education offer a unique opportunity to explore perspective-taking: understanding different viewpoints can enhance empathy and facilitate deeper learning by encouraging students to engage with narratives from diverse perspectives.

While all these steps will be useful to improve this methodology, Immersive Education already introduces innovative dynamics to organise shared experiences and reflections along a captivating interactive narrative, putting the learner at the centre of the learning process.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

RB: Writing – review & editing, Writing – original draft, Supervision, Methodology, Funding acquisition, Formal analysis, Conceptualization. SF: Writing – review & editing, Methodology, Investigation, Conceptualization. AA: Writing – review & editing, Project administration, Funding acquisition. AI: Writing – review & editing, Investigation. CG: Writing – review & editing, Investigation.

Funding

Acknowledgments

Conflict of interest

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2024.1471459/full#supplementary-material

References

Abbott, H. P. (2020). The Cambridge Introduction to Narrative: Cambridge University Press.

Agamben, G. (2006). Che cos'è un Dispositivo? Milano: Nottetempo.

Alston, A. (2013). Audience participation and neoliberal value: risk, agency and responsibility in immersive theatre. *Perform. Res.* 18, 128–138. doi: 10.1080/13528165.2013.807177

Barsalou, L. W. (2008). Grounded cognition. *Annu. Rev. Psychol.* 59, 617–645. doi: 10.1146/annurev.psych.59.103006.093639

Beggan, J. K. (1992). On the social nature of nonsocial perception: the mere ownership effect. *J. Pers. Soc. Psychol.* 62, 229–237. doi: 10.1037/0022-3514.62.2.229

Belk, R. W. (1988). Possessions and the extended self. *J. Consum. Res.* 15:139. doi: 10.1086/209154

Belk, R. W. (1991). The ineluctable mysteries of possessions. *J. Soc. Behav. Pers.* 6, 17–55.

Boal, A., and Epstein, S. (1990). Invisible theatre: Liege, Belgium, 1978. *Drama Rev.* 34, 24–34. doi: 10.2307/1146066

Bourriaud, N. (2002). Relational Aesthetics. Dijon: Les Presses du Réel.

Bowtell, T. (2015). Teaching pupils that genies are real can work magic in the classroom. The Guardian. Available online at: https://www.theguardian.com/stage/theatreblog/2015/feb/06/teaching-pupils-that-genies-are-real-magic-classroom (Accessed July 25, 2024).

Boyatzis, R. E. (1982). The Competent Manager: A Mode for Effective Performance. New York: Wiley.

Boyatzis, R. E. (2008). Competencies in the 21st century. *J. Manag. Dev.* 27, 5–12. doi: 10.1108/02621710810840730

Breel, A. (2023). "Facilitating narrative agency in experiential theatre" in Experiential Theatres: Praxis-based Approaches to Training 21st Century Theatre Artists. eds. W. W. Lewis and S. Bartley (New York: Routledge).

Bruner, J. (1991). The narrative construction of reality. *Crit. Inq.* 18, 1–21. doi: 10.1086/448619

Bruner, J. (2004). Life as narrative. *Soc. Res.* 71, 691–710. doi: 10.1353/sor.2004.0045

Brunetti, R. (Ed.) (2017). Esperienze Immersive. Creazione e Fruizione. Roma: La Rocca.

Brunetti, R., and Ferrante, S. (in press). Mattemashita—Teatro di Ricerca, sopravvivenza culturale e Teatro Immersivo. Scena, in press.

Busselle, R., and Bilandzic, H. (2009). Measuring narrative engagement. *Media Psychol.* 12, 321–347. doi: 10.1080/15213260903287259

Butcher, S. E. (2006). Narrative as a teaching strategy. *J. Correct. Educ.* 57, 195–208.

Cagiltay, N. E., Ozcelik, E., and Ozcelik, N. S. (2015). The effect of competition on learning in games. *Comput. Educ.* 87, 35–41. doi: 10.1016/j.compedu.2015.04.001

Carlson, S. M., Koenig, M. A., and Harms, M. B. (2013). Theory of mind. *Wiley Interdiscip. Rev. Cogn. Sci.* 4, 391–402. doi: 10.1002/wcs.1232

Colvert, A. (2018). The oracles: Mapping the affect and effects of immersive play in KS2: Final report for Punchdrunk enrichment. University of Roehampton—Punchdrunk Enrichment. Available online at: https://findingsinthefuture.live/wp-content/uploads/2021/09/Punchdrunk-Enrichment-The-Oracles-Resource-Pack.pdf (Accessed January 23, 2024).

Cunningham, S., Turk, D. J., Macdonald, L. A., and MacRae, N. D. (2008). Yours or mine? *Ownership Memory Conscious. Cogn.* 17, 312–318. doi: 10.1016/j.concog.2007.04.003

Deci, E. L., and Ryan, R. M. (2000). The "what" and "why" of goal pursuits: human needs and the self-determination of behavior. *Psychol. Inq.* 11, 227–268. doi: 10.1207/S15327965PLI1104_01

Delogu, F., Raffone, A., and Olivetti Belardinelli, M. (2009). Semantic encoding in working memory: is there a (multi)modality effect? *Memory* 17, 655–663. doi: 10.1080/09658210902998054

Dengel, A. (2022). "What is immersive learning?" in *Proceedings of the 8th International Conference of the Immersive Learning Research Network (iLRN)* (pp. 1-5). Vienna, Austria: IEEE.

Dengel, A., and Mägdefrau, J. (2018). "Immersive learning explored: subjective and objective factors influencing learning outcomes in immersive educational virtual environments" in *Proceedings of the 2018 IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE)*. Wollongong, Australia; 4–7 December 2018; IEEE: Piscataway, NJ, USA, 608–615.

Denny, E. B., and Hunt, R. R. (1992). Affective valence and memory in depression: dissociation of recall and fragment completion. *J. Abnorm. Psychol.* 101, 575–580. doi: 10.1037/0021-843X.101.3.575

Dewey, J. (1938/1963). Experience and Education. New York, NY: Collier Books.

Dewey, J. (1934/1980). Art as Experience. New York: Perigee Books.

Fleer, M. (2018). Conceptual Playworlds: the role of imagination in play and learning. *Early Years* 41, 353–364. doi: 10.1080/09575146.2018.1549024

Fleer, M. (2019). Conceptual PlayWorlds as a pedagogical intervention: supporting the learning and development of the preschool child in play-based setting. *Obutch. Rev. Didát. Psicol. Pedag.* 3, 1–22. doi: 10.14393/OBv3n3.a2019-51704

Fojkar, M. D., Skela, J., and Kovac, P. (2013). A study of the use of narratives in teaching English as a foreign language to young learners. *Engl. Lang. Teach.* 6, 21–28. doi: 10.5539/elt.v6n6p21

Foucault, M. (2004). "Qu'est-ce qu'un dispositif?" in Dits et Ecrits 1954–1988, book III. ed. G. Deleuze (Paris: Gallimard), 1976–1979.

Fredricks, J. A. (2011). Engagement in school and out-of-school contexts: a multidimensional view of engagement. *Theory Pract.* 50, 327–335. doi: 10.1080/00405841.2011.607401

Fredricks, J. A., Blumenfeld, P., Friedel, J., and Paris, A. (2005). "School engagement" in What Do Children Need to Flourish?. The Search Institute Series on Developmentally Attentive Community and Society. eds. K. A. Moore and L. H. Lippman, vol. 3 (Boston, MA: Springer), 305–321.

Froiland, J. M., and Worrell, F. C. (2016). Intrinsic motivation, learning goals, engagement, and achievement in a diverse high school. *Psychol. Sch.* 53, 321–336. doi: 10.1002/pits.21901

Garner, I. (2000). Problems and inconsistencies with Kolb's learning styles. *Educ. Psychol.* 20, 341–348. doi: 10.1080/713663745

Green, M. C., and Brock, T. C. (2000). The role of transportation in the persuasiveness of public narratives. *J. Pers. Soc. Psychol.* 79, 701–721. doi: 10.1037/0022-3514.79.5.701

Hanus, M. D., and Fox, J. (2015). Assessing the effects of gamification in the classroom: a longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. *Comput. Educ.* 80, 152–161. doi: 10.1016/j.compedu.2014.08.019

Hecht, D., Reiner, M., and Karni, A. (2008). Multisensory enhancement: gains in choice and in simple response times. *Exp. Brain Res.* 189, 133–143. doi: 10.1007/s00221-008-1410-0

Herman, D. (2009). Basic Elements of Narrative. Chichester, UK: John Wiley & Sons.

Higgin, P. (2018a). "On enrichment, engagement and education" in The Punchdrunk Encyclopaedia. ed. J. Machon. *1st* ed (London: Routledge), 98–99.

Higgin, P. (2018b). "Punchdrunk enrichment: on core principles" in The Punchdrunk Encyclopaedia. ed. J. Machon. *1st* ed (London: Routledge), 101–102.

Hon, N., and Yeo, N. (2021). Having a sense of agency can improve memory. *Psychon. Bull. Rev.* 28, 946–952. doi: 10.3758/s13423-020-01849-x

Isen, A. M., Daubman, K. A., and Nowicki, G. P. (1987). Positive affect facilitates creative problem solving. *J. Pers. Soc. Psychol.* 52, 1122–1131. doi: 10.1037/0022-3514.52.6.1122

Jeong, J. W., Diwadkar, V. A., Chugani, C. D., Sinsoongsud, P, Muzik, O., Behen, M. E., et al. (2011). Congruence of happy and sad emotion in music and faces modifies cortical audiovisual activation. *NeuroImage* 54, 2973–2982. doi: 10.1016/j.neuroimage.2010.11.017

Jung, N., and Hamburger, K. (2014). How emotions affect logical reasoning: evidence from experiments with mood-manipulated participants, spider phobics, and people with exam anxiety. *Front. Psychol.* 5:73445. doi: 10.3389/fpsyg.2014.00570

King, P. M. (2008). "Morality plays" in The Cambridge Companion to Medieval English Theatre. eds. R. Beadle and A. J. Fletcher. *2nd* ed (Cambridge: Cambridge University Press), 235–262.

Kolb, D. A. (1984). Experiential Learning: Experience as the Source of Learning and Development. Englewood Cliffs, NJ: Prentice-Hall.

