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Emotional intelligence in applied settings: Approaches to its theoretical model, measurement, and application

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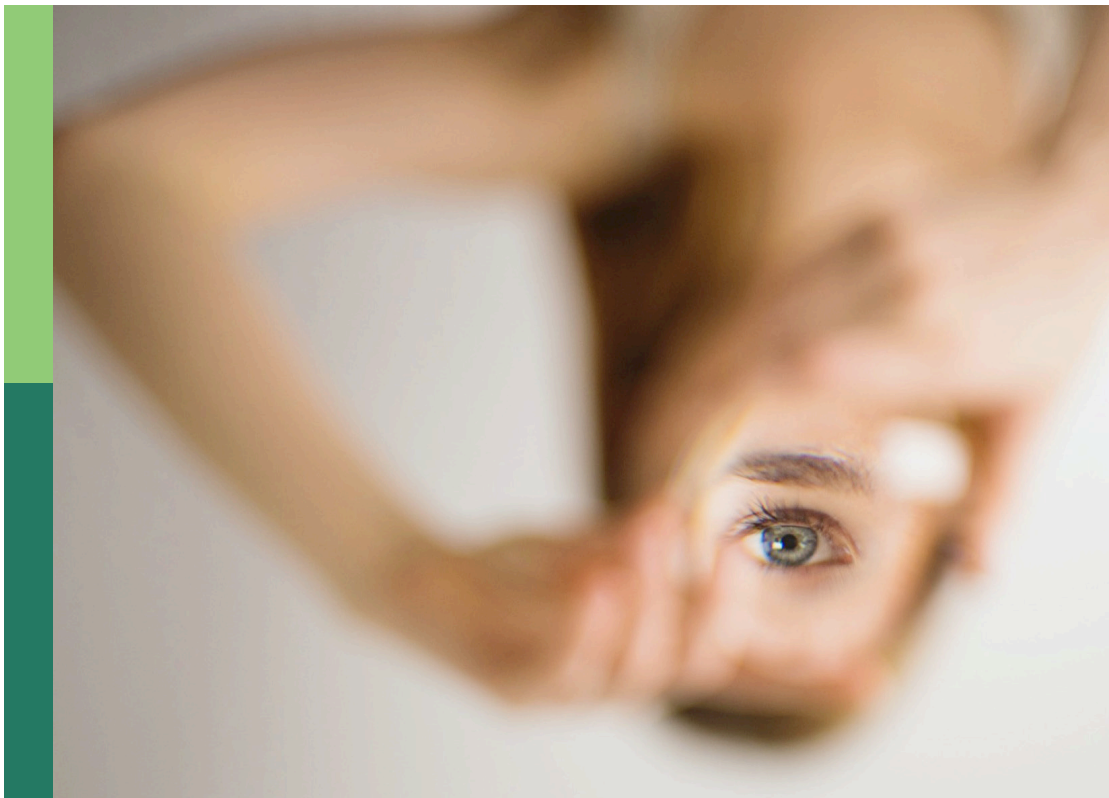

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Emotional intelligence in applied settings: Approaches to its theoretical model, measurement, and application

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Editorial: Emotional intelligence in applied settings: approaches to its theoretical model, measurement, and application

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Editorial on the Research Topic
Emotional intelligence in applied settings: approaches to its theoretical model, measurement, and application

Peter Salovey and John D. Mayer defined 'Emotional Intelligence' in 1990 (Salovey and Mayer, 1990), and Daniel Goleman popularized this concept via his book *Emotional Intelligence*, published in 1995 (Goleman, 1995). Since then, many studies have investigated the concept of emotional intelligence and its relationships with behavior and cognition. Although there are debates about the conceptualization and assessment of emotional intelligence (EI) (e.g., Simonet et al., 2021), such as EI as a set of traits or EI as a set of skills, EI proved to be a critical variable worth of consideration for applied research in several domains (e.g., Zeidner et al., 2004; Brackett et al., 2011; Schlegel and Mortillaro, 2019). In this Research Topic, we focused primarily on two specific domains that we think merit particular attention: organizations and education.

The role of EI in organizations has probably been the main focus of attention for the first wave of research following the pioneering publications from Salovey and Mayer (1990). EI has been considered a critical predictor of performance in organizational settings, and several meta-analyses confirmed this assumption (e.g., Joseph and Newman, 2010). Regardless of the conceptualization of EI, authors found that EI has incremental validity over and above the big five and cognitive ability in predicting job performance – at least for jobs high in emotional labor demands (Joseph and Newman, 2010). However, methods and conceptualizations impact the strength of this association (O'Boyle et al., 2011). In two more recent meta-analyses, besides job performance, Miao et al. (2017, 2018) found that EI relates to authentic leadership, job satisfaction, organizational commitment, and, inversely, to turnover intentions, especially when using self-report measures.

The second domain in which EI has been at the center of extensive attention is education, mostly from the perspective of academic success in students. This research, at

first, faced several theoretical and methodological issues that raised some criticisms (Humphrey et al., 2007). However, as the field matured, studies found that EI predicted students' success in a range of different education contexts, from secondary education (Sánchez-Álvarez et al., 2020) to performance across all age groups (MacCann et al., 2019), to special professional education contexts like hospitality (Goh and Kim, 2020) or medical school (Libbrecht et al., 2014). Studies focusing on teachers' emotional competencies are relatively less frequent and merit further consideration, but results seem to indicate their critical importance, as we will also read in the present Research Topic.

Our Frontiers Research Topic on *Emotional intelligence in applied settings: approaches to its theoretical model, measurement, and application* recognizes EI as a pivotal area of contemporary psychology. This stance was echoed by the authors in this collection of published articles, stressing the essential positive role of EI in individuals' lives across different contexts. From a general point of view, Manjarres et al. used a bibliometric analysis and literature review of emotional skills and concluded that emotional skills have nowadays become a requirement for success in all scenarios of individuals' actions and a large part of their life cycle.

We present four articles related to the field of education: two contributions that focus on teachers, one in the context of learning a foreign language and one on teachers' life satisfaction, and two on students, one concerning their emotions and the other on academic performance in a specific educational setting. Hu investigated the effects of teacher self-compassion, emotion regulation, and emotional labor strategies on teacher resilience in the English as a foreign language (EFL) context, finding the direct and indirect effects of different EI components on teacher resilience and highlighting EI's role in minimizing difficulties in the challenging field of foreign language instruction. Similarly, Deng et al. examined the effects of three facets of trait EI and two types of effects on rural teachers' general life satisfaction, pointing to the evidence that rural teachers with higher EI are more likely to have positive emotions, enhancing their general life satisfaction. If we move our focus from the teacher to the students, we find the interesting contribution of Xu et al. who used machine learning to identify categories of academic emotion among graduate students based on texts. Finally, Völker et al. focused on the role of EI in predicting academic performance among college students in hospitality education, highlighting how ability EI provides unique advantages beyond cognitive ability and personality traits in predicting academic performance.

Education is strictly related to development, and for this reason, we host two other articles in this collection that are not directly linked to academic performance but investigate the social life and mental health of children and adolescents, themes that can be also considered factors potentially influencing their academic performance. Indeed, Wang et al. studied the effects of emotional awareness on children's social adaptation in terms of emotional development and depression. Zhang et al. investigated the association between expressive flexibility and depressive symptoms among a large sample of adolescents and explored age and gender differences.

We then have two articles related to the organizational context. Robinson et al. hypothesized that a work-contextualized form of EI was positively associated with organizational citizenship behaviors. The pivotal function of EI in job performance is further analyzed by Zhao and Sang, who discussed how trait emotional quotient (EQ) and adversity quotient (AQ) contribute to individuals' objective career success (job position) and subjective career success (organizational commitment) among the general adult population.

In addition to the central theme of the articles mentioned above that emphasizes the applications of EI in social lives across different ages and environments, Audrin and Audrin proposed the concept of "digital emotional intelligence," going beyond solely EI by integrating digital competence and emotional intelligence in the digital context. This work makes a significant theoretical contribution by highlighting the relevance of digital competence to EI, offering opportunities for future studies.

In this Research Topic, we offer 10 articles that focus on various applications of EI in individuals' social lives, from children to adults. We hope you find something of interest to you in one or more of the 10 articles we present in this collection on the vital role of EI regarding interpersonal relationships and life success. We recognize that other studies may approach these topics differently; likewise, many other EI topics can be and will be discussed in the future. We look forward to continued research on EI to clarify the relationships between different theoretical approaches, suggest ways to integrate them, or identify ideas related to application contexts.

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Affectively effective: Work-related emotional intelligence as a predictor of organizational citizenship

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Introduction: Efforts to link ability-related emotional intelligence to organizational behavior have resulted in modest findings.

Methods: The present three studies examine whether a work-contextualized form of emotional intelligence (W-EI) may have greater predictive value, particularly in the organizational citizenship domain. Because W-EI should benefit social relationships within the workplace, positive associations between W-EI and organizational citizenship behavior were hypothesized.

Results: This hypothesis was supported in three studies (total *N* =462) involving samples of part-time student employees (Study 1), postdoctoral researchers (Study 2), and full-time employees (Study 3). All studies also provided evidence for incremental validity, such as with respect to the Big 5 personality traits, and Study 3 highlighted processes related to workplace engagement (in the form of higher levels of interpersonal job satisfaction and lower levels of burnout).

Discussion: The results demonstrate the importance of W-EI in understanding employee variations in organizational citizenship.

KEYWORDS

emotional intelligence, ability, work, contextual behavior, organizational citizenship

Introduction

As part of the "affective revolution" in organizational science, the idea that emotionally intelligent (EI) employees may be better employees has been of interest for several decades (Ashkanasy and Humphrey, 2011). Emotional intelligence can be assessed in trait-related terms or as an ability, but these streams of research need to be distinguished from each other (Mayer et al., 2008) because the two sorts of assessments do not correlate very highly with each other (Joseph and Newman, 2010) and/or assess fundamentally different constructs (Roberts et al., 2010). One rationale for such dissociations is that people have poor insight into their emotional abilities (Sheldon et al., 2014), and the present research is concerned with ability-related variations in emotional intelligence (ability EI) rather than self-reports of emotional ability (Mayer et al., 2008).

In the present research, we will begin by making the case that generic measures of ability EI display small or modest relationships with organizational outcomes (Ybarra et al., 2014). However, there are reasons for thinking that an ability EI measure that is contextualized for the workplace may fare better (Robinson et al., 2019). This point is investigated in the context of possible relationships between work-related emotional intelligence (W-EI) and organizational citizenship behaviors, which are non-mandatory behaviors that nonetheless play a large role in supporting organizational functioning (Werner, 2000). To obtain high W-EI scores, the test-taker needs to possess both emotion knowledge and social cognitive skills and this set of social–emotional skills is posited to contribute to better relationships in the workplace, which should be linked to higher levels of

interpersonal citizenship behavior (Bowler and Brass, 2006). Partly as a consequence of such relationships, individuals with higher levels of W-EI should achieve higher levels of integration and engagement within the workplace, which would be linked to citizenship behaviors benefitting the organization as a whole. Possible relationships between W-EI and citizenship behaviors will be examined in three studies.

The need for a contextualized measure

Efforts to link ability EI to organizational outcomes have resulted in modest findings. With respect to the performance of job-related tasks, Joseph and Newman (2010) reported a meta-analytic correlation of 0.16. However, ability EI did not predict task performance when controlling for personality plus cognitive ability and ability EI predicted task performance only in jobs that required high levels of emotional labor. O'Boyle et al. (2011) updated these meta-analytic conclusions and the results were similar. The ability EI/task performance correlation was 0.21, but this figure dropped to 0.07 when controlling for other individual difference factors. In additional meta-analyses, ability EI appears to be a largely inconsequential predictor of job satisfaction (Miao et al., 2017a), authentic leadership (Miao et al., 2018), and organizational citizenship behavior, particularly when controlling for other individual difference factors (Miao et al., 2017b). Findings such as these have led some commentators to conclude that ability EI may be a largely inconsequential predictor of workplace behaviors or outcomes (Zeidner et al., 2004; Ybarra et al., 2014).