Kolb, D. A. (2015). Experiential Learning: Experience as the Source of Learning and Development. Upper Saddle River, NJ: Pearson.

Kolb, A. Y., Kolb, D. A., Passarelli, A., and Sharma, G. (2014). On becoming an experiential educator: the educator role profile. *Simul. Gaming* 45, 204–234. doi: 10.1177/1046878114534383

Krath, J., Schürmann, L., and Von Korflesch, H. F. (2021). Revealing the theoretical basis of gamification: a systematic review and analysis of theory in research on gamification, serious games and game-based learning. *Comput. Hum. Behav.* 125:106963. doi: 10.1016/j.chb.2021.106963

Le Boterf, G. (2000). Construire les Compétences Individuelles et Collectives. Paris: Éditions d'Organisation.

Leshikar, E. D., Dulas, M. R., and Duarte, A. (2015). Self-referencing enhances recollection in both young and older adults. *Aging Neuropsychol. Cognit.* 22, 388–412. doi: 10.1080/13825585.2014.957150

Leslie, A. M., Friedman, O., and German, T. P. (2004). Core mechanisms in 'theory of mind'. *Trends Cogn. Sci.* 8, 528–533. doi: 10.1016/j.tics.2004.10.001

Lewis, W. W., and Bartley, S. (2023). "Experiential theatres: an introduction" in Experiential Theatres: Praxis-based Approaches to Training 21st Century Theatre Artists. eds. W. W. Lewis and S. Bartley (New York: Routledge).

Lindqvist, G. (1995). The aesthetics of play: A didactic study of play and culture in preschools. Uppsala University, Stockholm, Sweden.

Lunn, J., Sjoblom, A., Ward, J., Soto-Faraco, S., and Forster, S. (2019). Multisensory enhancement of attention depends on whether you are already paying attention. Cognition 187, 38–49. doi: 10.1016/j.cognition.2019.02.008

Ma, Z., and Nan, X. (2018a). Role of narratives in promoting mental illnesses acceptance. Atlant. J. Commun. 26, 196–209. doi: 10.1080/15456870.2018.1471925

Ma, Z., and Nan, X. (2018b). Friends don't let friends smoke: how storytelling and social distance influence nonsmokers' responses to antismoking messages. Health Commun. 33, 887–895. doi: 10.1080/10410236.2017.1321162

Ma, Z., Nan, X., Qin, Y., and Zhou, P. (2018). Using narrative persuasion to promote positive attitudes toward depression in different cultural contexts. Health Educ. 118, 239–249. doi: 10.1108/HE-08-2017-0041

Machon, J. (2013). Immersive Theatres: Intimacy and Immediacy in Contemporary Performance. New York: Palgrave Macmillan.

McClelland, D. C. (1973). Testing for competence rather than for 'intelligence'. Am. Psychol. 28, 1–14. doi: 10.1037/h0034092

Melo, M., Gonçalves, G., Monteiro, P., Coelho, H., Vasconcelos-Raposo, J., and Bessa, M. (2020). Do multisensory stimuli benefit the virtual reality experience? A systematic review. IEEE Trans. Vis. Comput. Graph. 28, 1428–1442. doi: 10.1109/TVCG.2020.3010088

Morris, T. H. (2020). Experiential learning – a systematic review and revision of Kolb's model. Interact. Learn. Environ. 28, 1064–1077. doi: 10.1080/10494820.2019.1570279

Moyer-Gusé, E. (2008). Toward a theory of entertainment persuasion: explaining the persuasive effects of entertainment-education messages. Commun. Theory 18, 407–425. doi: 10.1111/j.1468-2885.2008.00328.x

Murphy, S. T., Frank, L. B., Moran, M. B., and Patnoe-Woodley, P. (2011). Involved, transported, or emotional? Exploring the determinants of change in knowledge, attitudes, and behavior in entertainment-education. J. Commun. 61, 407–431. doi: 10.1111/j.1460-2466.2011.01554.x

Murray, J. H. (2017). Hamlet on the Holodeck: The Future of Narrative in Cyberspace. Cambridge, MA: The MIT Press.

Nelson, R. (2010). "Experiencer" in Mapping Intermediality in Performance. eds. S. Bay-Cheng, C. Kattenbelt, A. Lavender and R. Nelosn (Amsterdam: Amsterdam University Press), 45.

Nilsson, N. C., Nordahl, R., and Serafin, S. (2016). Immersion revisited: a review of existing definitions of immersion and their relation to different theories of presence. Hum. Technol. 12, 108–134. doi: 10.17011/ht/urn.201611174652

Norton, M. I., Mochon, D., and Ariely, D. (2012). The IKEA effect: when labor leads to love. J. Consum. Psychol. 22, 453–460. doi: 10.1016/j.jcps.2011.08.002

Ogwuegbu, D. A., Ajobiewe, D. N., and Marlin, A. O. (2023). Leveraging immersive learning for special needs education. Int. J. Res. Educ. Sustain. Dev. 3, 39–48.

Osborne, G. (2023). Agency and intra-textual co-creation in Punchdrunk Enrichment's immersive story worlds for children. Child. Lit. Educ. 55, 603–626. doi: 10.1007/s10583-023-09533-z

Pannunzi, M., Pérez-Bellido, A., Pereda-Baños, A., López-Moliner, J., Deco, G., and Soto-Faraco, S. (2015). Deconstructing multisensory enhancement in detection. J. Neurophysiol. 113, 1800–1818. doi: 10.1152/jn.00341.2014

Pekrun, R. (1992). The impact of emotions on learning and achievement: towards a theory of cognitive/motivational mediators. Appl. Psychol. 41, 359–376. doi: 10.1111/j.1464-0597.1992.tb00712.x

Phelps, E. A. (2004). Human emotion and memory: interactions of the amygdala and hippocampal complex. Curr. Opin. Neurobiol. 14, 198–202. doi: 10.1016/j.conb.2004.03.015

Potter, R. A. (2023). The English Morality Play: Origins, History, and Influence of a Dramatic Tradition. London: Taylor & Francis.

Prins, R., Avraamidou, L., and Goedhart, M. (2017). Tell me a story: the use of narrative as a learning tool for natural selection. Educ. Media Int. 54, 20–33. doi: 10.1080/09523987.2017.1324361

Punpeng, G., and Yodnane, P. (2023). The route to immersion: a conceptual framework for cross-disciplinary immersive theatre and experiences. Hum. Soc. Sci. Commun. 10:961. doi: 10.1057/s41599-023-02485-1

Qian, M., and Clark, K. R. (2016). Game-based learning and 21st century skills: a review of recent research. Comput. Hum. Behav. 63, 50–58. doi: 10.1016/j.chb.2016.05.023

Rajewsky, I. O. (2002). Intermedialität. Stuttgart: A. Francke UTB.

Rancière, J. (2009). The Emancipated Spectator. New York: Verso.

Rosenthal, S. (2009). Dewey's Copernican Revolution. Available online at: https://www.modernreformation.org/resources/articles/deweys-copernican-revolution (Accessed April 17, 2024).

Roth, C. (2019). "The 'Angstfabriek' experience: factoring fear into transformative interactive narrative design" in Proceedings of Interactive Storytelling: 12th International Conference on Interactive Digital Storytelling, ICIDS 2019, Little Cottonwood Canyon, UT, USA. November 19–22, 2019. Springer-Verlag, Berlin, p.101–114.

Ryan, R. M., and Deci, E. L. (2017). Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness. New York, NY: Guilford Publishing.

Ryan, R. M., and Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: definitions, theory, practices, and future directions. Contemp. Educ. Psychol. 61:101860. doi: 10.1016/j.cedpsych.2020.101860

Ryan, R. M., and Rigby, C. S. (2019). "Motivational foundations of game-based learning" in Handbook of Game-Based Learning. eds. J. L. Plass, R. E. Mayer and B. D. Homer (Cambridge, MA: The MIT Press), 153–176.

Ryan, R. M., Ryan, W. S., Di Domenico, S. I., and Deci, E. L. (2019). "The nature and the conditions of human autonomy and flourishing: self-determination theory and basic psychological needs" in The Oxford Handbook of Human Motivation. ed. R. M. Ryan. 2nd ed (New York, NY: Oxford University Press), 89–110.

Sailer, M., and Homner, L. (2020). The gamification of learning: a meta-analysis. Educ. Psychol. Rev. 32, 77–112. doi: 10.1007/s10648-019-09498-w

Sala, A., Punie, Y., Garkov, V., and Cabrera Giraldez, M. (2020). LifeComp: The European framework for personal, social and learning to learn key competence, EUR 30246 EN. Publications Office of the European Union, Luxembourg.

Santangelo, V., and Spence, C. (2007). Multisensory cues capture spatial attention regardless of perceptual load. J. Exp. Psychol. Hum. Percept. Perform. 33, 1311–1321. doi: 10.1037/0096-1523.33.6.1311

Sanz, J. (1996). Memory biases in social anxiety and depression. Cognit. Emot. 10, 87–106. doi: 10.1080/026999396380402

Schank, R. C. (1982). Dynamic Memory: A Theory of Reminding and Learning in Computers and People. New York, NY: Cambridge University Press.

Schank, R. C., and Abelson, R. (1977). Scripts, Plans, Goals, and Understanding. Hillsdale, NJ: LEA.

Schupp, H. T., Stockburger, J., Codispoti, M., Junghöfer, M., Weike, A. I., and Hamm, A. O. (2007). Selective visual attention to emotion. J. Neurosci. 27, 1082–1089. doi: 10.1523/JNEUROSCI.3223-06.2007

Sedikides, C., and Green, J. D. (2000). On the self-protective nature of inconsistency-negativity management: using the person memory paradigm to examine self-referent memory. J. Pers. Soc. Psychol. 79, 906–922. doi: 10.1037/0022-3514.79.6.906

Seli, P., Wammes, J. D., Risko, E. F., and Smilek, D. (2016). On the relation between motivation and retention in educational contexts: the role of intentional and unintentional mind wandering. Psychon. Bull. Rev. 23, 1280–1287. doi: 10.3758/s13423-015-0979-0

Shams, L., and Seitz, A. R. (2008). Benefits of multisensory learning. Trends Cogn. Sci. 12, 411–417. doi: 10.1016/j.tics.2008.07.006

Shapiro, L. (2019). Embodied Cognition. 2nd Edn. London: Routledge.

Shapiro, L., and Stolz, S. A. (2019). Embodied cognition and its significance for education. Theory Res. Educ. 17, 19–39. doi: 10.1177/1477878518822149

Siciliano, L. (2022). "'It Appears to Be a Free-for-All: Designing for Audience Agency in an Immersive Theatre Environment" in Proceedings of the 16th International Conference of the Learning Sciences—ICLS 2022. Hiroshima, Japan: International Society of the Learning Sciences.

Slater, M. D., and Rouner, D. (2002). Entertainment—education and elaboration likelihood: understanding the processing of narrative persuasion. Commun. Theory 12, 173–191. doi: 10.1111/j.1468-2885.2002.tb00265.x

Slota, S. T., and Young, M. F. (2017). "Stories, games, and learning through play: the affordances of game narrative for education" in Handbook of Research on Serious Games for Educational Applications. eds. R. Zheng and M. K. Gardner (United States: IGI Global), 294–319.

So, J, and Shen, L. (2016). Personalization of risk through convergence of self-and character-risk: narrative effects on social distance and self-character risk perception gap. Commun. Res. 43, 1094–1115. doi: 10.1177/0093650215570656

Sui, J., He, X., and Humphreys, G. W. (2012). Perceptual effects of social salience: evidence from self-prioritization effects on perceptual matching. J. Exp. Psychol. Hum. Percept. Perform. 38, 1105–1117. doi: 10.1037/a0029792

Sui, J., and Humphreys, G. W. (2015). The integrative self: how self-reference integrates perception and memory. Trends Cogn. Sci. 19, 719–728. doi: 10.1016/j.tics.2015.08.015

Takahashi, M. (1989). The self-choice effect in learning and memory. Kyoto Univ. Res. Stud. Educ. 35, 211–221.

Takahashi, M., and Umemoto, T. (1987). The study of selective memory in children: an interaction of academic successfulness and free choice. Hum. Dev. Res. 3, 167–176.

Taylor, S. E., and Brown, J. D. (1988). Illusion and well-being: a social psychological perspective on mental health. *Psychol. Bull.* 103, 193–210. doi: 10.1037/0033-2909.103.2.193

Taylor, G., Jungert, T., Mageau, G. A., Schattke, K., Dedic, H., Rosenfield, S., et al. (2014). A self-determination theory approach to predicting school achievement over time: the unique role of intrinsic motivation. *Contemp. Educ. Psychol.* 39, 342–358. doi: 10.1016/j.cedpsych.2014.08.002

Thelen, A., Matusz, P. J., and Murray, M. M. (2014). Multisensory context portends object memory. *Curr. Biol.* 24, R734–R735. doi: 10.1016/j.cub.2014.06.040

Tukachinsky, R. (2014). Experimental manipulation of psychological involvement with media. *Commun. Methods Meas.* 8, 1–33. doi: 10.1080/19312458.2013.873777

Um, E., Plass, J. L., Hayward, E. O., and Homer, B. D. (2012). Emotional design in multimedia learning. *J. Educ. Psychol.* 104, 485–498. doi: 10.1037/a0026609

Voelkl, K. E. (1997). Identification with school. *Am. J. Educ.* 105, 294–318. doi: 10.1086/444158

Vuilleumier, P. (2005). How brains beware: neural mechanisms of emotional attention. *Trends Cogn. Sci.* 9, 585–594. doi: 10.1016/j.tics.2005.10.011

Wang, Ma, Li, & Fleer (2024). Conceptual PlayWorld: creating motivating conditions for new kindergarten practices in China to support engineering education. Eur. Early Child. Educ. Res. J. 32: 522–540. doi: 10.1080/1350293X.2023.2266784

White, G. (2012). On immersive theatre. *Theatr. Res. Int.* 37, 221–235. doi: 10.1017/S0307883312000880

White, G. (2013). Audience Participation in Theatre: Aesthetics of the Invitation. New York: Palgrave Macmillan.

Wolf, W. (2015). "Literature and music: theory" in Handbook of Intermediality. Literature—Image—Sound—Music. ed. G. Rippl (Berlin: De Gruyter), 459–474.

Wong, S. C. (2020). Competency definitions, development and assessment: a brief review. *Int. J. Acad. Res. Progress. Educ. Dev.* 9, 95–114. doi: 10.6007/IJARPED/v9-i3/8223

Xu, H., Ge, S., and Yuan, F. (2022). Research on the mechanism of influence of game competition mode on online learning performance. *Behav. Sci.* 12:225. doi: 10.3390/bs12070225

Zou, X., Chen, Y., Xiao, Y., Zhou, Q., and Zhang, X. (2023). Better controlled, better maintained: sense of agency facilitates working memory. *Conscious. Cogn.* 110:103501. doi: 10.1016/j.concog.2023.103501

![frontiers logo] **frontiers** | Frontiers in Psychology

Family functionality as a mediator in the relationship between humanization and academic burnout in adolescents

Pablo Molina Moreno[1]*, Silvia Fernández Gea[1],
María del Carmen Pérez-Fuentes[1],
María del Mar Molero Jurado[1] and José Jesús Gázquez Linares[2]

[1]Department of Psychology, Universidad de Almería, Almería, Spain, [2]Department of Psychology,
Universidad Autónoma de Chile, Santiago, Chile

Introduction: During adolescence, personal competencies serve as protective factors against social exclusion and are crucial for promoting psychological well-being and creating opportunities for growth. Family and educational systems play a pivotal role in supporting these competencies. This study aims to analyze the relationships between humanization competencies, academic burnout, and family functionality, to examine sex differences in these variables, and to explore the mediating effect of family functionality.

Methods: The sample comprised 1,092 secondary school students (584 females and 508 males) from Almería, Spain, aged 12 to 17 (M = 14.5 years).

Results: The findings show that family functionality is positively associated with humanization competencies and academic efficacy, and negatively associated with emotional exhaustion and cynicism. Notable sex differences emerged, with males scoring higher in optimism, self-efficacy, and affect, while females scored higher in sociability and cynicism. Mediation analysis revealed that family functionality partially mediates the relationship between humanization competencies and academic burnout, specifically impacting cynicism, academic efficacy, and emotional exhaustion.

Discussion: These results highlight the critical role of a supportive family environment in enhancing adolescents' psychological resilience and academic outcomes. The study suggests that interventions targeting family functionality could be effective in reducing academic burnout and promoting overall well-being among adolescents.

KEYWORDS

personal competencies, family functionality, academic burnout, humanization, adolescence, education, high-school students

1 Introduction

Adolescence is the developmental period between childhood and adulthood, marked by the onset of puberty and ending when an individual achieves independence within society (Dumontheil, 2016; Sibilia et al., 2024). The World Health Organization (World Health Organization, 2021) defines this stage as occurring between the ages of 10 and 19, emphasizing its significance due to the relevant emotional, social and physical changes experienced by adolescents, which place them in a vulnerable position to factors that may impair their

development towards adulthood. Studies such as that of Tervo-Clemmens et al. (2024) highlight this stage as one characterized by heightened exposure to risk behaviors. Having a well-developed set of personal competencies during adolescence is crucial for effectively managing these challenges and promoting psychological well-being (Schoeps et al., 2021). These personal competencies protect against social exclusion and rejection (Griffin, 2017) during a stage when social relationships become more complex, driven by developing executive functions and heightened social sensitivity—key influences on adolescent development (Blakemore and Mills, 2014).

Therefore, to ensure the comprehensive well-being of adolescents, it is essential to prioritize the improvement of their mental health and psychological aspects (Matić and Musil, 2023). Numerous studies highlight the importance of cultivating personal competencies to enhance the well-being of young individuals (Galván, 2015; Molina-Montes et al., 2023). Some researchers conceptualize these personal skills under the framework of "humanization," which includes competencies such as Disposition to Optimism, Emotional Understanding, Sociability, Affect, and Self-Efficacy (Pérez-Fuentes et al., 2019a,b). The development of these competencies from an early age should be supported by family and educational systems to strengthen youth, thereby promoting greater overall well-being and expanding future opportunities (Márquez and Gaeta, 2017).

Insufficient development of these competencies can lead to lower academic performance and increased stress in students (Llanos, 2016; Pérez and Chávez, 2024). Burnout is a condition that arises after prolonged exposure to adverse events, such as chronic stress, and manifests through physical, psychological, and emotional symptoms (Abarkar et al., 2023). When the origin of stress is in the school setting, this disorder is referred to as academic burnout and is identified as a persistent and negative psychological state experienced by students in relation to their learning (Gao, 2023). Adolescents who experience academic burnout usually present physical exhaustion and emotional exhaustion; feelings of cynicism towards their studies, understood as indifference or lack of interest; and low levels of academic efficacy, which refers to the aptitude for the performance of their academic competencies (Usán et al., 2020). Although this type of disorder can affect each adolescent differently, it has been evidenced in works such as Lee and Lee (2018) and Barbosa-Camacho et al. (2022), that academic burnout can affect the individual's relationships with their teachers, family and friends; as well as their attitudes towards study, negatively affecting academic performance, adaptation to school life and satisfaction with life. Ultimately, academic burnout and social anxiety can lead to problem behaviors such as absenteeism and dropping out of school (Sasagawa and Essau, 2022; Wang et al., 2019), given the lack of participation in class activities, frequent absences, and feelings of meaninglessness and incompetence in learning content (Rezaei et al., 2021).

Stressful academic events increase the probability that high school students present symptoms of depression (Salmela-Aro, 2022) and anxiety (Gázquez et al., 2023; Martínez-Líbano et al., 2022). In addition, adolescents' mental health symptoms, such as depression and anxiety, are closely linked to higher levels of academic burnout, as they tend to rely on avoidance strategies due to a lack of positive emotional regulation techniques (Vinter et al., 2021). Additionally, a strong sense of academic self-efficacy positively influences academic performance and school adaptation, which, in turn, enhances overall life satisfaction (Castelli and Marcionetti, 2024; Kim and Park, 2020).