Part of the problem is that the measures used in these studies—such as the MSCEIT (Mayer et al., 2003)—were not designed for the workplace. In fact, the MSCEIT includes tasks, such as ascribing emotions to abstract images or likening emotions to physical sensations, that would seem to possess little relevance to workplace functioning. This analysis is pertinent because the nature of a predictor will determine what it predicts (Hogan and Roberts, 1996) and measures contextualized for the workplace, relative to measures that are not, are likely to be better predictors of workplace outcomes (Lievens and De Soete, 2012). A general case for this point has been made in the attitude literature, which has shown that measures targeting particular behaviors predict those behaviors much better than more general (non-targeted) measures do (Ajzen and Timko, 1986; Kraus, 1995; Siegel et al., 2014). A more specific case for this point has been made in a literature that has shown that personality measures that have been contextualized for the workplace (such as by adding "at work" to items) predict workplace outcomes better than non-contextualized personality measures do (Bowling and Burns, 2010; Fisher et al., 2017). The predictive benefits of contextualization are likely to extend to many classes of predictors (Wernimont and Campbell, 1968), including those of an ability-related type (Lievens and De Soete, 2012).

On the basis of such considerations, Krishnakumar et al. (2016) created an ability-based EI measure for use in workplace settings (also see Schlegel and Mortillaro, 2019). The test—which is termed the NEAT (North Dakota Emotional Abilities Test)—uses a situational judgment test (SJT) format, both to assess social cognitive skills (Persich et al., 2020) and because SJT tests have been shown to be valid predictors of workplace outcomes (McDaniel et al., 2007). In the perception task, test-takers are asked to rate the extent to which an employee would experience a series of four emotions in a given scenario (e.g., "There have been widespread layoffs in Margie's organization recently"). In the management task, test-takers are asked to rate the effectiveness of four different ways of responding to a situation that would induce emotions in its participants (e.g., "Stephan saw his co-worker struggling to a considerable extent"). The test is scored using a proportion consensus metric (Mayer et al., 2003) that utilizes the ratings of 82 workplace leaders, as described below. Krishnakumar et al. (2016) report extensive reliability and validity information for the NEAT and scores from the test are now referred to in terms of variations in work-related emotional intelligence (W-EI: Robinson et al., 2019).

Investigating possible relationships with organizational citizenship

Thus far, the NEAT has primarily been used in studies focused on the prediction of workplace affect (e.g., Robinson et al., 2020), task performance (e.g., Krishnakumar et al., 2019), or deviance and/or counterproductive work behavior (e.g., Robinson et al., 2019). What remains to be known is whether employees with higher levels of W-EI are better organizational citizens. Findings of this type would represent an important discovery because organizational citizenship behaviors (OCBs) contribute to better ratings of job performance (Borman and Motowidlo, 1997) and benefit organizational functioning (Werner, 2000). Indeed, higher rates of OCB, which can be defined in terms of helpful and conscientious behaviors within the workplace (e.g., showing up on time, helping coworkers, and speaking well of one's organization) have been linked to managerial ratings of performance, turnover intentions, productivity, efficiency, and organizational performance (Podsakoff et al., 2009). As an example of the benefits of OCB, Walz and Niehoff (2000) found that restaurants with higher OCB rates were more efficient, produced higher-quality service, and garnered higher ratings of customer satisfaction. In the present studies, we therefore focused squarely on this class of behaviors.

Organizational citizenship behaviors can be classified in various ways (Podsakoff et al., 2000), but the most stable distinction involves whether the behavior benefits individual targets (OCB-Is) or the organization as a whole (OCB-Os; Spitzmuller et al., 2008). Included in the first category would be helping coworkers who have been absent or taking time to listen to coworker concerns; included in the second category would be showing up on time and protecting organizational property (Williams and Anderson, 1991). There are reasons for thinking that higher levels of W-EI should be linked to a greater frequency of OCB-Is. Perhaps most straightforwardly, obtaining higher scores on the NEAT would seem to require skills related to perspective taking and empathetic concern—that is, the successful test taker must be capable of appreciating the plight of a protagonist and simulating the emotional reactions that he/she (i.e., the target character) would experience. Empathy and perspective taking, in turn, have been linked to prosocial behavior generally (Eisenberg and Miller, 1987; Batson, 1991; Van der Graaf et al., 2018) and to organizational citizenship behavior in particular (Borman et al., 2001; Joireman et al., 2006). This analysis accords with the results of several studies that have linked self-reported levels of emotional intelligence to perspective taking (Schutte et al., 2001), empathetic concern (Hajibabaee et al., 2018), and to relationship-enhancing behaviors that would tend to follow from perspective taking and empathetic concern (Schröder-Abe and Schütz, 2011).

Second, it is widely thought that facility with the emotion domain contributes to better interpersonal functioning (Halberstadt et al., 2001; Brackett et al., 2006; Farmer and Chapman, 2016). In fact, emotional intelligence is often considered a type of social intelligence (Mayer and

Salovey, 1993; Schlegel et al., 2013) and individuals who can understand their emotions, and manage them in skillful manners, tend to have better interpersonal relationships (Schutte et al., 2001; Schröder-Abe and Schütz, 2011; Farmer and Chapman, 2016). In support of this point, a series of studies by Lopes and colleagues have linked the management branch of the MSCEIT to outcomes such as relationship quality, popularity, and lesser tendencies toward interpersonal conflict (Lopes et al., 2003, 2004, 2011). The NEAT, too, has been linked to perceptions of social support (Krishnakumar et al., 2019) and to satisfaction with interpersonal features of the workplace (Krishnakumar et al., 2016). Satisfaction with one's workplace colleagues should, in turn, give rise to higher levels of organizational citizenship behavior (Spitzmuller et al., 2008; Organ, 2018). In concert with this proposed model, Study 3 will examine whether satisfaction with interpersonal features of the job mediates relationships between W-EI and OCB-I rates.

Beyond individual relationships, social and emotional skills can support higher levels of social integration, defined in terms of being an active, engaged member of a community (Berkman et al., 2000). Socially integrated individuals identify with the communities to which they belong and they enact a higher frequency of responsible behaviors as well as supportive reciprocal exchanges (Ware et al., 2007). In fact, Brañas-Garza et al. (2010) contend that there are evolutionary reasons for thinking that social integration supports prosocial behavior (Nowak, 2006) and Brañas-Garza et al. (2010) found that participants with higher levels of social integration allocated more money to strangers in a dictator game. Through the application of social and emotional skills within the workplace, the high W-EI employee should develop higher levels of social integration within their workplaces, which should give rise to higher levels of citizenship, particularly of an OCB-O type (Podsakoff et al., 2000; Chiu and Tsai, 2006). In support of the latter links, variables such as organizational identification (Lee et al., 2015) and organizational commitment (Meyer et al., 1989) are robust predictors of OCB-O rates (Podsakoff et al., 2000).

Within the workplace, social integration would support something termed work engagement, which can be defined in terms of investing oneself in one's work role (Wefald et al., 2012). Investments of this type support job performance (Bailey et al., 2017), but they also support citizenship behaviors, particularly of an OCB-O type (Rich et al., 2010). Given that we have suggested that higher levels of W-EI should be linked to higher levels of social integration, they should support greater workplace engagement as well. Indirect evidence for this point would be evident to the extent that W-EI correlates positively with OCB-O rates, which suggest investment in one's work role and the broader organizational culture (Macey and Schneider, 2008). More direct evidence would take the form of lower levels of workplace burnout, which is antithetical to engagement (Schaufeli and Bakker, 2004), and which may mediate relationships between W-EI levels and OCB-O rates (for a relevant precedent, see Swider and Zimmerman, 2010). Study 3 will examine mediation-related processes of this type.

Altogether, the present investigation consisted of three studies. In Study 1, we sought to examine relationships between W-EI and OCB among part-time (student) workers, who are an important component of the workforce (Conway and Briner, 2002). In Study 2, we reasoned that it would be good to obtain one sample of employees who held similar positions and obtained a large sample of postdoctoral researchers. Even in this context, we expected positive associations between W-EI and organizational citizenship behaviors. In Study 3, finally, we obtained a diverse sample of full-time employees and again predicted positive relationships between W-EI and OCB levels. In all studies, we focused on the distinction between individual-targeted OCBs and organization-targeted OCBs (Spitzmuller et al., 2008) and hypothesized relationships with both OCB types. All studies also focused on questions of incremental validity, for example with respect to personality traits such as agreeableness and conscientiousness (Sackett and Walmsley, 2014), and Study 3 additionally focused on mechanisms related to job satisfaction and burnout. In total, the investigation was designed to establish the relationships of interest while exploring additional questions about them.

Study 1

Method

Participants and procedures

We sought adequate (0.80) power to detect zero-order relationships in the 0.3 range, following precedent (Krishnakumar et al., 2016). G*Power software (Faul et al., 2009) recommended a sample size of 84 and we recruited 83 (48.19% female; 90.36% Caucasian; *M* age = 21.16) undergraduate students from a north Midwestern University in the United States who were working at least 20 h per week (of note, sample sizes exceeded 84 in Studies 2 and 3). Participants signed up for the study with SONA software and completed the study at a secure Qualtrics-programmed website, following which research credit was awarded. The average employee worked 26.52 h per week, had worked at their places of employment for 17.30 months, and types of employment included accounting, customer service, health care, manufacturing, office management, and sales. Data and a materials file for all studies can be found at OSF: https://osf.io/26tcu/?view_only=ec9f2275950c467ead7f4c16ee080451.

Work-related emotional intelligence

Work-related emotional intelligence was assessed with the NEAT, which applies the situational judgment method (Corstjens et al., 2017) to the key emotional intelligence tasks of perception, understanding, and management (Joseph and Newman, 2010), with a specific focus on workplace events and contexts (Krishnakumar et al., 2016). By embedding all scenarios and ways of responding within a workplace context, the hope is to capture a particular form of emotional reasoning that should have particular relevance to workplace functioning (Shaffer and Postlethwaite, 2012). In studies by Krishnakumar et al. (2016), the understanding branch of the NEAT tended to be less reliable and valid than the perception and management branches. In addition, the perception and understanding branches involve similar tasks—namely, rating the extent to which characters would experience particular emotions. Finally, the correlation among latent factors indicated that the perception and understanding branches were largely redundant ($r = 0.81$). For all of these reasons, and to support efficiently of measurement, we used a revised version of the NEAT that administers the perception and management tasks, but not the understanding task (Robinson et al., 2020).

The perception and management branches are thought to capture explicit and implicit (more behavioral) forms of emotion knowledge, complementing each other well (Robinson et al., 2019). The perception task asks individuals to rate the extent to which 10 protagonists (e.g., "Cassidy successfully finished a project that took months to accomplish") would each experience four different emotions (e.g., joy and interest). The management task then asks individuals to rate the effectiveness of

four different ways of responding (e.g., take over the co-worker's more challenging tasks, hope the co-worker eventually "gets" it) to another 10 emotional situations (e.g., "Stephan saw his co-worker struggling to a considerable extent").

For each task, responses range from poor ones to moderately good ones to very good ones, and both tasks were therefore paired with five-point rating scales (e.g., 1 = very ineffective; 5 = very effective). Ratings were then rescored using proportion consensus scoring metrics, which have performed well in many previous studies (e.g., Barchard et al., 2013). Participants, that is, received scores that reflected the percentage of an expert sample who made the same rating for a particular item (e.g., 0.2683 if 26.83% of the expert sample made the same rating that the participant did). Given the focus on workplace knowledge, expert norms were obtained from 82 workplace leaders (administrators, CEOs, etc.) who had an average of 18.53 years of workplace experience and an average of 27.15 supervisees. Scores were averaged across items for a particular scenario and then across scenarios to quantify work-related emotional intelligence (W-EI) in general terms (M = 0.3027; SD = 0.0625; α = 0.92). Of note, chance responding would produce a score of 0.2000 and the maximal possible score was 0.4531, which would be awarded if the participant always matched the highest percentage of expert raters for all of the ratings that they made. In actuality, scores ranged from 0.1083 to 0.3985. For comparison purposes, we also computed separable perception (M = 0.3286; SD = 0.0812; α = 0.92; range = 0.0614–0.4175) and management (M = 0.2768; SD = 0.0649; α = 0.90; range = 0.1456–0.4020) scores. The perception and management branches were correlated at r = 0.46, consistent with the presence of a general factor (Krishnakumar et al., 2016).