Although the development of academic burnout syndrome is influenced by individual factors, the influence of the adolescent's family factors has also been argued (Liu et al., 2024; Zhang et al., 2023), an aspect highlighted in studies such as that of Wu et al. (2022) where the existence of a significant correlation between academic burnout and family functioning has been highlighted. Family functionality refers to the growth and maturation, both physically and psychologically, of all the members that make up a family, which is a relevant factor for adolescents as it affects their overall behavior (Wu et al., 2016). Affective bonds within a functional family can help it adapt to challenges, fostering higher adolescent satisfaction, whereas family dysfunction reduces satisfaction and increases vulnerability in physical, psychological, and social development (Mateo-Crisóstomo et al., 2018). It has been seen that good family functionality acts as a protective factor against risk behaviors, such as difficulties in communicating with friends, self-esteem problems and decision-making (Esteves et al., 2020), given that the affective relationships that are generated provide a social support network and an increase in adaptive capacity through emotional regulation skills (Barragán et al., 2021). This fosters a greater ability to overcome adverse situations, mitigating mental health issues such as anxiety and depression (Elizarov et al., 2023), reducing exposure to tobacco and alcohol consumption (Molero et al., 2019; Musitu et al., 2007), and lowering the likelihood of developing psychopathic traits (Cano-Lozano et al., 2023; Jiménez-Granado et al., 2023).

Similarly, personal competencies such as self-efficacy (Zakiei et al., 2020), affect (Alvarez-Subiela et al., 2022), sociability (Esteves et al., 2020), emotional skills (Szcześniak and Tułecka, 2020) and optimism (Barragán et al., 2021) have been directly related to family functionality.

Additionally, it is necessary to consider adolescents' personal characteristics, such as age and sex, as these factors play a key role in empirical studies examining humanization competencies (Bermejo et al., 2013; Villacieros et al., 2019), academic burnout (Read et al., 2022; Vinter et al., 2021), and family functionality (Barragán et al., 2021; Spitz and Steinhausen, 2023).

Family functionality has been identified as a mediator in various adolescent contexts, such as the relationship between prosocial behavior and school climate (González and Molero, 2023). However, there is a limited body of research that has specifically explored the mediating effect between personal competencies and academic burnout in depth, highlighting the need for further investigation in this area. Consequently, the main objectives of the present study are: (1) to analyze the relationships between humanization competencies, academic burnout, and family functioning in adolescents; (2) to explore potential sex differences in these variables; and (3) to examine the mediating role of family functioning in the relationship between humanization competencies and academic burnout.

The following are the research hypotheses established for this study. The first hypothesis (H1) seeks to establish positive associations between the three primary variables: humanization competencies, academic burnout and family functionality. The second hypothesis (H2) focuses on investigating whether there are significant sex differences in humanization, academic burnout and family functioning. And the third hypothesis (H3) explores whether family functionality acts as a mediator in the relationship between personal competencies (HUMAS) and the dimensions of academic burnout in adolescents (Figure 1).
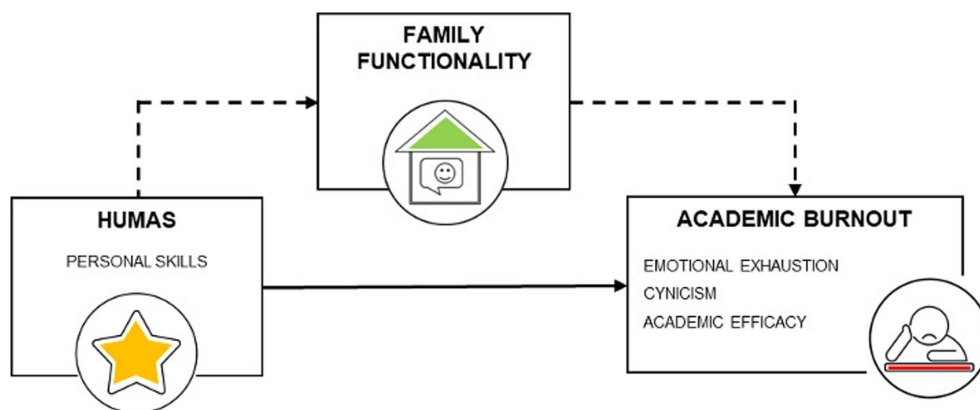
FIGURE 1
Hypothesized mediation model. Source: Own elaboration.

2 Materials and method

2.1 Participants

To select the participants for the sample and ensure the study's relevance and consistency, specific inclusion and exclusion criteria were established to the inclusion criteria were: (a) enrollment in a secondary education institution, (b) age between 12 and 16 years, and (c) possession of signed informed consent from parents or legal guardians. Conversely, the exclusion criteria included: (a) any pre-existing medical or psychological condition that could interfere with the accurate completion of the questionnaires, and (b) failure to complete the questionnaire in its entirety, as incomplete data were excluded from the analysis. These criteria ensured a homogeneous sample of adolescents within the school context, aligned with the study's objectives.

This study involved a final sample of 1,092 secondary school students from the province of Almería, Spain, drawn from six high schools and spanning the 2nd, 3rd, and 4th years of compulsory secondary education (ESO, due to its initials in Spanish). Participants were required to be between 12 and 17 years old ($M = 14.5$, SD = 1.11) to meet the eligibility criteria. Initially, the sample consisted of 1,280 adolescents; however, 188 were excluded after data processing due to incomplete attendance, language barriers, or random response patterns (see Figure 2). The final sample comprised 1,092 adolescents, of whom 53.5% were female ($n = 584$; $M = 14.14$, SD = 1.04) and 46.5% were male ($n = 508$; $M = 14.17$, SD = 1.17). The distribution of the sample by academic year was as follows: 2nd ESO ($n = 400$; 194 males, 206 females), 3rd ESO ($n = 342$; 143 males, 199 females), and 4th ESO ($n = 350$; 171 males, 179 females).

2.2 Instruments

An *ad hoc* questionnaire was initially designed to collect sociodemographic data from the students, including age, sex, educational level, and country of origin. Additionally, other variables related to the school environment, academic performance, involvement in violent behaviors, and personal interactions with
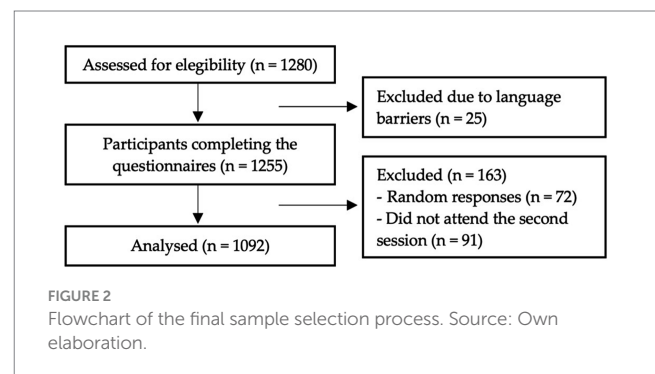

FIGURE 2
Flowchart of the final sample selection process. Source: Own elaboration.

immediate social contexts—such as parents, legal guardians, teachers, and peers—were also assessed.

The HUMAS scale (Pérez-Fuentes et al., 2019a; Pérez-Fuentes et al., 2019b), which demonstrated a reliability of $\alpha = 0.75$ in this study, is designed to assess humanization through 19 items rated on a five-point Likert scale (ranging from "never" to "always"). It comprises five subscales: (1) Willingness to optimism ($\alpha = 0.62$) measured by items such as "I look forward to the future with enthusiasm"; (2) Sociability ($\alpha = 0.67$) assessed through statements like "When I relate to my peers I try to put myself in their place"; (3) Emotional Understanding ($\alpha = 0.70$) with items such as "When I dislike someone, I make an effort to understand them and give them a chance to get to know them"; (4) Self-Efficacy ($\alpha = 0.68$) through statements like "I am satisfied with what I do and how I do it"; and (5) Affect ($\alpha = 0.73$) evaluated using items such as "I feel nervous when I perform group tasks."

The Maslach Burnout Inventory-Student Survey (MBI-SS) (Pérez-Fuentes et al., 2020) used in this study is the Spanish adaptation for adolescents based on the original Burnout scale by Maslach and Jackson (1981, 1986), demonstrating a reliability of $\alpha = 0.72$. This instrument is designed to assess students' feelings and attitudes toward their academic activities by measuring burnout in terms of its frequency and intensity. It consists of 12 items rated on a 7-point Likert scale (from 0, "Never" to 6, "Always/Every day"). The scale is divided into three subscales: (1) Emotional exhaustion ($\alpha = 0.83$) through items such as "I feel emotionally drained by my

studies"; (2) Depersonalization (α = 0.84) with items such as "I have become less enthusiastic about my studies"; and (3) Academic efficacy (α = 0.80) assessed with items like "In my opinion, I am a good student."

The Family Functioning Scale (APGAR) (Bellón et al., 1996) used in this study is the Spanish adaptation of the original version by Smilkstein et al. (1982), demonstrating a reliability of α = 0.80. This scale consists of five items that evaluate key aspects of family functioning: adaptability, growth, partnership, affection, and resolve. Responses are measured on a three-point scale (0 = "Almost Never," 1 = "Sometimes," 2 = "Almost Always") through items such as, "Are you satisfied with the time you and your family spend together?"

2.3 Procedure

Educational institutions in Almería offering Compulsory Secondary Education were randomly contacted. Initial communication with the responsible staff (administration or school office) was conducted via telephone or email, providing detailed information about the research project, its objectives, and the questionnaire booklet for student administration. Six high schools agreed to participate, and data collection took place during the first quarter of the 2023/24 academic year.

After obtaining permissions from the schools and informed consent from parents, visits were scheduled in coordination with the schools. Assessments were administered in classrooms with the presence of the respective academic tutor.

Each group session lasted 2 h; although the tests could be completed in approximately one-hour, two-hour weekly slots were scheduled for each group to allow for two sessions, minimizing fatigue and ensuring optimal performance. To clearly separate the sessions, a statement reading "End of Session 1" was included in the questionnaire, instructing students to stop at that point and conclude the first session. To maintain anonymity while ensuring participant recognition in the second session, students created an anonymous code to record in their notebooks. They were instructed to construct a code based on a pattern of personal cues that would be easy for them to remember.

Each session began with a thorough explanation of the study's objectives, followed by clear instructions for participants to complete the questionnaires individually. Participants were assured of the privacy and secure statistical handling of their data, with an emphasis on the voluntary, anonymous, and confidential nature of their participation. No costs were incurred for participation, and no financial compensation was provided. The study was conducted in accordance with the World Medical Association's Declaration of Helsinki, as it involved human subjects. Additionally, the research received approval from the Bioethics Committee of the University of Almería (Reference: UALBIO2020/046).

2.4 Data analysis

This cross-sectional study employed a quantitative, descriptive, and correlational design. Data analysis was conducted using IBM SPSS Statistics for Windows (Version 29) (IBM Corp, 2023). First, the reliability of the instruments used for data collection was assessed by estimating Cronbach's alpha coefficient (Cronbach, 1951).

Pearson's correlation coefficient was calculated to analyze the correlation among the study variables. The interpretation of the magnitude of the correlation followed Cohen's (1988) guidelines: rxy < 0.3 indicating a weak correlation, 0.3 ≤ rxy < 0.5 indicating a moderate correlation, and 0.5 ≤ rxy indicating a strong correlation.

Additionally, a comparative analysis of means was performed to identify significant differences in personal skills, academic burnout, and family functioning based on sex, using Student's t-test for independent samples. Cohen's d was calculated to estimate effect sizes, following the author's criteria: 0.2 (small effect), 0.5 (medium effect), and 0.8 (large effect) (Cohen, 1988).

Subsequently, simple mediation models were estimated, with the total score on personal competencies (HUMAS scale) as the independent variable, family functionality as the mediating variable, and each factor of academic burnout (emotional exhaustion, cynicism, and academic efficacy) as the dependent variable in separate models. The mediation models were computed using the PROCESS macro (v.4.0) for SPSS (Hayes, 2013), applying the bootstrapping technique with estimated coefficients from 5,000 bootstrap samples, and a 95% confidence interval.

3 Results

3.1 Humanization, burnout and family functionality: correlation analysis

As shown in Table 1, the correlation matrix of the humanization, burnout and family functioning variables is presented.

Positive correlations were found between family functionality and most dimensions of the HUMAS scale: Disposition to Optimism ($r = 0.43$; $p < 0.01$), Sociability ($r = 0.16$; $p < 0.01$), Self-Efficacy ($r = 0.38$; $p < 0.01$), and Affect ($r = 0.22$; $p < 0.01$). However, no correlation was observed with the Emotional Understanding dimension.

Similarly, Family Functionality was negatively correlated with two dimensions of Burnout: Emotional Exhaustion ($r = -0.23$; $p < 0.01$) and Cynicism ($r = -0.27$; $p < 0.01$), and positively correlated with Academic Efficacy ($r = 0.34$; $p < 0.01$).

Furthermore, all HUMAS dimensions were significantly correlated with each dimension of Academic Burnout, showing negative correlations with Emotional Exhaustion and Cynicism, and positive correlations with Academic Efficacy.

Next, a Student's t-test for independent samples was performed to determine whether significant differences exist based on students' sex.

3.2 Humanization, burnout and family functionality: mean comparison according to sex

Statistically significant sex differences were found in most dimensions of the HUMAS scale. Specifically, males reported higher mean scores than females in Disposition to Optimism ($t = 6.94$, $p < 0.001$, $d = 0.42$), Self-Efficacy ($t = 6.62$, $p < 0.001$, $d = 0.40$), and

TABLE 1 Humanization, burnout and family functionality.

	Disposition to optimism	Sociability	Emotional understanding	Self-efficacy	Affectation	Emotional exhaustion	Cynicism	Academic efficacy	Family Functionality
Disposition to optimism		0.21**	0.11**	0.58**	0.29**	−0.27**	−0.25**	0.41**	0.43**
Sociability			0.44**	0.28**	−0.16**	−0.06*	−0.19**	0.19**	0.16**
Emotional understanding				0.20**	−0.17**	−0.12**	−0.15**	0.09**	0.06
Self-efficacy					0.22**	−0.26**	−0.30**	0.51**	0.38**
Affectation						−0.38**	−0.20**	0.20**	0.22**
Emotional exhaustion							0.57**	−0.20**	−0.23**
Cynicism								−0.28**	−0.27**
Academic efficacy									0.34**
Mean	10.63	10.99	7.95	18.35	13.44	14.06	9.75	14.62	7.75
SD	2.37	2.39	2.82	3.44	4.10	5.85	6.56	5.16	2.37
Min - Max.	3–15	3–15	3–15	5–25	5–25	0–24	0–24	0–24	0–10

Correlation matrix and descriptive statistics. *$p < 0.05$; **$p < 0.01$.

Affect ($t = 9.57$, $p < 0.001$, $d = 0.58$). Conversely, females scored higher than males in Sociability ($t = -4.35$, $p < 0.001$, $d = 0.26$). No significant sex differences were observed in the Emotional Understanding dimension ($t = -1.33$, $p = 0.091$).

Regarding Burnout dimensions, significant differences were identified in Cynicism ($t = 3.78$, $p < 0.001$, $d = 0.23$), with females scoring higher, and in Academic Efficacy ($t = 4.94$, $p < 0.001$, d = 0.30), where males showed higher mean scores. No significant differences were found in Emotional Exhaustion ($t = -1.13$, $p = 0.130$), despite a higher mean in females.

Lastly, significant differences in Family Functionality were noted ($t = 3.60$, $p < 0.001$, $d = 0.22$), with males reporting a higher mean score than females (see Table 2).

3.3 Mediation models

In the initial regression analysis, which is common across all three models, Family Functionality (M) was designated as the outcome variable, and the effect of the total score in Humanization competencies (X) was estimated, yielding a significant effect ($\beta = 0.11$, $p < 0.001$).

Table 3 and Figure 3 present the results of the simple mediation model for the Emotional Exhaustion factor of academic burnout (Y_1). In the subsequent regression analysis, with Emotional Exhaustion (Y_1) as the outcome variable, the direct effect of the independent variable was estimated ($\beta = -0.24$, $p < 0.001$) along with the effect of the mediator ($\beta = -0.18$, $p < 0.05$). The total effect of the model was also significant ($\beta = -0.26$, $p < 0.001$).

Finally, the analysis of indirect effects using the *bootstrapping* technique showed a significant result ($\beta = -0.02$, SE = 0.008, 95% CI - 0.037, −0.004), indicating a mediation effect of 7.78%. The standardized coefficients are displayed in the corresponding figure.

In Table 4 and Figure 4, Cynicism (Y_2) is taken as the outcome variable in the regression model. The direct effect of the independent variable was estimated ($\beta = -0.22$, $p < 0.001$), along with the effect of the mediator ($\beta = -0.41$, $p < 0.001$), both of which were statistically significant. The total effect of the model was also significant ($\beta = -0.27$, $p < 0.001$). The analysis of indirect effects using the *bootstrapping* technique revealed a significant result ($\beta = -0.04$, SE = 0.010, 95% CI - 0.066, −0.025), indicating a mediation effect of 16.8%. The standardized coefficients are presented in the figure.

Table 5 and Figure 5 illustrate the simple mediation model for the Academic Efficacy factor of Academic Burnout. In this model, Academic Efficacy (Y_3) is designated as the outcome variable. The estimated effects of the independent variable ($\beta = 0.23$, $p < 0.001$) and the mediator ($\beta = 0.38$, $p < 0.001$) were both statistically significant, and the total effect of the model also reached significance ($\beta = 0.27$, $p < 0.001$). The analysis of indirect effects yielded a significant result ($\beta = 0.04$, SE = 0.008, 95% CI 0.027, 0.058), indicating a mediation effect of 15.3%. The standardized coefficients are presented in the corresponding figure.

4 Discussion

The aim of this study was to analyze the relationships between humanization competencies, academic burnout, and family functioning in secondary school students aged 12 to 16. In addition, the study sought to examine potential sex differences in these variables, including humanization competencies, academic burnout, and family functioning. Finally, the research aimed to investigate the mediating role of family functioning in the relationship between humanization competencies and academic burnout among the adolescent participants.

Among personal humanization competencies, Disposition to Optimism, emotional skills, Sociability, Affectivity, and Self-Efficacy

TABLE 2 Humanization, burnout and family functionality.

| | | Sex | | | | | | t | p | Confidence interval | Cohen's d |
| | | Man | | | Women | | | | | | |
		N	Mean	SD	N	Mean	SD				
HUMAS	Disposition to optimism	508	11.16	2.25	584	10.18	2.37	6.94	<0.001	0.70, 1.25	0.42
	Sociability	508	10.66	2.30	584	11.28	2.42	−4.35	<0.001	−0.91, −0.34	0.26
	Emotional understanding	508	7.83	2.77	584	8.06	2.87	−1.33	0.091	−0.56, 0.11	0.08
	Self-efficacy	508	19.07	3.15	584	17.72	3.56	6.62	<0.001	0.94, 1.75	0.40
	Affectation	508	14.67	3.95	584	12.38	3.93	9.57	<0.001	1.82, 2.76	0.58
MBI-SS	Emotional exhaustion	508	13.84	5.96	584	14.24	5.75	−1.13	0.130	−1.10, 0.30	0.07
	Cynicism	508	10.55	6.61	584	23.44	6.45	3.78	<0.001	0.72, 2.27	0.23
	Academic efficacy	508	15.44	4.91	584	13.91	5.27	4.94	<0.001	0.92, 2.14	0.30
	Family Functionality	508	8.02	2.16	584	7.51	2.52	3.60	<0.001	0.23, 0.79	0.22

Descriptives and *t*-test according to sex.

TABLE 3 Mediation estimates.

Effect	Label	Estimate	SE	95% CI		p	Standardized estimates
				Lower	Upper		
Indirect	a x b	−0.020	0.008	−0.036	−0.004	0.013	−0.031
Direct	c'	−0.239	0.020	−0.280	−0.198	< 0.001	−0.368
Total	c' + a x b	−0.260	0.019	−0.297	−0.221	< 0.001	−0.399

Simple mediation model of family functionality on the relationship between humanization and the emotional exhaustion of academic burnout.