In previous studies, the NEAT has been shown to be a reliable measure (Krishnakumar et al., 2016; Robinson et al., 2019). It has also been shown to predict workplace performance (e.g., Krishnakumar et al., 2019) and deviant workplace behaviors (Robinson et al., 2019). In addition, the NEAT displays sensible correlations with personality, general mental ability, and other performance-based EI measures (Krishnakumar et al., 2016).

Organizational citizenship behaviors

Carpenter et al. (2014) have shown that self-reports of organizational citizenship behavior (OCB) are generally preferable to other-reports of the same behaviors, in part because employees have greater knowledge of their own behaviors than others (supervisors or coworkers) do (Allen et al., 2000). Furthermore, other-reports of OCB seem to lack incremental validity relative to self-reports of OCB (Carpenter et al., 2014). For such reasons, and because we sought to establish a novel relationship across multiple studies, we probed for tendencies toward OCB through the use of the self-report method. Of importance, relationships between W-EI and OCB cannot be ascribed to self-reports predicting self-reports because the W-EI measure is an ability-based one (Mayer et al., 2008).

Williams and Anderson (1991) provided support for the discriminability of OCBs with an individual target focus (e.g., helping a coworker) versus OCBs with an organizational target focus (e.g., conserving organizational resources) and this distinction has considerable merit to it (Spitzmuller et al., 2008). As a first way of assessing OCBs within the workplace, we therefore administered the Williams and Anderson (1991) scales. One seven-item scale focused on OCBs intended to help individuals (e.g., "I help others who have been absent"; M = 5.37; SD = 1.13; α = 0.90) and the other focused on OCBs intended to help the organization (e.g., "I conserve and protect organizational property"; M = 5.51; SD = 0.97; α = 0.69).

Another major OCB taxonomy was introduced by Organ (1988), who proposed the categories of altruism, conscientiousness, civic virtue, courtesy, and sportsmanship. In the present study, we focused on the first three categories relative to the second 2 because the first three categories implicate actions (e.g., arriving early to work) rather than inactions (e.g., not complaining). Employees were asked to indicate the extent to which they have engaged in altruistic behaviors (e.g., "I am willing to assist new colleagues to adjust to the work environment"; M = 4.10; SD = 0.73; α = 0.88), conscientious behaviors (e.g., "I often arrive early and start to work immediately"; M = 4.00; SD = 0.73; α = 0.86), and behaviors consistent with civic virtue (e.g., "I make constructive suggestions that can improve the operation of the company"; M = 3.91; SD = 0.74; α = 0.86), using scales developed by Podsakoff and MacKenzie (1994). Altruism fits into the OCB-I category and conscientious behavior and civic virtue fit into the OCB-O category (Podsakoff et al., 2000).

Additional variables

Participants reported on gender and job tenure. Additionally, they completed a factual autonomy scale (Spector and Fox, 2003) that probed for degrees of autonomy within the workplace (M = 3.94; SD = 0.78; α = 0.81). Such degrees of latitude could reasonably result in higher OCB rates, given that OCBs are defined in discretionary terms (Organ, 1988).

Results

Initial results involving W-EI total scores

We hypothesized that employees with higher W-EI levels would engage in OCBs more frequently. This hypothesis was examined in five simple regressions, the results of which are displayed in Table 1. As shown in Table 1, W-EI predicted all forms of organizational citizenship, with Betas ranging from 0.28 to 0.56.

Branch-specific analyses

The skills assessed by the NEAT are probably best conceptualized in total-score (global EI) terms (Krishnakumar et al., 2016). Nonetheless, because we were interested in the possibility of unique relationships, we performed follow-up simple regressions that replaced the W-EI total score with one branch (perception or management) considered alone. These results, which are also displayed in Table 1, indicate that both perception scores (average β = 0.39) and management scores (average β = 0.35) predicted the occurrence of OCBs, probably because both branches require individuals to understand the emotional states of others, whether explicitly (perception) or implicitly (management).

Incremental validity

To bolster the case for discriminant or incremental validity, we performed five multiple regressions that included the predictors of W-EI (total score), gender (−1 = male; +1 = female), factual autonomy, and job tenure. As indicated in Table 2, the W-EI continuum remained a significant predictor of all forms of OCB with the other factors controlled.

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TABLE 1 Work-related emotional intelligence (W-EI) as a predictor of organizational citizenship behavior (OCB), simple regression results, Study 1.

OCB dimension and predictor	*t*	*p*	*β*
OCB-individual			
W-EI total score	4.39	<0.001	0.44
Perceptual EI	5.31	<0.001	0.51
Management EI	1.93	0.057	0.21
OCB-organizational			
W-EI total score	6.08	<0.001	0.56
Perceptual EI	5.14	<0.001	0.50
Management EI	4.64	<0.001	0.46
Altruism			
W-EI total score	5.01	<0.001	0.49
Perceptual EI	3.95	<0.001	0.40
Management EI	4.34	<0.001	0.43
Conscientiousness			
W-EI total score	4.21	<0.001	0.42
Perceptual EI	3.34	0.001	0.35
Management EI	3.71	<0.001	0.38
Civic Virtue			
W-EI total score	2.63	0.010	0.28
Perceptual EI	1.93	0.057	0.21
Management EI	2.60	0.011	0.28

Fifteen simple regressions were performed.

Discussion

We hypothesized systematic relationships between W-EI and organizational citizenship behaviors. Study 1, which constituted an initial investigation of such relations, confirmed both that these associations were robust and that they were associated with large (Gignac and Szodorai, 2016) effect sizes. There was some indication that W-EI may be a stronger predictor of organizational forms of citizenship relative to individual-targeted forms of OCB, but both such relationships were evident. W-EI, therefore, seems to be an important predictor of organizational citizenship, pending replication.

Study 2

Study 2 sought to replicate relations between W-EI and organizational citizenship behaviors in the context of a single occupation, which would control for several factors that could vary across jobs. Study 2 did so by recruiting a sample of postdoctoral researchers, who occupy a sort of limbo between graduate studies and longer-term positions that are aspired to (Akerlind, 2005). In addition, we collected self-reports of personality, which would allow us to demonstrate incremental validity with respect to personality.

Method

Participants and procedures

The Study 2 sample consisted of post-doctoral researchers who were recruited in two manners. Initially, a Research Assistant visited the websites of major departments in the life sciences (biology, molecular biology, biochemistry, plant sciences, biological sciences, wildlife biology, and ecology) throughout the United States, which led to a compiled list of 1,076 postdoctoral researchers. These individuals were emailed and asked whether they would be willing to complete a study concerning their postdoctoral experiences in return for a chance to win a $20 gift card. Forty-eight individuals used the provided link to complete the Qualtrics-programmed survey on a secure website. Additionally, we obtained an email list of approximately 3,400 postdoctoral researchers from the National Post-Doctoral Association. These individuals were also invited to complete the postdoctoral experiences study over the Internet, in return for a chance to win a $20 gift card. Usable surveys (following from this second recruitment effort) were completed by 184 participants, for a total of 232 participants.

The vast majority (98.71%) of postdoctoral researchers worked in university settings in biological science disciplines. The sample was 65.09% female with a mean age of 32.86 (65.09% Caucasian, 24.14% Asian, 4.31% Hispanic, 3.45% African American, and 3.02% Pacific Islander). Participants had been in their current postdoctoral positions for an average of 24.23 months and the average job salary was $46,107. Participants completed the NEAT and demographic information prior to reporting on their behaviors within the postdoctoral setting.

Work-related emotional intelligence

Work-related emotional intelligence was again assessed with the NEAT, which was designed to capture skills and abilities pertinent to the workplace context (Krishnakumar et al., 2016). The perception task required individuals to discern the emotions that would be present in different situations ($M = 0.3401$; $SD = 0.0648$; $\alpha = 0.89$; range = 0.1516–0.4296) and the management task required individuals to indicate which sorts of responses would be most effective in another set of emotion-laden situations ($M = 0.3037$; $SD = 0.0640$; $\alpha = 0.76$; range = 0.1558–0.3946). Of most interest was the W-EI total score ($M = 0.3219$; $SD = 0.0453$; $\alpha = 0.85$; range = 0.1860–0.4026), but we also retained perception and management scores for follow-up analyses.

Organizational citizenship behaviors

We assessed tendencies toward organizational citizenship in two manners. The distinction between OCBs that target individuals versus OCBs that target the organization is a good one (Spitzmuller et al., 2008) and we therefore administered the Williams and Anderson (1991) scales also administered in Study 1 (OCB-I: $M = 5.33$; $SD = 0.90$; $\alpha = 0.83$; OCB-O: $M = 5.50$; $SD = 0.75$; $\alpha = 0.66$).

Participants also characterized their contextual behavior, which are behaviors closely aligned with OCBs (Organ, 2018), in terms of the contextual behavior scales of Van Scotter and Motowidlo (1996). One subscale focused on interpersonal facilitation (e.g., "support or encourage a co-worker with personal problems"; $M = 5.83$; $SD = 0.76$; $\alpha = 0.81$) and the other focused on job dedication (e.g., "put in extra hours to get work done on time"; $M = 5.77$; $SD = 0.71$; $\alpha = 0.80$). Interpersonal facilitation is

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TABLE 2 Work-related emotional intelligence (W-EI) as a predictor of organizational citizenship behavior (OCB), multiple regression results, Study 1.

OCB dimension and predictor	*t*	*p*	*β*
OCB-individual			
W-EI total score	4.36	<0.001	0.44
Gender	1.62	0.109	0.16
Factual autonomy	0.60	0.553	0.06
Job tenure	0.51	0.610	0.05
OCB-organizational			
W-EI total score	6.41	<0.001	0.55
Gender	2.80	0.006	0.24
Factual autonomy	3.49	<0.001	0.30
Job tenure	0.31	0.755	0.03
Altruism			
W-EI total score	4.99	<0.001	0.49
Gender	0.20	0.845	0.02
Factual autonomy	1.21	0.231	0.12
Job tenure	0.79	0.434	0.08
Conscientiousness			
W-EI total score	4.24	<0.001	0.42
Gender	0.26	0.794	0.03
Factual autonomy	2.34	0.022	0.23
Job tenure	0.70	0.486	0.07
Civic virtue			
W-EI total score	2.57	0.012	0.28
Gender	0.86	0.394	0.09
Factual autonomy	0.60	0.550	0.07
Job tenure	0.31	0.759	0.03

Five multiple regressions were performed. Gender was scored such that females received a higher score (−1 = male; +1 = female).

OCB-I-like in nature and job dedication is OCB-O-like in nature (Podsakoff et al., 2000).

Additional variables

Participants reported on gender and job tenure. In addition, we sought to include measures of cognitive ability and personality. Cognitive ability was assessed through the proxy of college GPA ($M = 3.58$; $SD = 0.34$) and the Big 5 personality traits were assessed with the Ten-Item Personality Inventory (TIPI: Gosling et al., 2003). The latter scales of extraversion ($M = 3.78$; $SD = 1.60$; $\alpha = 0.70$), agreeableness ($M = 5.22$; $SD = 1.19$; $\alpha = 0.31$), conscientiousness ($M = 5.67$; $SD = 1.13$; $\alpha = 0.52$), neuroticism ($M = 3.25$; $SD = 1.34$; $\alpha = 0.63$), and openness to experience ($M = 5.25$; $SD = 1.06$; $\alpha = 0.35$) were brief, but TIPI scales have been shown to correlate highly with longer, typically more reliable, measures of the Big 5 (Ehrhart et al., 2009). Of note, W-EI levels shared positive relationships with agreeableness, $r = 0.38$, $p < 0.001$, and conscientiousness, $r = 0.39$, $p < 0.001$, which is a personality profile that has been linked to better organizational citizenship (Sackett and Walmsley, 2014).

TABLE 3 Work-related emotional intelligence (W-EI) as a predictor of organizational citizenship behavior (OCB), simple regression results, Study 2.