FIGURE 3
Simple mediation model of family functionality on the relationship between humanization and the emotional exhaustion of academic burnout. a = Dire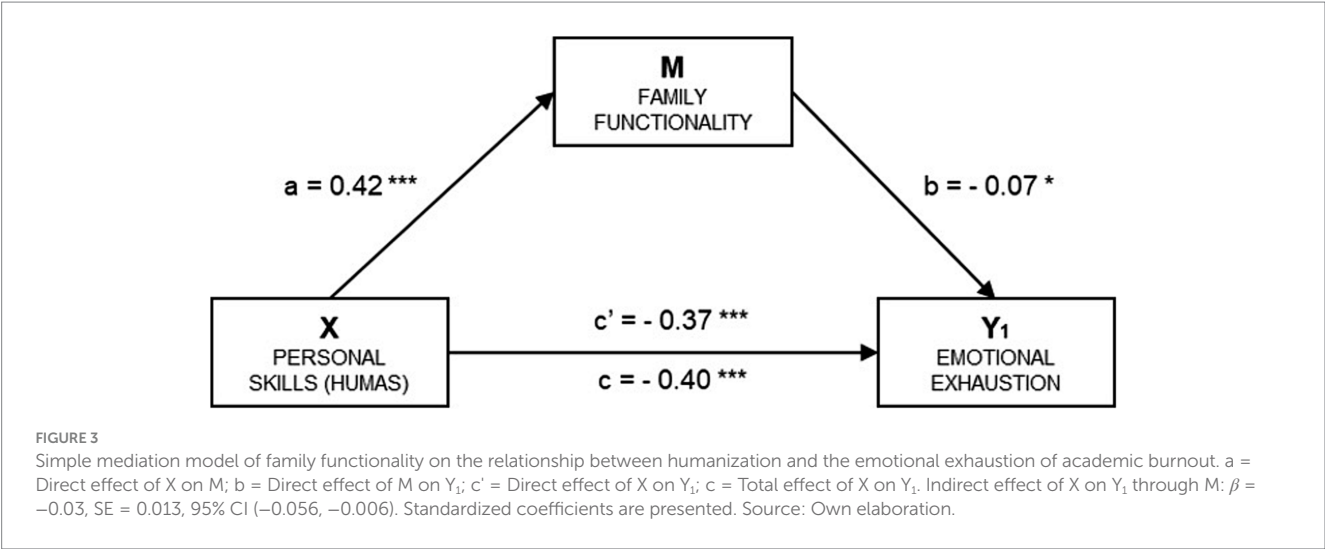ct effect of X on M; b = Direct effect of M on Y_1; c' = Direct effect of X on Y_1; c = Total effect of X on Y_1. Indirect effect of X on Y_1 through M: β = −0.03, SE = 0.013, 95% CI (−0.056, −0.006). Standardized coefficients are presented. Source: Own elaboration.

TABLE 4 Mediation estimates.

Effect	Label	Estimate	SE	95% CI		p	Standardized estimates
				Lower	Upper		
Indirect	a x b	−0.045	0.010	−0.066	−0.025	< 0.001	−0.062
Direct	c'	−0.223	0.023	−0.270	−0.178	< 0.001	−0.306
Total	c' + a x b	−0.269	0.020	−0.309	−0.227	< 0.001	−0.368

Simple mediation model of family functionality on the relationship between humanization and the cynicism of academic burnout.
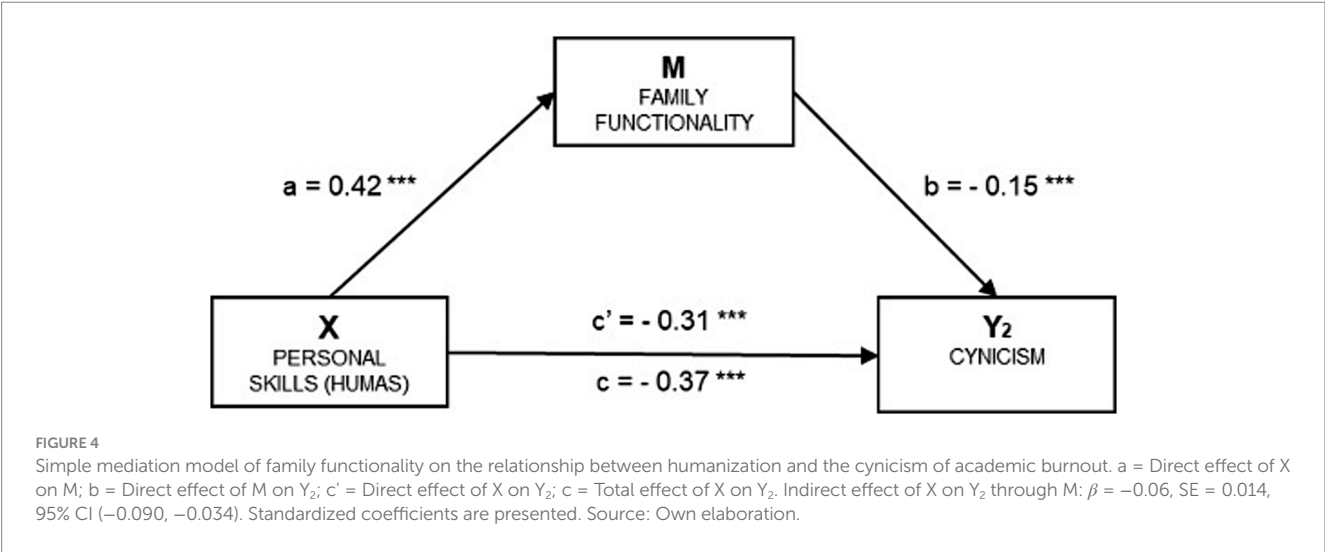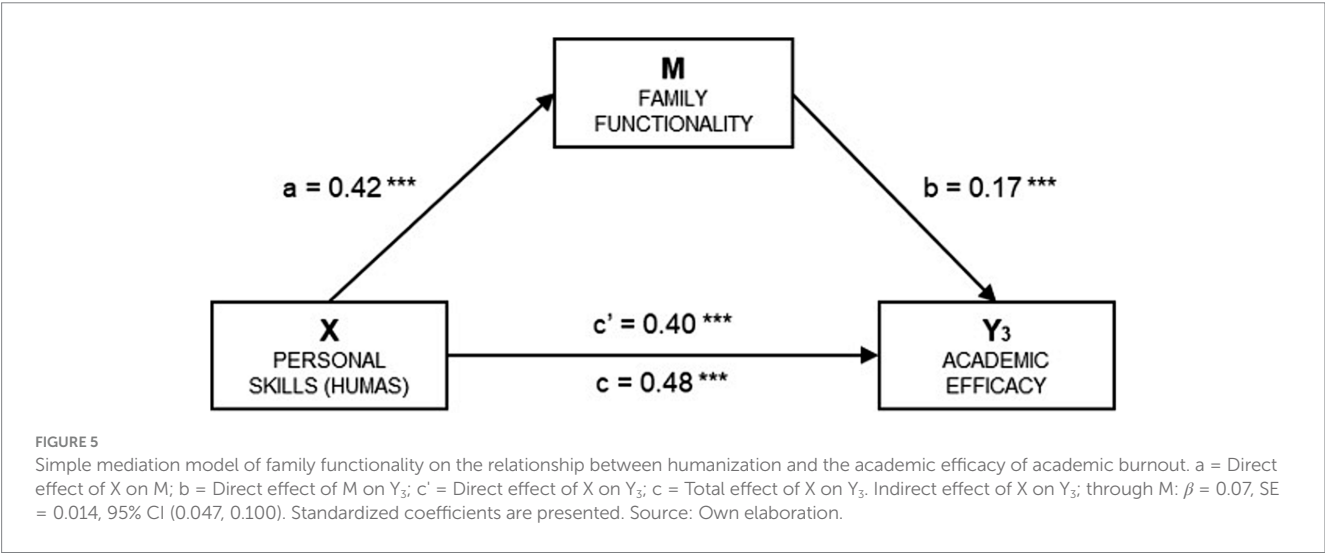

FIGURE 4
Simple mediation model of family functionality on the relationship between humanization and the cynicism of academic burnout. a = Direct effect of X on M; b = Direct effect of M on Y_2; c' = Direct effect of X on Y_2; c = Total effect of X on Y_2. Indirect effect of X on Y_2 through M: β = −0.06, SE = 0.014, 95% CI (−0.090, −0.034). Standardized coefficients are presented. Source: Own elaboration.

TABLE 5 Mediation estimates.

Effect	Label	Estimate	SE	95% CI		p	Standardized estimates
				Lower	Upper		
Indirect	a x b	0.042	0.007	0.027	0.058	< 0.001	0.073
Direct	c'	0.231	0.017	0.197	0.265	< 0.001	0.403
Total	c' + a x b	0.273	0.016	0.241	0.305	< 0.001	0.476

Simple mediation model of family functionality on the relationship between humanization and the academic efficacy of academic burnout.

FIGURE 5
Simple mediation model of family functionality on the relationship between humanization and the academic efficacy of academic burnout. a = Direct effect of X on M; b = Direct effect of M on Y_3; c' = Direct effect of X on Y_3; c = Total effect of X on Y_3. Indirect effect of X on Y_3; through M: β = 0.07, SE = 0.014, 95% CI (0.047, 0.100). Standardized coefficients are presented. Source: Own elaboration.

stand out, as pointed out by Pérez-Fuentes et al. (2019a, 2019b). These competencies should be supported by appropriate family and educational functionality during adolescence to strengthen and optimize individual development (Márquez and Gaeta, 2017). Inadequate development of these competencies has been associated with poorer academic performance and heightened classroom stress in adolescent students (Llanos, 2016; Pérez and Chávez, 2024).

Persistent stress in the school environment can contribute to the onset of academic burnout syndrome, which is defined as a negative psychological state experienced by students in relation to their learning processes (Gao, 2023). The development of this syndrome is influenced by both individual and family factors (Liu et al., 2024; Zhang et al., 2023).

Based on the above, the first hypothesis was established, with results supporting the existence of a positive correlation between adolescent family functionality and nearly all personal humanization competencies, except for Emotional Understanding. Similarly, family functionality was found to positively correlate with academic burnout dimensions, such as Academic Efficacy, while showing a negative correlation with Emotional Exhaustion and Cynicism. Moreover, significant correlations were observed between all dimensions of the HUMAS scale and those of academic burnout, indicating that all the dimensions of the former are negatively associated with Emotional Exhaustion and Cynicism, and positively associated with Academic Efficacy.

Statistically significant sex differences were observed across most dimensions of the three scales. Regarding personal humanization competencies, males showed higher mean scores than females in Disposition to Optimism, Self-Efficacy, and Affect. Conversely, females scored higher in Sociability. No significant differences were found in the Emotional Understanding dimension. These findings

align with previous research, which reported no sex differences in the mean scores of individual dimensions or the overall scale (Bermejo et al., 2013; Villacieros et al., 2019).

The comparison by sex for the burnout variable in this study revealed significant differences in Cynicism, with females showing a higher mean score, whereas males scored higher in Academic Efficacy. No significant differences were found in Emotional Exhaustion, although the mean was higher among female adolescents. These findings are consistent with previous research, which suggests that academic burnout is prevalent in both sexes but tends to yield higher scores in girls (Read et al., 2022; Vinter et al., 2021).

The observed gender differences in humanization and burnout dimensions have important implications for the development of targeted interventions. Higher scores in sociability among women and in optimism, self-efficacy, and affectivity among men may reflect gendered socialization patterns that influence how both genders manage emotional and academic competencies. Additionally, the higher cynicism scores in women and greater academic efficacy in men suggest that burnout experiences may be shaped by societal expectations and gender roles, which could impact the design of support and prevention strategies in these areas.

Finally, the results indicated significant sex differences in family functionality, with males showing a higher mean score than females. This finding is consistent with the study by Barragán et al. (2021), which also reported higher family functionality scores in males. In addition to these results, Spitz and Steinhausen (2023) reported lower parental cohesion scores in male adolescents compared to females, supporting the second hypothesis of this study.

Regarding the third hypothesis, the results confirm that family functionality serves as a mediator in the relationship between personal

competencies (HUMAS) and the dimensions of academic burnout in adolescents. Specifically, family functionality exhibited the strongest mediating effect with Cynicism, followed by Academic Efficacy and Emotional Exhaustion. This suggests that higher levels of humanization competencies in adolescents are associated with lower levels of emotional exhaustion and cynicism, and greater academic efficacy, through the positive influence of family functionality. These findings align with previous research, which also identified family functionality as a key mediator when examining similar variables (González and Molero, 2023).

The results suggest that schools should integrate programs to develop humanization competencies into their curricula. Activities fostering socio-emotional learning could reduce academic burnout. For families, promoting functional dynamics—such as open communication and emotional support—can help mitigate stress and improve adolescents' academic well-being. Parental training programs focused on cohesion and adaptability may be particularly effective. Strengthening collaboration between schools and families is also essential to maximize these benefits.

5 Conclusion

The significant results of this study aim to elucidate the mediating role of family functionality, based on adolescents' humanization competencies, and its impact on academic burnout, thereby providing a deeper understanding of these interrelated factors. Despite the insights gained, several limitations were identified. One major limitation concerns the type of assessments used, as self-report instruments are susceptible to social desirability bias, wherein adolescents may unconsciously respond in a manner that reflects a more favorable self-image. Although instructions were provided to mitigate this effect, such limitations are inherent to this type of data collection.

Another limitation relates to timing constraints, as some sessions were conducted when participants had low motivation or competing priorities, such as impending exams. Additionally, although the assessments were intended to be completed individually, some participants occasionally shared their responses with peers seated nearby. Language barriers were also a challenge for some adolescents, which hindered their understanding of certain items and required additional time and effort to complete the questionnaires. Furthermore, the contextualization of the present study was constrained by a lack of prior research examining the three variables - humanization competencies, academic burnout, and family functionality - simultaneously in adolescents. Although this study establishes the mediating role of family functionality between humanization competencies and academic burnout, the underlying mechanisms require further exploration. A functional family environment could enhance adolescents' emotional regulation and coping strategies, mitigating academic stress and promoting academic efficacy. Future studies could use longitudinal designs to clarify whether improvements in family functionality led to sustained development of humanization competencies and a reduction in burnout. Additionally, qualitative methods such as interviews could provide deeper insights into how family dynamics influence adolescents' academic and emotional well-being. Related studies exist, but they have typically explored these variables in isolation, supporting the relevance and contribution of this research. Also, the sample's limitation to adolescents from a single spanish province may affect the generalizability of the findings, as cultural and geographical differences could influence how academic burnout, and related factors manifest in other regions.

This study addresses a gap in the literature by highlighting the mediating role of family functioning in the relationship between personal competencies and academic burnout, offering new insights into adolescent well-being. These findings underscore the need for practical applications, such as family-focused intervention programs that enhance communication and cohesion, alongside school-based initiatives to strengthen students' social–emotional skills. This can serve as a foundation for educational professionals and parents to better understand how adolescents' family functioning and personal competencies influence their academic well-being and mental health. It is recommended that these results be used to inform the design of intervention programs aimed at fostering a healthy family environment and enhancing social–emotional skill development in adolescents, which would, in turn, help prevent academic burnout and promote improved academic performance and overall well-being.

In conclusion, efforts should focus on promoting comprehensive educational approaches that incorporate these intervention programs into the academic curricula of schools, both in Spain and globally, adapting their objectives to the specific needs and characteristics of the students and educational staff involved.

Data availability statement

The data presented in this study are available on request from the corresponding author.

Ethics statement

The studies involving humans were approved by the Committee of Bioethics of the University of Almería with reference UALBIO2020/046. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

PMM: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft. SFG: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft. MdCP-F: Conceptualization, Data curation, Investigation, Methodology, Project administration, Supervision, Writing – review & editing. MdMMJ: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Supervision, Writing – original draft. JJGL: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Supervision, Writing – review & editing.

Funding

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.

The author(s) declared that they were an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

Generative AI statement

The authors declare that no Gen AI was used in the creation of this manuscript.

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

Abarkar, Z., Ghasemi, M., Manesh, E. M., Sarvestani, M. M., Moghbeli, N., Rostamipoor, N., et al. (2023). The effectiveness of adolescent-oriented mindfulness training on academic burnout and social anxiety symptoms in students: experimental research. *Ann. Med. Surg.* 85, 2683–2688. doi: 10.1097/ms9.0000000000000811

Alvarez-Subiela, X., Castellano-Tejedor, C., Villar-Cabeza, F., Vila-Grifoll, M., and Palao-Vidal, D. (2022). Family factors related to suicidal behavior in adolescents. *Int. J. Environ. Res. Public Health* 19:9892. doi: 10.3390/ijerph19169892

Barbosa-Camacho, F. J., Romero-Limón, O. M., Ibarrola-Peña, J. C., Almanza-Mena, Y. L., Pintor-Belmontes, K. J., Sánchez-López, V. A., et al. (2022). Depression, anxiety, and academic performance in COVID-19: a cross-sectional study. *BMC Psychiatry* 22, 443–410. doi: 10.1186/s12888-022-04062-3

Barragán, A. B., Molero, M. D. M., Pérez-Fuentes, M. D. C., Oropesa, N. F., Martos, Á., Simón, M. D. M., et al. (2021). Interpersonal support, emotional intelligence and family function in adolescence. *Int. J. Environ. Res. Public Health* 18:5145. doi: 10.3390/ijerph18105145

Bellón, J. A., Delgado, A., Luna, J. D. D., and Lardelli, P. (1996). Validity and reliability of the APGAR family function questionnaire family. *Prim. Care* 18, 289–296.

Bermejo, J. C., Lozano, B., Villacieros, M., and Carabias, R. (2013). Development and validation of a scale on the meaning of suffering: Escala Humanizar. *Anales Sistema Sanitario Navarra* 36, 35–45. doi: 10.4321/S1137-66272013000100004

Blakemore, S. J., and Mills, K. L. (2014). Is adolescence a sensitive period for sociocultural processing? *Annu. Rev. Psychol.* 65, 187–207. doi: 10.1146/annurev-psych-010213-115202

Cano-Lozano, M. C., Contreras, L., Navas-Martínez, M. J., León, S. P., and Rodríguez-Díaz, F. J. (2023). Child-to-parent violence offenders (specialists vs. generalists): the role of direct victimization at home. *Eur. J. Psychol. Appl. Legal Context* 15, 9–22. doi: 10.5093/ejpalc2023a2

Castelli, L., and Marcionetti, J. (2024). Life satisfaction and school experience in adolescence: the impact of school supportiveness, peer belonging and the role of academic self-efficacy and victimization. *Cogent Educ.* 11:2338016. doi: 10.1080/2331186X.2024.2338016

Cohen, J. (1988). Statistical power analysis for the behavioral sciences. *2nd* Edn. Hillsdale, NJ: Erlbaum Associates.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika* 16, 297–334. doi: 10.1007/BF02310555

Dumontheil, I. (2016). Adolescent brain development. *Curr. Opin. Behav. Sci.* 10, 39–44. doi: 10.1016/j.cobeha.2016.04.012

Elizarov, E., Konshina, T., Benish-Weisman, M., Lee, T. K., Van Ryzin, M., Vos, S. R., et al. (2023). Family functioning, well-being, and mental health among new immigrant families. *J. Fam. Psychol.* 37, 806–817. doi: 10.1037/fam0001092

Esteves, A. R., Paredes, R. P., Calcina, C. R., and Yapuchura, C. R. (2020). Social skills in adolescents and family functionality. *Communication* 11, 16–27. doi: 10.33595/2226-1478.11.1.392

Galván, N. G. (2015). Development of emotional competencies in young high school students under a psychoeducational approach. *Caleidoscopio* 18, 157–180. doi: 10.33064/33crscsh563

Gao, X. (2023). Academic stress and academic burnout in adolescents: a moderated mediating model. *Front. Psychol.* 14:1133706. doi: 10.3389/fpsyg.2023.1133706

Gázquez, J. J., Molero, M. D. M., Pérez-Fuentes, M. D. C., Martos, Á., and Simón, M. D. M. (2023). Mediating role of emotional intelligence in the relationship between anxiety sensitivity and academic burnout in adolescents. *Int. J. Environ. Res. Public Health* 20:572. doi: 10.3390/ijerph20010572

González, A., and Molero, M. (2023). The moderating role of family functionality in prosocial behaviour and school climate in adolescence. *Int. J. Environ. Res. Public Health* 20:590. doi: 10.3390/ijerph20010590

Griffin, A. (2017). Adolescent neurological development and implications for health and well-being. *Healthcare* 5:62. doi: 10.3390/healthcare5040062

Hayes, A. F. (2013). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. New York, USA: The Guilford Press.