OCB dimension and predictor	*t*	*p*	*β*
OCB-individual			
W-EI total score	5.42	<0.001	0.34
Perceptual EI	3.89	<0.001	0.25
Management EI	4.97	<0.001	0.31
OCB-organizational			
W-EI total score	7.13	<0.001	0.43
Perceptual EI	4.06	<0.001	0.26
Management EI	8.09	<0.001	0.47
Job dedication			
W-EI total score	5.91	<0.001	0.36
Perceptual EI	4.30	<0.001	0.27
Management EI	5.27	<0.001	0.33
Interpersonal facilitation			
W-EI total score	7.26	<0.001	0.43
Perceptual EI	6.21	<0.001	0.38
Management EI	5.27	<0.001	0.33

Twelve simple regressions were performed.

Results

Initial results involving W-EI total scores

As in Study 1, we hypothesized that employees with higher W-EI levels would engage in OCBs more frequently. This hypothesis was initially examined in 4 simple regressions, the results of which are displayed in Table 3. As shown there, W-EI was a positive predictor of all four forms of organizational citizenship, with Betas ranging from 0.34 to 0.43.

Branch-specific analyses

Skills related to perception and management correlated moderately in Study 2, $r = 0.31$, $p < 0.001$. It therefore made sense to perform follow-up regressions in which the predictive ability of each branch was considered separately. As shown in Table 3, all of the regressions involving perception were significant and all of the regressions involving management were also significant. Thus, both branches appear to be linked to organizational citizenship behaviors.

Incremental validity

To demonstrate incremental validity, we conducted four multiple regressions, one for each of the four outcomes. The predictors were W-EI total scores, gender (−1 = male; +1 = female), tenure, GPA, and all five dimensions of personality. As shown in Table 4, W-EI continued to predict all 4 OCB outcomes (examined in Study 2) when controlling for other factors. Relationships between W-EI and OCB were more consistent than relationships between personality and OCB.

Discussion

The W-EI/OCB relationship remained stable among a sample of full-time employees. Betas for initial analyses were in the 0.34–0.43

TABLE 4 Work-related emotional intelligence (W-EI) as a predictor of organizational citizenship behavior (OCB), multiple regression results, Study 2.

OCB dimension and predictor	*t*	*p*	*β*
OCB-individual			
W-EI total score	3.31	0.001	0.27
Gender	1.33	0.186	0.10
Tenure	−0.12	0.901	−0.01
GPA	−1.38	0.169	−0.09
Extraversion	2.99	0.003	0.19
Agreeableness	2.54	0.012	0.18
Conscientiousness	−0.48	0.632	−0.04
Neuroticism	0.19	0.846	0.01
Openness to experience	0.03	0.974	0.00
OCB-organizational			
W-EI total score	3.89	<0.001	0.28
Gender	−1.60	0.111	−0.11
Tenure	0.07	0.947	0.00
GPA	−0.70	0.488	−0.04
Extraversion	−0.02	0.981	−0.00
Agreeableness	3.31	0.001	0.21
Conscientiousness	4.66	<0.001	0.32
Neuroticism	−0.41	0.684	−0.03
Openness to experience	1.55	0.123	0.10
Job dedication			
W-EI total score	2.90	0.004	0.22
Gender	0.85	0.396	0.06
Tenure	−0.35	0.727	−0.02
GPA	−1.68	0.095	−0.11
Extraversion	1.87	0.063	0.11
Agreeableness	−0.28	0.779	−0.02
Conscientiousness	4.48	<0.001	0.32
Neuroticism	−2.48	0.014	−0.16
Openness to experience	0.75	0.457	0.05
Interpersonal facilitation			
W-EI total score	4.65	<0.001	0.35
Gender	1.18	0.239	0.08
Tenure	0.66	0.511	0.04
GPA	−1.38	0.168	−0.09
Extraversion	3.97	<0.001	0.24
Agreeableness	2.52	0.012	0.17
Conscientiousness	0.95	0.341	0.07
Neuroticism	0.14	0.893	0.01
Openness to experience	−0.20	0.845	−0.01

Four multiple regressions were performed. Gender was scored such that females received a higher score (−1 = male; +1 = female).

range and both perception and management predicted these behaviors. Of importance, these relationships remained significant when controlling for personality and cognitive ability, which are individual differences that figure prominently in the organizational literature (Sackett and Walmsley, 2014). The skills and abilities tapped by W-EI can therefore be considered important ones, both with respect to contextual behaviors in general and OCBs in particular.

Study 3

In Study 3, we sought to replicate W-EI/OCB relationships among a more heterogeneous sample of full-time employees, relative to Study 2. Study 1 had suggested that W-EI may be more strongly linked to organization-focused OCBs than dyad-focused OCBs and Study 2 also displayed small trends along these lines (see Tables 1, 3). Accordingly, we revisited this OCB-type distinction in the third study. Additionally, we suggested that W-EI should support higher levels of social engagement or integration, which should be evident in terms of higher levels of job satisfaction as well as lower levels of burnout (Rich et al., 2010). Further, such factors and processes matter for OCB rates (Podsakoff et al., 2000) and might therefore explain some of the variance linking W-EI to organizational citizenship. With respect to these analyses, though, we should caution that cross-sectional forms of mediation might or might not provide insights into longitudinal relationships among the variables (MacKinnon and Fairchild, 2009). Because this is true, mediational analyses should be considered supplemental rather than primary.

Method

Participants and procedures

In Study 3, we contracted with Qualtrics, who are a top survey research company, to obtain a high-quality sample of 150 full-time employees. We specified that the employees needed to be working in the United States and that they needed to be 25 years old or older, which would target individuals working in their intended careers. We also specified an even mix of male and female participants. Qualtrics used their panel recruitment resources to target qualified employees from diverse occupations and respondents received points or credit as the result of their participation.

Qualtrics ensured that participants were eligible (e.g., residence in the US) and they also deleted responses from anyone failing any of four attention checks. We deleted another three individuals who completed the study too quickly (< 10 min) and this resulted in a final sample size of 147. A slight majority of the sample were married (54.62%) and the average age was 42.78. The sample was somewhat diverse with respect to gender (48.85% female), ethnicity (71% Caucasian, 12.98% African American, 9.16% Hispanic, and 4.58% Asian American), and geographic location, as participants resided in 42 different states. Jobs were also diverse and they included accountant, caregiver, educator, janitor, IT supervisor, registered nurse, wholesale parts manager, etc. The average job tenure was 11.34 years and the average annual salary was $61,078. The study was completed over the Internet, using Qualtrics software.

Work-related emotional intelligence

Work-related emotional intelligence was assessed with the NEAT (Krishnakumar et al., 2016), consistent with prior studies. Our primary interest was in W-EI defined in total terms ($M = 0.3175$; $SD = 0.0500$; $\alpha = 0.89$; range = 0.1249–0.4015), but we also computed separable scores

for perception (M = 0.3501; SD = 0.0569; α = 0.84; range = 0.1300–0.4225), and management (M = 0.2849; SD = 0.0584; α = 0.86; range = 0.1199–0.3826), which were correlated at r = 0.53.

Organizational citizenship behaviors

We began assessing organizational citizenship behaviors in a manner parallel to prior studies. Specifically, employees were asked to characterize their rates of individual-oriented OCBs (M = 5.50; SD = 1.09; α = 0.87) and organization-oriented OCBs (M = 5.54; SD = 1.04; α = 0.74), using the Williams and Anderson (1991) scales. We also administered the scales of McNeely and Meglino (1994) as a way of gaining further insights into W-EI/OCB relationships. There were seven items targeting prosocial organizational behavior (e.g., "speak favorably about the organization to outsiders"; M = 4.05; SD = 0.76; α = 0.88), seven targeting role-prescribed prosocial behavior (e.g., "arrive to work on time"; M = 4.33; SD = 0.62; α = 0.86), and six describing prosocial individual behaviors (e.g., "bring food to share with co-workers"; M = 3.17; SD = 1.07; α = 0.90). The last set of behaviors were somewhat specific and perhaps overly sentimental, but the subscale was included for the sake of complete reporting. Broadly speaking, prosocial organizational behavior and role-prescribed prosocial behavior fit into the OCB-O category and prosocial individual behavior fits into the OCB-I category (Podsakoff et al., 2000).

Potential mediators

We were interested in further understanding the reasons why employees with higher W-EI levels engage in OCBs more frequently. Such reasons, it seemed to us, are likely to involve affective and motivational processes that tie the individual to the workplace. That is, W-EI may facilitate more engagement and satisfaction in the workplace, which may, in turn, give rise to higher rates of OCB. To examine questions of this type, we asked employees to report on their satisfaction with interpersonal features of the job and we also asked them to report on experiences of burnout, which have been linked to lower levels of OCB in several studies (e.g., Chiu and Tsai, 2006).

Satisfaction with interpersonal features of the job was assessed by combining the satisfaction with coworkers and satisfaction with supervisor subscales of job satisfaction scale of Spector (1997). Employees responded to each of the eight relevant items (e.g., "I enjoy my coworkers") and we computed a total score by averaging across items (M = 4.68; SD = 1.08; α = 0.88). Experiences of burnout were assessed with the work-related burnout scale of the Copenhagen Burnout Inventory (Kristensen et al., 2005), which has performed well in a number of studies (e.g., Fiorilli et al., 2015). Individuals responded to the seven relevant questions (e.g., "do you feel burnt out because of your work?") and we averaged across ratings (M = 2.56; SD = 0.94; α = 0.88).

Personality assessment

The personality traits of the Big 5 were assessed using scales developed by Donnellan et al. (2006). Participants reported on the extent to which they could be characterized in terms of statements targeting extraversion (M = 3.25; SD = 0.89; α = 0.65), agreeableness (M = 3.79; SD = 0.79; α = 0.68), conscientiousness (M = 3.98; SD = 0.76; α = 0.62), neuroticism (M = 2.63; SD = 0.90; α = 0.63), and openness (M = 3.69; SD = 0.90; α = 0.71). Participants achieving higher W-EI scores were more extraverted, r = 0.17, p = 0.035, agreeable, r = 0.39, p < 0.001, conscientious, r = 0.39, p < 0.001, and open to experience, r = 0.32, p < 0.001. They were also lower in neuroticism, r = −0.28, p = 0.001.

Results

Initial results involving W-EI total scores

Simple regressions were performed to determine whether there were positive relationships between W-EI levels and organizational citizenship behaviors (see Table 5). Considering the Williams and Anderson (1991) outcomes first, W-EI was a significant predictor of individual-targeted OCBs (β = 0.17) and a larger-magnitude predictor of organization-targeted OCBs (β = 0.59). Considering the McNeely and Meglino (1994) outcomes second, W-EI was a significant predictor of prosocial organizational behavior (β = 0.26) and role-prescribed prosocial behavior (β = 0.40), but it was a non-significant predictor of individual-level behaviors (e.g., bringing cake to work) that we characterized as overly sentimental (β = −0.13).

Branch-specific analyses

As shown in Table 5, perceptual abilities (as assessed by the NEAT) were predictive of four of the five outcomes, with the exception being the same one noted above (i.e., prosocial individual behavior, as assessed by the McNeely and Meglino, 1994, scale). Management abilities, considered alone, predicted the OCB-O, prosocial organizational behavior, and role-prescribed prosocial behavior outcomes. Although perceptual abilities tended to predict individual-targeted OCBs more positively, and management abilities tended to predict

TABLE 5 Work-related emotional intelligence (W-EI) as a predictor of organizational citizenship behavior (OCB), Simple regression results, study 3.

OCB dimension and predictor	t	p	β
OCB-individual			
W-EI total score	2.09	0.039	0.17
Perceptual EI	2.35	0.020	0.19
Management EI	1.31	0.193	0.11
OCB-organizational			
W-EI total score	8.72	<0.001	0.59
Perceptual EI	6.23	<0.001	0.46
Management EI	8.23	<0.001	0.56
Prosocial OB			
W-EI total score	3.22	0.002	0.26
Perceptual EI	2.99	0.003	0.24
Management EI	2.61	0.010	0.21
Role-prescribed PB			
W-EI total score	5.21	<0.001	0.40
Perceptual EI	4.79	<0.001	0.37
Management EI	4.14	<0.001	0.32
Prosocial IB			
W-EI total score	−1.63	0.106	−0.13
Perceptual EI	−0.51	0.614	−0.04
Management EI	−2.33	0.021	−0.19

Fifteen simple regressions were performed. Prosocial OB, prosocial organizational behavior; Role-Prescribed PB, role-prescribed prosocial behavior; Prosocial IB, prosocial individual behavior.

organization-targeted OCBs more positively, these were not very strong trends. Rather, the relevant ability sets tended to converge in their predictions.