IBM Corp (2023). IBM SPSS statistics for windows, version 29.0.2.0. Armonk, NY: IBM Corp.

Jiménez-Granado, A., Hoyo-Bilbao, J. D., and Fernández-González, L. (2023). Interaction of parental discipline strategies and Adolescents' personality traits in the prediction of child-to-parent violence. *Eur. J. Psychol. Appl. Legal Context* 15, 43–52. doi: 10.5093/ejpalc2023a5

Kim, M. J., and Park, J. H. (2020). Academic self-efficacy and life satisfaction among adolescents: mediating effects of self-transcendence. *Child Youth Serv.* 41, 387–408. doi: 10.1080/0145935X.2020.1852920

Lee, M. Y., and Lee, S. M. (2018). The effects of psychological maladjustments on predicting developmental trajectories of academic burnout. *Sch. Psychol. Int.* 39, 217–233. doi: 10.1177/0143034318766206

Liu, C., She, X., Lan, L., Wang, H., Wang, M., Abbey, C., et al. (2024). Parenting stress and adolescent academic burnout: the chain mediating role of mental health symptoms and positive psychological traits. *Curr. Psychol.* 43, 7643–7654. doi: 10.1007/s12144-023-04961-y

Llanos, S. L. (2016). Generic competencies and academic stress in university students. *Rev. ConCiencia* 1, 11–19. doi: 10.32654/CONCIENCIAEPG

Márquez, M. C., and Gaeta, M. L. (2017). Development of emotional competencies in pre-adolescents: the role of parents and teachers. *Rev. Electr. Interuniv. Interuniv. Form. Prof.* 20, 221–235. doi: 10.6018/reifop/20.2.232941

Martínez-Líbano, J., Yeomans, M. M., and Oyanedel, J. C. (2022). Psychometric properties of the emotional exhaustion scale (ECE) in Chilean higher education students. *Eur. J. Investig. Health Psychol. Educ.* 12, 50–60. doi: 10.3390/ejihpe12010005

Maslach, C., and Jackson, S. E. (1981). The measurement of experienced burnout. *J. Organ. Behav.* 2, 99–113. doi: 10.1002/job.4030020205

Maslach, C., and Jackson, S. E. (1986). Maslach burnout inventory manual. *2nd* Edn. Palo Alto: Consulting Psychologists Press.

Mateo-Crisóstomo, Y., Rivas-Acuña, V., González-Suárez, M., Ramírez, G. H., and Victorino-Barra, A. (2018). Functionality and family satisfaction in adolescent alcohol and tobacco use. *Health Addict.* 18, 195–205. doi: 10.21134/haaj.v18i2.378

Matić, I., and Musil, V. (2023). Subjective well-being and self-assessed health of adolescents: a longitudinal cohort study. *Eur. J. Investig. Health Psychol. Educ.* 13, 2853–2862. doi: 10.3390/ejihpe13120197

Molero, M. M., Pérez-Fuentes, M. C., Barragán, A. B., del Pino, R. M., and Gázquez, J. J. (2019). Analysis of the relationship between emotional intelligence, resilience, and family functioning in Adolescents' sustainable use of alcohol and tobacco. *Sustain. For.* 11:2954. doi: 10.3390/su11102954

Molina-Montes, A., Pérez-Villamizar, D. I., Domínguez-Angarita, D. D., and Yohaid-Trujillo, Y. L. (2023). Student emotional competencies and opportunities for improvement of teaching and learning processes in emotional education. *AiBi J. Res. Manag. Eng.* 11, 98–105. doi: 10.15649/2346030X.3129

Musitu, G., Jiménez, T., and Murgui, S. (2007). The role of family functioning and social support in adolescent substance use. *Rev. Española Drogodepend.* 32, 370–380.

Pérez, Y. P., and Chávez, D. E. P. (2024). Contributions from psychology and didactics: emotional development and academic performance in adolescents. *Rev. Varela* 24, 25–32. doi: 10.5281/zenodo.10429148

Pérez-Fuentes, M. D. C., Herrera-Peco, I., Molero, M. D. M., Oropesa, N. F., Ayuso-Murillo, D., and Gázquez, J. J. (2019a). The development and validation of the healthcare professional humanization scale (HUMAS) for nursing. *Int. J. Environ. Res. Public Health* 16:3999. doi: 10.3390/ijerph16203999

Pérez-Fuentes, M. D. C., Molero, M. D. M., Peco, I. H., Oropesa, N. F., and Gázquez, J. J. (2019b). Proposal of a humanization model based on personal competences: HUMAS model. *Eur. J. Health Res.* 5, 63–77. doi: 10.30552/ejhr.v5i1.173

Pérez-Fuentes, M. C., Molero, M. M., Simón, M. M., Oropesa, N. F., and Gázquez, J. J. (2020). Validation of the Maslach burnout inventory-student survey in Spanish adolescents. *Psicothema* 3, 444–451. doi: 10.7334/psicothema2019.373

Read, S., Hietatajärvi, L., and Salmela-Aro, K. (2022). School burnout trends and sociodemographic factors in Finland 2006-2019. *Soc. Psychiatry Psychiatr. Epidemiol.* 57, 1659–1669. doi: 10.1007/s00127-022-02268-0

Rezaei, A. M., Naeim, M., Asadi, R., Ardebil, F. D., Bayat, M., and Khoshroo, K. (2021). The predictive role of emotional intelligence, resilience, and personality traits in addiction potential of students at Arak University of Medical Sciences. *Addict. Disord. Treat.* 20, 472–478. doi: 10.1097/ADT.0000000000000276

Salmela-Aro, K. (2022). "Current findings and policy concepts concerning school-related health and well-being in Finland-school burnout and engagement," in *Wohlbefinden und Gesundheit im Jugendalter*, eds. A. Heinen, R. Samuel, C. Vögele and H. Willems (Wiesbaden: Springer VS).

Sasagawa, S., and Essau, C. A. (2022). Relationship between social anxiety symptoms and behavioral impairment in adolescents: the moderating role of perfectionism and learning motivation. *Eur. J. Educ. Psychol.* 15, 79–96. doi: 10.32457/ejep.v15i2.1964

Schoeps, K., Tamarit, A., Postigo, S., and Montoya-Castilla, I. (2021). The long-term effects of emotional competencies and self-esteem on adolescents' internalizing symptoms. *Rev. Psicod.* 26, 113–122. doi: 10.1016/j.psicod.2020.12.001

Sibilia, F., Jost-Mousseau, C., Banaschewski, T., Barker, G. J., Büchel, C., Desrivières, S., et al. (2024). The relationship between negative life events and cortical structural connectivity in adolescents. *IBRO Neurosci. Rep.* 16, 201–210. doi: 10.1016/j.ibneur.2024.01.012

Smilkstein, G., Ashworth, C., and Montano, D. (1982). Validity and reliability of the family APGAR as a test of family function. *J. Fam. Pract.* 15, 303–311.

Spitz, A., and Steinhausen, H. C. (2023). Development of family adaptability and cohesion from adolescence to young adulthood and associations with parental behavior. *J. Child Fam. Stud.* 32, 2036–2045. doi: 10.1007/s10826-023-02562-8

Szcześniak, M., and Tułecka, M. (2020). Family functioning and life satisfaction: the mediatory role of emotional intelligence. *Psychol. Res. Behav. Manag.* 13, 223–232. doi: 10.2147/PRBM.S240898

Tervo-Clemmens, B., Karim, Z. A., Khan, S. Z., Ravindranath, O., Somerville, L. H., Schuster, R. M., et al. (2024). The developmental timing but not magnitude of adolescent risk-taking propensity is consistent across social, environmental, and psychological factors. *J. Adolesc. Health* 74, 613–616. doi: 10.1016/j.jadohealth.2023.11.001

Usán, P., Salavera, C., and Mejías, J. (2020). Relationships between emotional intelligence, academic burnout and performance in school adolescents. *Rev. Ces. Psico* 13, 125–139. doi: 10.21615/cesp.13.1.8

Villacieros, M., Bermejo, J. C., and Hassoun, H. (2019). Psychometric validation of the brief humanizing scale on the meaning of suffering. *J. Healthc. Qual. Res.* 34, 86–92. doi: 10.1016/j.jhqr.2019.01.003

Vinter, K., Aus, K., and Arro, G. (2021). Adolescent girls' and boys' academic burnout and its associations with cognitive emotion regulation strategies. *Educ. Psychol.* 41, 1061–1077. doi: 10.1080/01443410.2020.1855631

Wang, M., Guan, H., Li, Y., Xing, C., and Rui, B. (2019). Academic burnout and professional self-concept of nursing students: a cross-sectional study. *Nurse Educ. Today* 77, 27–31. doi: 10.1016/j.nedt.2019.03.004

World Health Organization (2021). Adolescent mental health. Geneva: WHO.

Wu, K., Wang, F., Wang, W., and Li, Y. (2022). Parents' education anxiety and children's academic burnout: the role of parental burnout and family function. *Front. Psychol.* 12:764824. doi: 10.3389/fpsyg.2021.764824

Wu, C. S. T., Wong, H. T., Yu, K. F., Fok, K. W., Yeung, S. M., Lam, C. H., et al. (2016). Parenting approaches, family functionality, and internet addiction among Hong Kong adolescents. *BMC Pediatr.* 16:130. doi: 10.1186/s12887-016-0666-y

Zakiei, A., Vafapoor, H., Alikhani, M., Farnia, V., and Radmehr, F. (2020). The relationship between family function and personality traits with general self-efficacy (parallel samples studies). *BMC Psychol.* 8, 88–11. doi: 10.1186/s40359-020-00462-w

Zhang, H., Li, S., Wang, R., and Hu, Q. (2023). Parental burnout and adolescents' academic burnout: roles of parental harsh discipline, psychological distress, and gender. *Front. Psychol.* 14:1122986. doi: 10.3389/fpsyg.2023.1122986

Frontiers in
Psychology

Paving the way for a greater understanding of human behavior

The most cited journal in its field, exploring psychological sciences - from clinical research to cognitive science, from imaging studies to human factors, and from animal cognition to social psychology.

Discover the latest Research Topics

See more →

frontiers | Research Topics