Incremental validity

To preserve journal space, we will omit any further results involving prosocial individual behavior (McNeely and Meglino, 1994). For the remaining outcomes, we performed follow-up multiple regressions in which W-EI and all five personality dimensions were simultaneously controlled (Table 6). W-EI remained a significant predictor of the OCB-O and role-prescribed prosocial outcomes with all dimensions of the Big 5 controlled, but not the OCB-I or prosocial organizational behavior outcomes. Nonetheless, the average Beta coefficient for W-EI (average $\beta = 0.19$) was higher than that for extraversion (average $\beta = 0.15$), agreeableness (average $\beta = 0.17$), conscientiousness (average $\beta = 0.15$), neuroticism (average $\beta = -0.03$), and openness (average $\beta = 0.02$).

TABLE 6 Work-related emotional intelligence (W-EI) as a predictor of organizational citizenship behavior (OCB), multiple regression results, Study 3.

OCB dimension and predictor	*t*	*p*	*β*
OCB-individual			
W-EI total score	−0.03	0.977	−0.00
Extraversion	3.58	<0.001	0.29
Agreeableness	3.62	<0.001	0.35
Conscientiousness	−0.19	0.852	−0.02
Neuroticism	1.12	0.266	0.08
Openness to experience	0.56	0.578	0.05
OCB-organizational			
W-EI total score	5.93	<0.001	0.43
Extraversion	0.76	0.447	0.06
Agreeableness	1.18	0.240	0.10
Conscientiousness	2.53	0.013	0.21
Neuroticism	−0.44	0.664	−0.03
Openness to experience	0.63	0.532	0.05
Prosocial OB			
W-EI total score	1.24	0.219	0.11
Extraversion	2.07	0.040	0.18
Agreeableness	0.88	0.381	0.09
Conscientiousness	1.23	0.220	0.12
Neuroticism	−1.42	0.157	−0.12
Openness to experience	0.05	0.964	0.00
Role-prescribed PB			
W-EI total score	2.62	0.010	0.21
Extraversion	0.79	0.429	0.07
Agreeableness	1.38	0.170	0.14
Conscientiousness	2.97	0.004	0.27
Neuroticism	−0.83	0.409	−0.06
Openness to experience	−0.19	0.847	−0.02

Five multiple regressions were performed. Prosocial OB, prosocial organizational behavior; Role-Prescribed PB, role-prescribed prosocial behavior; and Prosocial IB, prosocial individual behavior.

Mediational pathways

W-EI was a positive predictor of satisfaction with interpersonal features of the job, $r = 0.35$, $p < 0.001$, and it was a negative predictor of burnout, $r = -0.23$, $p = 0.006$. Job satisfaction positively predicted all four OCBs (OCB-I: $r = 0.24$, $p = 0.004$; OCB-O: $r = 0.42$, $p < 0.001$; prosocial OB: $r = 0.54$, $p < 0.001$; role-prescribed PB: $r = 0.35$, $p < 0.001$) and burnout negatively predicted all four OCBs (OCB-I: $r = -0.26$, $p = 0.002$; OCB-O: $r = -0.35$, $p < 0.001$; prosocial OB: $r = -0.29$, $p < 0.001$; role-prescribed PB: $r = -0.22$, $p = 0.006$). Hence, it is plausible that both satisfaction with interpersonal features of the job and burnout could account for some of the variance linking W-EI to organizational citizenship.

To examine such questions, we performed eight mediation-related analyses using the PROCESS macro for SAS (Hayes, 2013), which employs bootstrapping methods to examine the significance of indirect pathways (MacKinnon and Fairchild, 2009). Four analyses examined possible mediation by satisfaction with interpersonal features of the job and four analyses examined possible mediation by burnout. Within each set, the four successive models focused on the OCB-I, OCB-O, prosocial organizational behavior, and role-prescribed prosocial behavior outcomes, respectively. As shown in Table 7, zero-order relationships between W-EI and each of the outcomes (*c* coefficient) were reduced in magnitude (*c'* coefficient) when accounting for the relevant mediational pathway (*ab*). Furthermore, all mediational pathways were significant, as indicated by the Bias Corrected Confidence Interval (BCCI) estimates for indirect pathways, which always excluded 0. Thus, satisfaction with interpersonal features of the job and burnout seem to play some role in linking W-EI to OCBs.

Discussion

Study 1 had suggested that W-EI could be a stronger predictor of OCB-Os than OCB-Is and Study 3 seems to confirm this pattern. Indeed, the one scale that consisted of prosocial behaviors that have little organizational merit (e.g., bringing cake to work or sending birthday greeting cards to fellow employees) was the one OCB scale that did not correlate with the W-EI dimension. In further work on the W-EI/OCB interface, therefore, it may be useful to distinguish merely "nice" behaviors from those that are more central to organizational functioning. In support of such ideas, W-EI was positively linked to job satisfaction and negatively linked to workplace burnout (both of which are key organizational variables: Organ, 2018) and these relationships played some role in explaining W-EI/OCB relationships. The reduction in variance for OCB-O behaviors was slight, however, suggesting the need to consider other potential manifestations of W-EI such as social network centrality (Brañas-Garza et al., 2010).

General discussion

Just as personality measures that have been contextualized for the workplace outperform those that do not (in predicting workplace outcomes: Shaffer and Postlethwaite, 2012), ability EI measures that that been contextualized for the workplace may do a better job of predicting behavior and performance at work. On the basis of such reasoning as

TABLE 7 Mediation results involving job satisfaction (interpersonal features) and burnout, Study 3.

Model	*a*	*b*	*c*	*c*′	BCCI for *ab* pathway
W-EI → JS-I → OCB-I	0.35*	0.20*	0.17*	0.10	0.01–0.16
W-EI → JS-I → OCB-O	0.35*	0.25*	0.59*	0.50*	0.03–0.16
W-EI → JS-I → Prosocial	0.35*	0.39*	0.26*	0.12	0.09–0.21
W-EI → JS-I → Role	0.35*	0.24*	0.40*	0.31*	0.04–0.16
W-EI → Burnout → OCB-I	−0.23*	−0.23*	0.17*	0.12	0.02–0.11
W-EI → Burnout → OCB-O	−0.23*	−0.23*	0.59*	0.54*	0.02–0.10
W-EI → Burnout → Prosocial	−0.23*	−0.25*	0.26*	0.20*	0.02–0.11
W-EI → Burnout → Role	−0.23*	−0.14	0.40*	0.37*	0.01–0.08

Eight investigations of mediation were conducted. W-EI, Work-Related Emotional Intelligence; JS-I, Job Satisfaction-Interpersonal Features; Prosocial, prosocial organizational behavior; and Role, role-prescribed prosocial behavior; *$p < 0.05$.

well as reasoning linking workplace EI to higher levels of social integration, we hypothesized that a work-contextualized ability EI measure (the NEAT: Krishnakumar et al., 2016) would be a consistent positive predictor of organizational citizenship behaviors (OCBs). Such relations were evident across several sample types and they were also evident across four OCB taxonomies—those of Williams and Anderson (1991), Organ (1988), Van Scotter and Motowidlo (1996), and McNeely and Meglino (1994). The one exception was the prosocial individual behavior scale of McNeely and Meglino (1994), which focuses on sentimental behaviors that possess little organizational relevance. On the basis of the results, we conclude that W-EI is a robust predictor of performing contextual behaviors that benefit the organization.

Consistent with our theorizing with respect to social integration (Berkman et al., 2000), W-EI proved to be a stronger predictor of OCB-O behaviors (Betas = 0.56, 0.43, and 0.59 across Studies 1–3, respectively) than OCB-I behaviors (Betas = 0.44, 0.34, and 0.17). The skills and abilities assessed by W-EI may therefore tie the individual to the organization in ways that are respectful and conscientious to a somewhat greater extent than they result in prosocial behaviors of an individualized type. One way of understanding these findings is to suggest that the skills of individuals with higher W-EI levels lead them to become more integrated with the workplace, in organizational terms, resulting in commitment to behaviors that benefit the organization as a whole. Relatedly, we have suggested that high W-EI employees are more capable of sustaining workplace engagement, which would be linked to behaviors and practices of an OCB-O type (Rich et al., 2010). These ideas require further analysis, but a point worth making is that being a conscientious employee (or a good organizational citizen) is something that one can always do (Organ, 2018). By contrast, individualized citizenship behaviors may largely depend on coworkers having problems, whether personal or work-related (McNeely and Meglino, 1994). Such problems may only occasionally occur, resulting in fewer opportunities for resolving them.

Another angle that was pursued was whether OCBs might follow from the perception branch of W-EI, the management branch, or both. Perceptual skills, in particular, might support empathy and situational awareness (Schlegel and Scherer, 2016), but management skills should be more proximate to behavior (Joseph and Newman, 2010). In fact, perception (average β = 0.31) and management (average β = 0.30) proved to be equally predictive of OCBs. Furthermore, the strongest predictions were obtained when averaging across the perception and management branches (average β = 0.36). Thus, it may be what is common to perception and management (global EI) that matters the most.

In summarizing the findings, we emphasize several strengths. We were able to replicate W-EI/OCB relationships across several sample types—part-time employees (Study 1), full-time employees within a particular occupation (Study 2), and full-time employees from diverse occupations (Study 3). Also, W-EI/OCB relationships tended to remain significant when controlling for all of the personality traits captured by the Big 5 taxonomy and this was certainly true with respect to the most organizational types of citizenship behavior. Finally, we provided some evidence—in Study 3—for the idea that variables related to social affiliation and engagement provide some insights into why employees with higher levels of W-EI tended to be better organizational citizens, though the cross-sectional forms of mediation that were performed should be considered provisional until they are replicated in longitudinal analyses (MacKinnon and Fairchild, 2009; O'Laughlin et al., 2018). In the remainder of the General Discussion, we further explore implications and future directions.

Further implications

The results provide further evidence in favor of the NEAT perspective on ability EI within the workplace. The NEAT embeds traditional EI tasks (such as perception and management) into a situational judgment test format and this format permits a consistent focus on workplace events and experiences (Krishnakumar et al., 2016). Previous results had indicated that W-EI, as assessed by the NEAT, is inversely linked to the probability of counterproductive work behavior (Krishnakumar et al., 2017) and deviance (Robinson et al., 2019). The current results additionally establish that employees with high W-EI levels are more inclined toward conscientious and helpful behaviors within the workplace. In total, then, W-EI seems to support better contextual performance both through the inhibition of undesirable workplace behaviors and through increased rates of desirable workplace behaviors. This is a profile that attests to the potential importance of the relevant individual differences, perhaps in contrast to previous investigations focused on ability EI, which have tended to use ability EI measures not designed for the workplace (see Schlegel and Mortillaro, 2019, for further considerations along these lines).

In this connection, it is common to ask questions about whether ability EI might support higher levels of well-being, either within or outside the workplace. Such relationships are often slight (MacCann et al., 2020) and the more profitable questions may relate to the manner in which individual differences in EI manifest themselves behaviorally, particularly in social contexts. Perceiving emotions accurately, for example, may sometimes result in higher levels of distress, particularly when concurrent circumstances are stressful (Engelberg and Sjöberg, 2004). Still, the abilities involved should render one more sensitive to the needs of others, which should be linked to cooperative social behavior (Halberstadt et al., 2001), and they should facilitate the skill with which the relevant behaviors can be performed (Farmer and Chapman, 2016). In this context, we emphasize the socio-emotional interface as a basis for further theorizing, much as Halberstadt et al. (2001) do.

There is certainly some relationship between W-EI and the personality trait of agreeableness, which involves cooperative social behavior and effectiveness in social contexts (Jensen-Campbell et al., 2010). However, there is also a relationship between W-EI and conscientiousness (e.g., see Study 3), which has been linked to more effective workplace behaviors more generally (Sackett and Walmsley, 2014). This combination of personality attributes can be thought of in terms of agentic communion (Mansfield and McAdams, 1996), maturity (DeYoung, 2010), or social competence (Gurtman, 1999). By this analysis, one would expect W-EI to support effective mentoring relationships, social communication, and at least certain forms of leadership, which are directions worthy of future research (Côté, 2014). Regardless, we emphasize the fact that the skills and abilities involved are not isomorphic with personality traits and many W-EI/OCB relationships remained significant when controlling for them.

The results, also, provide insights into the factors that give rise to employee variations in OCB rates. It is common to emphasize OCB antecedents that are conceptualized in situational (or job-specific) terms, such as organizational support or procedural justice (Spitzmuller et al., 2008). Independent of such factors, it appears that individual differences, at least of a certain type, matter quite a bit in predicting OCB rates. These individual differences relate to social–emotional skills (Mayer et al., 2016) or emotion knowledge (Izard et al., 2001) that matter for relationships and/or allow the individual to achieve higher levels of integration with the groups and organizations to which they belong (Ware et al., 2007). Bowler and Brass (2006) have shown that relationship ties powerfully predict OCB-I rates and a similar analysis, perhaps of a sociometric type (Avramidis et al., 2017), might provide further insights into OCB-O behaviors.

Limitations and future directions

A limitation was that participants self-reported their OCB rates in the present studies. Such reports are valid, and they may be more valid than other-reports of OCB (Carpenter et al., 2014), but it would still be valuable to determine whether individual differences in W-EI could be used to predict what coworkers or supervisors are capable of observing. Given the magnitude of the present associations, and given the links involving OCB-O rates, it is likely that coworkers or supervisors would perceive employees with higher W-EI levels to be more conscientious, dependable, and committed to their organizations.

In the future, too, it would be valuable to further probe mechanisms linking W-EI to OCB. Rioux and Penner (2001) have established that at least three different motives (prosocial values, organizational concern, and impression management) can guide citizenship behaviors and investigating potential links between these motives and the W-EI dimension would have merit. In addition, we have made the case that employees with higher W-EI levels are more engaged with the workplace and this suggestion would benefit from additional research that squarely focuses on engagement and its multiple manifestations (Rich et al., 2010). In this context, it may also be useful to examine perceptions of what counts as in-role behavior because employees with higher levels of W-EI may define their jobs in ways that encourage OCBs (Morrison, 1994).

Conclusion

Being able to reason about emotions may be crucial in using them for productive purposes (Salovey and Mayer, 1990). The present studies have shown that abilities of this type, if they are contextualized for the workplace, are a robust predictor of tendencies toward organizational citizenship. These results reaffirm the value of emotional intelligence (in the form of W-EI) for successful workplace functioning.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found at: https://osf.io/26tcu/?view_only=ec9f2275950c467ead7f4c16ee080451.

Ethics statement

The studies involving human participants were reviewed and approved by NDSU Institutional Review Board. The patients/participants provided their written informed consent to participate in this study.

Author contributions

MR, RI, and SK designed the studies and analyzed data. MR wrote the manuscript. RI and SK provided input. All authors contributed to the article and approved the submitted version.

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

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The role of emotional quotients and adversity quotients in career success

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Career success has been considered equally important for both personal and organizational development. The purpose of the current study was to examine how trait emotional quotient (EQ) and adversity quotient (AQ) contribute to individuals' objective career success (job position) and subjective career success (organizational commitment). Participants included 256 Chinese adults who completed four measurements—the Self-Reported Emotional Intelligence Test, Resilience Scale, Grit Scale, and the Affective, Continuance, and Normative Commitment Scale—and provided demographic information. After validating the four scales used in this study, multiple regression analysis revealed that only one aspect of trait EQ (regulation of emotion) positively predicted one component of organizational commitment (affective commitment). Adversity quotient was measured on two dimensions: resilience and grit. Only consistency of interest (grit) positively predicted affective commitment. Perseverance of effort (grit) and acceptance of self and life (resilience) positively predicted normative commitment. Personal competence (resilience) positively predicted continuance commitment but negatively predicted normative commitment. Only acceptance of self and life (resilience) positively predicted job position. Overall, these findings demonstrate the specific influence of trait EQ and AQ on career success for organizational professionals who want to improve organizational productivity as well as individuals who want to achieve success at work.

KEYWORDS

trait emotional quotient, adversity quotient, career success, organizational commitment, job position

Introduction

As early as the 1970s, career success has already been intensively studied in the fields of management and applied psychology (Ng et al., 2005; Sullivan and Baruch, 2009). Personal career success is not only vital for individuals but also for organizations, as employees' career success will eventually contribute to an organization's success (Judge et al., 1999). With the development of the world as well as the rapid change of the global economic structure around the world, researchers need to continue to explore the potential factors that contributed to individuals' career success, which is equally important for both individual and organizational growth. Career success is often referred to as an outcome of an individual's career experience (Seibert et al., 1999; Arthur et al., 2005).

Even though scholars indicated that little attention has been devoted to discussing the nature of career success (e.g., Sturges, 1999; Greenhaus, 2003; Heslin, 2003, 2005), various theories (e.g., Chartrand and Rose, 1996; Seibert et al., 2001) and models (e.g., Holland, 1997) were discuses by previous researchers. One of the most cited frameworks for operationalized career success was Hughes' (1937, 1958) study, which made a theoretical distinction between objective career success

(OCS) and subjective career success (SCS). Specifically, Hughes operationalized objective career as the experienced that is directly observable, measurable, and verifiable by an impartial third party, while the subjective career is only experienced by the person engaged in the individual's career. Thus, OCS is often defined as outcomes that can be directly observed and measured in a standardized way (Hughes, 1937, 1958; Arthur et al., 2005), which was also referred to as extrinsic career success in some other studies (Judge et al., 1999; Erdogan et al., 2004). These outcomes included salary, a person's organizational position, promotion history, and occupational prestige (Van Maanen, 1977; Dries et al., 2009), which have been considered the features of career success across different societies (Nicholson, 2000). Even though previous studies often employed individuals' salaries and promotions to represent OCS, the current research used job positions based on two main reasons. On the one hand, individuals received higher salaries and promotions do not necessarily make people feel proud or successful (Schein, 1978; Korman et al., 1981). Heslin (2005) suggested that researchers should "conceptualize and assess objective success in a manner that is guided by the career concerns and status hierarchies" (p. 116), which can be represented by job position. On the other hand, the salary was not stable and often fluctuated according to geographic location. For example, average annual salaries in more developed areas (i.e., New York) are higher than in less developed areas (i.e., Alaska; U.S. Bureau of Labor Statistic, 2020). In addition, the likelihood of receiving promotions largely depends on the type of organization and profession, and such concerns are often magnified when collecting national data or collecting data on the internet. In contrast, the job position is more objective and standardized. Most people know what manager means and what to expect from individuals at a managerial level. Therefore, the job position was selected to represent OCS in the current study.

As discussed by Shockley et al. (2016), career success should not only be indicated by objective factors, but also by fewer tangible factors that required subjective interpretation, such as SCS which was also called intrinsic career success (Judge et al., 1999; Erdogan et al., 2004). Subjective career success is generally defined by using more personally meaningful career outcomes (Shockley et al., 2016) or an individual's personal reaction to their unfolding career experiences (Hughes, 1937, 1958), such as job or career satisfaction (Thorndike, 1934; Kirchmeyer, 2006; Abele and Spurk, 2009). Even though job or career satisfaction is often used as a proxy for SCS (Tsui and Gutek, 1984; Judge et al., 1995; Boudreau et al., 2001), the organizational commitment was selected to represent SCS in the current study for two main reasons. On the one hand, researchers discussed four major concerns regarding the use of job satisfaction to represent SCS and indicated that SCS should include individuals' reactions to "actual and anticipated career-related attainments" (Heslin, 2005, p. 117), such as a sense of identity (Law et al., 2002) and organizational commitment (Cabrera-Suárez and Martín-Santana, 2012). On the other hand, individuals' organizational commitments indicate a deeper psychological connection with the organization or the career than job satisfaction. Meyer and Allen (1991) defined organizational commitment as "a psychological state that (a) characterizes the employee's relationship with the organization, and (b) has implications for the decision to continue membership in the organization" (p. 67). Organizational commitment is a relational psychological contract with the organization or career, which is different from other contracts since it is based on employees' perceptions rather than actual reality. Employees can be satisfied with their organization but not work hard and achieve success in their job. However, if individuals are committed to their organization, such commitment may encourage or foster individuals to continually investigate energy and time into their careers to obtain success. Therefore, in the current study, career success was measured by both OCS, as represented by an individual's position in the organization, and SCS, as represented by organizational commitment.

Under current global economic circumstances, work environments have become more flux and complex than ever. Apart from controllable influences, which are supported by the life-span perspective on career development (Vondracek et al., 1986), no one can anticipate the impact of new technologies or economic instability on one's career. To face these uncontrollable changes and situations, individuals need to master stress-coping skills associated with career uncertainties and unanticipated changes, as well as become more effective and efficient at their jobs, which requires high levels of cognitive and emotional adjustment skills (Coetzee and Harry, 2014). Regarding cognitive adjustment skills, over the past few decades, meta-analyses have found individuals' general mental ability (i.e., *g*) to be a predictor of job performance and success (Hunter, 1986; Schmidt and Hunter, 1998; Kuncel et al., 2004). However, more studies have shown that IQ has little predictive power for job performance and it has less predictive power than it once did (i.e., Jencks, 1998), which might be due to the "Flynn effect" (Flynn, 2007). Moreover, the correlation between IQ and job performance also shows cultural differences. For example, one study found this correlation to be weaker in China and the Middle East than in the United States and Europe (Byington and Felps, 2010).

Due to the concern about the predictive power of cognitive ability (i.e., general *g*) on job performance, increasing studies have turned their attention to the effects of non-cognitive factors. For example, Goleman (2000) pointed out that, across all job categories, emotional competence was twice as important as IQ, since most of the abilities important for effective performance were related to emotional competence. Goleman further indicated that emotional competence that was used to facilitate individual performance can be represented as an emotional quotient (EQ). Besides the influence of emotional competencies, how individuals deal with adversity in their life and work is often discussed by researchers, especially in positive psychology (Seligman, 2011; Southwick et al., 2014). Stoltz (1997) identified the concept of adversity quotient (AQ), which try to address questions such as why people with a high IQ and EQ can still fall short of their potential. Therefore, the current study suggested that EQ and AQ play a vital role in how individuals deal with emotional, interpersonal, and occupational adversities and obstacles.

Theoretical framework

Emotional quotient

There are two main types of EQ: ability EQ and trait EQ. Ability EQ was originally defined as "the subset of social intelligence that involves the ability to monitor one's own and other's feelings and emotions, to discriminate among them, and to use this information to guide one's thinking and actions" (Salovey and Mayer, 1990, p. 189). They further identified a threefold framework for EQ: appraising and expressing emotions in self and others, regulating emotions in self and others, and using emotions in adaptive ways. Whereas trait EQ is usually defined as "a distinct and compound construct that lies at the lower levels of personality hierarchies" (Petrides et al., 2007, p. 283).

Theoretically, EQ, in general, is related to career success for two main reasons. First, individuals with higher EQ should also have higher inter-and intra-personal skills, which help them build interpersonal relationships with their co-workers and senior managers (Salami, 2008). As Jain (2012) stated, "EQ provides the protentional for performance, rather than performance itself" (p. 11). Indeed, studies have found that EQ or trait EQ is positively correlated with general success at work (Suhonen and Paasivaara, 2011; Amdurer et al., 2014; Jasielska, 2014; Latif et al., 2017). More specifically, in Amdurer et al.'s (2014) study, by studying 266 MBA graduates who had graduated between 5 and 19 years prior, the researchers found that trait EQ showed a long-term positive predictive influence on career satisfaction and success. Secondly, individuals with high EQ should be able to control and regulate their positive and negative emotional experiences at work which may transfer to organizational commitment. Studies have shown positive relationships between EQ and work success and organizational commitments (Petrides and Furnham, 2006; Taboli, 2013; Shafiq and Akram Rana, 2016; Baba, 2017). Specifically, in a study of 233 teachers at a higher educational institution in India, Baba (2017) found a positive significant relationship between trait EI and organizational commitment.

However, previous studies also reported some contradictory findings regarding the relationship between trait EQ and career success. For example, Latif et al. (2017) found that trait EQ had no direct effect on job performance for high school teachers. Similarly, researchers found that trait EQ had no direct or indirect effects on organizational commitment for 234 employees in an Iranian organization (Aghdasi et al., 2011).

Adversity quotient

For career success, individuals also need to have the competency or capabilities to deal with the adversities and difficulties that they encountered in the workplace and daily life. In 1997, Stolz proposed the concept of AQ, describing it as a factor that can largely determine our success in work and life, more so than IQ or EQ. Even though Stoltz (1997) purposed AQ can predict various aspects of work, few empirical studies have focused on the topic of AQ. Among these limited studies, only one article was found that explored the positive relationship between AQ and career adaptability (Tian and Fan, 2014). Because of the limited empirical research on AQ as well as the critical role of resilience and persistence or grit in AQ (Stoltz, 1997; Suryaningrum et al., 2020), the current study purposed that individuals' resilience and grit can be incorporated into the broader construct of AQ. In the current study, AQ was defined as the capacity to effectively cope and recover from internal and external obstacles, which may include perseverance and dynamic adaptation.

Werner and Smith (1982) carried out a longitudinal study of a community by following the same cohort ($N = 700$) for 30 years, starting in childhood, and found the significant role of resilience in helping children to do very well in later life, despite the risk factors that they faced during early childhood development. Studies found that individual resilience had a positive influence on their success at work (Tait, 2008; Wei and Taormina, 2014; Salisu et al., 2020), and even organizational success or change (e.g., Lengnick-Hall et al., 2011; Moenkemeyer et al., 2012; Cooper et al., 2013). Most of the previous studies did not explore the direct effect of resilience, particularly as a representation of AQ, on career success (e.g., Carstens et al., 2021; Guillén, 2021; Yu et al., 2022), and the effect of resilience on career success is mostly context-based (e.g., Fletcher and Sarkar, 2013).

Meanwhile, Duckworth et al. (2007) indicated grit involves "working strenuously toward challenges, maintaining effort and interest over years despite failure, adversity, and plateaus in progress"(p. 1087). They proposed that grit accounts for an average of 4% of the variance in success in life and career success. Concerning factors associated with career success, even though no studies have specifically examined the relationship between grit and work success, researchers have demonstrated a positive relationship between grit and academic success as well as retention in the military, workplace, school, and marriage (Eskreis-Winkler et al., 2014). Meanwhile, Hill et al. (2016) found that grit was positively correlated with purpose commitment ($r = 0.44$, $p < 0.05$) in a sample of 337 undergraduate students in Canada. However, there is no previous research on how grit affects organizational commitment. Grit, as another construct under the broader construct of AQ purposed in the current study, showed significant influence on individuals' achievement-related domains but fewer studies focused on the career context (e.g., Clark and Plano Clark, 2019), and the effect on academic success was even challenged in Finland adolescents (Tang et al., 2019).

The current study

The primary purpose of this study was to investigate the effects of trait EQ and AQ on career success, particularly in the domain of job position and organizational commitment, among Chinese adults. It was hypothesized that all aspects of trait EQ and AQ would have a positive influence on job position and organizational commitment.

Methods

Participants

In the current study, 256 participants were participated. Of those, 39.8% (102) were men and 60.2% (154) were women. The mean age was 36 years old ($SD = 10.58$). Most participants had earned a college degree (64.5%), were married (71.5%), and worked more than 40 h per week (61.3%). The working position was divided into three main categories (i.e., Tiers 1, 2, and 3). Tier 1 included entry-level positions that required little preparation regarding education, experience, and training to perform the work, such as assistants and sales associates. Tier 2 included positions that required some preparation regarding education, experience, and training to perform the work, such as grade school teachers and accountants. Tier 3 included the positions that required considerable preparation regarding education, experience, and training to perform the work, such as professors and managers. Participants indicated the highest position they had held, which was coded by the researchers into these three tiers. Participants currently working in cities were also divided into three tiers based on the city size. Tier 1 cities included major cities, such as Beijing, Shanghai, and Guangzhou. Tier 2 cities included the capital cities of each province in China, such as Shenyang and Urumqi. Tier 3 cities were those not included in Tiers 1 and 2. Cities were indicated by participants and coded by the researchers into these three tiers. More detailed demographic information is provided in Table 1.

TABLE 1 Total responses (*N*) and percentages for each demographic variable.

Variables	*N* (percentage)
Gender	256
Male	102 (*39.8%*)
Female	154 (*60.2%*)
Age	256
Age 18–34	128 (*50%*)
Age 35–50	98 (*38.3%*)
Age 51–69	30 (*11.7%*)
Age 70–87	0 (*0%*)
Education	256
Elementary and below	0 (*0%*)
Middle school	9 (*3.5%*)
High school	21 (*8.2%*)
University or college	165 (*64.5%*)
Masters	50 (*19.5%*)
PhD and above	11 (*4.3%*)
Marital Status	256
Married	183 (*71.5%*)
Divorce	11 (*4.3%*)
In a relationship	27 (*10.5%*)
Single	35 (*13.7%*)
Working status	256
Less than 40 h per week	99 (*38.7%*)
More than 40 h per week	157 (*61.3%*)
Highest working position	225
Tier 1	96 (*42.7%*)
Tier 2	73 (*32.4%*)
Tier 3	56 (*24.9%*)
City	256
Tier 1	14 (*5.5%*)
Tier 2	81 (*31.6%*)
Tier 3	161 (*62.9%*)

Highest working positions: Tier 1 positions required little education, experience, and training to perform the occupation; Tier 2 positions required some preparation; and Tier 3 positions required considerable preparation. City: Tier 1 included major cities (e.g., Beijing and Shanghai); Tier 2 included capital cities (e.g., Shenyang and Urumqi); and Tier 3 included cities not in to Tiers 1 and 2.

Measures

Emotional quotient

The scale used to measure EQ was developed by Schutte et al. (1998), based on Salovey and Mayer's (1990) model of EI. Schutte et al. (1998) developed the 33-item SREIT that comprises three factors: appraisal and expression of emotion (13 items), regulation of emotion (10 items), and utilization of emotion (10 items). Schutte et al. (1998) reported internal consistency reliability ($\alpha = 0.87$) and test–retest reliability ($\alpha = 0.78$), and the measurements were validated in China (Zhao et al., 2021). Respondents are asked to rate how well each statement describes them using a 5-point Likert scale (*1 = strongly disagree* to *5 = strongly agree*); however, in the current study, this was changed to a 4-point Likert scale, due to the mid-point effect or social desirability bias (Garland, 1991). Example questions for appraisal and expression of emotion include "emotions are one of the things that make my life worth living" and "I like to share my emotions with others." Example questions for regulation of emotion include "I expect that I will do well on most things I try" and "other people find it easy to confide in me." Example questions for utilization of emotion include "I expect good things to happen" and "I arrange events others enjoy."

Adversity quotient

Adversity quotient was measured in two aspects, resilience and grit. Resilience was measured by using the RS-25 (Wagnild and Young, 1993). Grit was measured using the Grit Scale (Duckworth et al., 2007).

The RS-25 is a 25-item self-report measurement of resilience developed by Wagnild and Young (1993). In the original study, the researchers reported reliability of 0.91. Respondents are asked to indicate their agreement with each item on a 7-point Likert scale (*1 = disagree* to *7 = agree*). However, in the current study, this was changed to a 6-point Likert scale, due to the mid-point effect or social desirability bias (Garland, 1991). The measurement comprises two sub-factors: personal competence (17 items) and acceptance of self and life (8 items). Examples of questions for personal competence include "maintaining interest in things is important to me" and "I can be on my own if I have to be." Example questions for acceptance of self and life include "I seldom wonder what the point of it all is" and "I take things 1 day at time."

The Grit Scale is a 12-item self-report measurement of grit developed by Duckworth et al. (2007), who reported a range of reliabilities from 0.77 to 0.85. Respondents are asked to indicate how much each statement describes them, using a 5-point scale (*1 = not like me at all*, *2 = not much like me*, *3 = somewhat like me*, *4 = mostly like me*, and *5 = very much like me*). The Grit Scale comprises two factors: consistency of interest (6 items) and perseverance of effort (6 items). All six items of the consistency of interest subscale were reverse-coded. Example questions for consistency of interest include "I become interested in new pursuits every few months" and "my interests change from year to year." Example questions for the perseverance of effort include "I finish whatever I begin" and "setbacks do not discourage me."

To assess the construct of AQ using RS-25 and GRIT scales, we performed factor and bifactor analyses. The results of the comparisons with different models of the structure of AQ were available from the corresponding author.

Organizational commitment

Organizational commitment was measured using the ACNCS (Allen and Meyer, 1990). The ACNCS is a 24-item self-report measurement that assesses organizational commitment in three aspects: affective commitment (AC; 8 items), continuance commitment (CC; 8 items), and normative commitment (NC; 8 items). According to Allen and Meyer's (1990) three-component model, AC refers to employees' psychological connection with an organization, CC refers to employees' perceived viable alternatives available in the job market, and NC refers to employees' perceived experiences associated with an organization. In the original study, reliability for the AC, CC, and NC subscales was 0.87, 0.75, and 0.79, respectively. Respondents are asked to indicate how much they agree with each item using a 7-point Likert scale (*1 = disagree* to *7 = strongly agree*); however, in the current study, a 6-point Likert scale was used in which the mid-point was deleted, due to the mid-point

effect or social desirability bias (Garland, 1991). Example questions for AC include "I would be very happy to spend the rest of my career with this organization" and "I enjoy discussing my organization with people outside of it." Example questions for CC include "I am not afraid of what might happen if I quit my job without having another one lined up" and "it would be very hard for me to leave my organization right now, even if I wanted to." Example questions for NC include "I think that people these days move from company to company too often" and "I do not believe that a person must always be loyal to his or her organization." Nine items of the ACNCS were reverse coded (i.e., four items on the AC scale, two items on the CC scale, and three items on the NC scale).

Basic demographic information

The present study collected basic demographic information including gender, age, city, education level, marital status, working status, and highest working position, which was used to represent objective career success.

Procedure

Since the current study was conducted in China, all instruments were first translated into Chinese by the researcher and proofread by another person, who is fluent in both Chinese and English. Then all Chinese versions of the questionnaires went through the back-translation procedure (Brislin, 1986). After approval was received from the appropriate IRB, the questionnaire was administrated *via* WenJuanXing, which is an online survey platform similar to Qualtrics or SurveyMonkey. A QR code and a URL link were generated for the survey and put together in a poster distributed online through a social networking platform in China. Informed consent was collected before participants began the survey. All data in the current study were collected online. The questionnaire was open to the public for a month.

All participants were recruited online *via* social media. The snowball sampling method was used in the current study. All participants were encouraged to forward the poster to their social media. A total of 378 participants were recruited online. From that group, 122 participants were removed from the current study, as they did not meet the pre-requisite of being employed (either part-time or full-time). Therefore, 256 participants were totally involved in the current study, and they all being employed.

Data analysis

Factor analysis was first performed for each questionnaire to examine its internal structure (e.g., confirmatory factor analysis). Internal reliability for each scale was determined by Cronbach's (1951) alpha coefficients. Meanwhile, bi-factor analysis was performed to test the construct structure of AQ. Preliminary analyses of all scales were performed (e.g., mean, standard deviation (*SD*), and skewness). To identify the effect of specific aspects of EQ and AQ on job position and three aspects of organizational commitment, multiple regression analysis was conducted using SPSS version 23. Four analyses were performed independently regarding different aspects of career success, which were three types of organizational commitment and job position.

Results

Measurements validity and reliability

Based on the results from confirmatory factor analysis for the SREIT, three factors were confirmed. Two items were deleted due to low factor loadings, which left 31 items in total. Therefore, in the current study, the appraisal and expression of emotion subscale had 11 items, the regulation of emotion subscale had 10 items, and the utilization of emotion subscale had 10 items. Subscales were created by averaging all scores for each scale, which ranged from 1 to 4. Higher scores indicated a higher perceived emotional ability in that domain. Reliability for appraisal and expression of emotion, regulation of emotion, and utilization of emotion were 0.80, 0.79, and 0.76, respectively.

Based on the confirmatory factor analysis results for the RS-25, two subscales were confirmed as it in the original study. However, based on the factor loadings in the current study, the personal competence subscale had 9 items rather than 17 items, and the acceptance of self and life subscale had 16 items rather than 8 items in the original study. Subscales were created by averaging all scores in that subscale, which ranged from 1 to 6. Higher scores indicate higher levels of resilience for that specific domain. In the current study, the reliability for the personal competence and acceptance of self and life subscales were 0.87 and 0.93, respectively.

Based on the confirmatory factor analysis results for the Grit Scale, the same two subscales structure was found as in the original study. Subscales were created by averaging all scores in each subscale, ranging from 1 to 5. Higher scores indicate a higher level of grit. In the current study, the reliabilities for consistency of interest and perseverance of effort subscales were 0.81 and 0.83, respectively.

Finally, confirmatory factor analyses were performed for each of the three ACNCS subscales that were used to measure organizational commitment, which found the same internal structure was found as in the original study. However, items were deleted due to low factor loadings in each subscale. Two items were deleted from the AC subscale, one item was deleted from the CC and the NC subscale. Thus, in the current study, the AC, CC, and NC subscales contained 6, 7, and 7 items, respectively. Three subscales were created by averaging all scores for each subscale, which ranged from 1 to 6. Higher scores indicate higher levels of AC, CC, and NC. Reliability for the AC, CC, and NC subscales were 0.78, 0.90, and 0.80, respectively.

Descriptive statistics

Table 2 presents the number of responses (*N*), means (*M*), standard deviations (*SD*), and skewness for study variables. Participants in the current study demonstrated medium to high levels of EQ in all three domains, ranging from 2.85 to 2.97. Similar to EQ, both the grit and resilience aspects of AQ showed medium or medium to high levels of AQ. Regarding aspects of organizational commitment, participants showed a medium commitment level for all three aspects (ranging from 3.54 to 3.98) with a large SD (ranging from 0.94 to 1.14). Finally, regarding the correlations among study variables, all variables are significant and positively correlated with each other, except for consistent of interest from AQ. Consistency of interest was significantly and negatively correlated to EQ and organizational commitment and showed a non-significant correlation with girt.

TABLE 2 Descriptive statistics and correlations between study variables.

Variable	1	2	3	4	5	6	7	8	9	10
Emotional quotient (EQ) predictor										
1. Appraisal and expression of emotion	-									
2. Regulation of emotion	0.70**	-								
3. Utilization of emotion	0.71**	0.75**	-							
Adversity quotient (AQ) predictor										
4. Resilience-Personal competence	0.62**	0.70**	0.61**	-						
5. Resilience-acceptance of self and life	0.62**	0.71**	0.59**	0.75**	-					
6. Grit-consistency of interest	−0.32**	−0.14*	−0.22**	−0.22**	−0.12	-				
7. Grit-perseverance of effort	0.51**	0.51**	0.49**	0.59**	0.68**	−0.12	-			
Dependent variable										
8. OC-affective commitment	0.32**	0.38**	0.35**	0.31**	0.36**	−0.15**	0.28**	-		
9. OC-continuance commitment	0.14*	0.19**	0.18**	0.26**	0.12	−0.15*	0.05	0.49**	-	
10. OC-normative commitment	0.27**	0.35**	0.27**	0.30**	0.35**	−0.13*	0.28**	0.62**	0.51**	-
M	2.85	2.96	2.97	4.77	4.39	3.18	3.45	3.54	3.98	3.69
SD	0.40	0.38	0.38	0.66	0.80	0.86	0.84	1.01	1.14	0.94
a	0.80	0.79	0.76	0.87	0.93	0.81	0.83	0.79	0.90	0.80

*$p < 0.005$. ***$p < 0.001$ (2-tailed).
OC: organizational commitment.

Emotional quotient, adversity quotient, and organizational commitment

As shown in Table 3, three components of organizational commitment were involved in the current study. Allen and Meyer (1990) indicated that these three components were conceptually different, and each component was developed independently. Considering the psychometric structure of the ACNCS, three independent regression analyses were conducted.

For AC, all three aspects of EQ (e.g., appraisal and expression of emotion, regulation of emotion, and utilization of emotion) and all four aspects of AQ (e.g., consistency of interest, perseverance of effort, personal competence, and acceptance of self and life) were used to predict AC. The overall predictive model was statistically significant, $F(7, 256) = 6.39$, $p < 0.001$, and accounted for approximately 15.3% of the variance for AC ($R^2 = 0.153$, Adjusted $R^2 = 0.129$). However, only one factor of EQ (regulation of emotion) and one factor of AQ (consistency of interest) showed a significant and positive regression effect on AC.

For CC, the same EQ and AQ variables were used to predict CC. Overall, the prediction model was statistically significant, $F(7, 256) = 3.05$, $p = 0.05$, and accounted for approximately 7.9% of the variance for CC ($R^2 = 0.079$, Adjusted $R^2 = 0.053$). Results further indicated that two out of the seven factors reached statistically significant levels. More specifically, the utilization of emotion positively predicted CC, and personal competence from the resilience aspect of AQ showed a positive regression weight in predicting CC.

For NC, the same EQ and AQ variables were again used to predict NC. Overall, the prediction model was statistically significant, $F(7, 256) = 5.62$, $p < 0.001$, and accounted for approximately 13.7% of the variance for NC ($R^2 = 0.137$, Adjusted $R^2 = 0.113$). Results further indicated that three out of seven factors reached statistically significant levels. More specifically, perseverance of effort and acceptance of self and life showed significant positive regression weights in predicting NC, whereas personal competence showed a significant negative effect on NC.

Emotional quotient, adversity quotient, and job position

Regarding the relationship between EQ, AQ, and job position, all three aspects of EQ and four aspects of AQ were used to predict job position. Overall, the prediction model did not reach statistically significant, $F(7, 256) = 3.49$, $p = 0.001$, and accounted for approximately 10.1% of the variance for the job position ($R^2 = 0.101$, Adjusted $R^2 = 0.072$). Regression analysis results indicated that only one out of seven factors in the model significantly predicated job position, which was the acceptance of self and life from the resilience aspect of AQ.

Discussion

Following Shockley et al.'s (2016) recommendation that individual career success should consider both OCS and SCS, the current study used job position as a proxy for OCS and self-reported perceived organizational commitment as a proxy for SCS. By exploring the relationship between different aspects of trait EQ and AQ and organizational commitment and job position, the current study revealed several significant findings.

Emotional quotient, adversity quotient, and organizational commitment

The positive relationship between trait EQ and organizational commitment was partially supported. In the present study, rather than viewing organizational commitment as a single construct and exploring

TABLE 3 Regression coefficients in predicting organizational commitment and job position from emotional quotient (EQ) and adversity quotient (AQ) variables.

	Organizational commitment			Job position
	Affective commitment	Continuance commitment	Normative commitment	
	Standardized b coefficient (SE)	*Standardized b coefficient (SE)*	*Standardized b coefficient (SE)*	*Standardized b coefficient (SE)*
EQ variables				
Appraisal and expression of emotion	−0.02	−0.15	−0.01	0.07
	(0.19)	(0.20)	(0.16)	
Regulation of emotion	**0.27***	0.07	0.15	−0.11
	(0.22)	(0.23)	(0.19)	
Utilization of emotion	−0.09	**0.21***	−0.17	−0.12
	(0.19)	(0.21)	(0.17)	
AQ variables				
Grit-consistency of interest	**0.17***	−0.07	−0.03	0.05
	(0.06)	(0.06)	(0.05)	
Grit-perseverance of effort	0.15	−0.13	**0.17***	−0.06
	(0.08)	(0.08)	(0.07)	
RS-personal competence	−0.13	**0.32***	**−0.26***	0.05
	(0.12)	(0.12)	(0.10)	
RS-acceptance of self and life	0.18	−0.09	**0.36***	**0.39***
	(0.17)	(0.11)	(0.09)	

*$p < 0.05$. RS: resilience.
Variables that reached significant levels are bolded.

how it was affected by personal competence (e.g., Bruning and Snyder, 1983), the organizational commitment was examined in three different aspects, namely AC, NC, and CC. Although the results of the present study conflicted with those of Shafiq and Akram Rana (2016), who found trait EQ was a significant and positive predictor of all three components of organizational commitment (i.e., AC, CC, and NC), the results of the present study indicated that only specific aspect of trait EQ had a positive influence on organizational commitment. Specifically, the present study revealed that individuals' ability to regulate their emotions positively predicted AC. In other words, individuals with higher abilities to regulate their own and others' emotions are more likely to become psychologically connected and committed to an organization. A possible explanation for this finding is that when an individual has strong abilities to regulate their emotions and those of others, they are more likely to develop strong emotional or psychological connections with their co-workers. Such overall strong emotional connections further ensure individuals will build strong affective attachments to an organization. Individuals willing to be more committed to their organization can increase their ability to regulate their emotions and those of others, in which they will be able to better deal with their working relationship and get psychologically connected to their organization. Moreover, the utilization of emotion positively predicted CC. Utilization of emotion refers to "flexible planning, creative thinking, redirected attention and motivation" (Schutte et al., 1998, p. 168), and CC refers to individuals' perception of the cost of leaving an organization. Thus, individuals who usually have flexible plans and active thoughts are less likely to leave the organization because they have a better ability to balance the cost-effectiveness between staying and leaving the organization. In the other words, individuals with a higher ability to utilize emotions might be more rational rather than emotional, which helped them rationally analyze the cost of leaving an organization. It might be important for organizations, especially human resources personnel, to pay attention to such individuals since they might also be the individuals that suddenly leave the organization as soon as they find better work on the job market. Future studies might also consider exploring the relationship between the utilization of emotion, turnover, and continuous commitment to provide empirical evidence on the above assumption.

The positive relationship between AQ and organizational commitment was complicated. Four factors of AQ (i.e., consistency of interest, perseverance of effort, personal competence, and acceptance of self and life) were found to independently and positively predict different aspect(s) of organizational commitment. Specifically, consistency of interest was found to positively predict AC but not CC or NC. Considering the demographic characteristics of the sample in the current study (e.g., the average age was 36), as well as the culture in China, most individuals may not be sure of what their interests are. Interest has been defined as "a person's relatively enduring predisposition to reengage particular content over time" (Hidi and Renninger, 2006, p. 113). It is possible that there is a bidirectional influence between consistency of interest and work. The more time and energy individuals spend at their jobs, the more likely their jobs are to become their interest. Therefore, due to the enduring predisposition and continuing re-engagement with job-related activities (i.e., consistency of interest), individuals become more emotionally and psychologically involved, connected, and eventually affectively committed to an organization. The possible bidirectional influence between consistency of interest and

affective commitment shed the light on the fact that interest in the job position might not be a necessary consideration when recruiting new employees. Therefore, when recruiting potential employees, human resources personnel should prioritize employees' talent and qualifications rather than their personal interest in the position.

Perseverance of effort and acceptance of self and life were found to positively predict NC. In the other words, individuals who are characterized as having more perseverance for their efforts or goals and have a more adaptive, balanced, and flexible perspective of life (i.e., acceptance of self and life) tend to show more obligation, loyalty, and responsibility to an organization (i.e., NC). One previous study found that more adaptable individuals, especially with career-related adaptive behaviors (i.e., career planning), displayed more loyalty to an organization during an organizational restructuring period (Klehe et al., 2011). Beyond the positive effects of adaptability (i.e., acceptance of self and life), the present study also revealed the positive influence of the internal quality of perseverance (i.e., perseverance of effort) on organizational loyalty (i.e., NC) for in-service employees. During recruiting and new-employee training period, human resource personnel might consider examining and cultivating individuals' acceptance of self and life and perseverance. In such ways, individuals might be more loyal and committed to their organization.

A notable finding was that one aspect of AQ (i.e., personal competence) positively predicted CC, but negatively predicted NC. As described by Meyer and Allen (1991), CC is developed when individuals invest a lot in an organization and perceive a lack of alternative opportunities in the job market. NC is affected by experiences (i.e., loyalty-related) individuals have both before and after they start work with an organization. Therefore, results from the current study revealed that individuals who are characterized as having "self-reliance, independence, determination, invincibility, mastery, resourcefulness, and perseverance" (i.e., personal competence; Wagnild and Young, 1993, p. 174) may also invest a lot into an organization (i.e., CC), but demonstrate less loyalty (i.e., NC). By analyzing 124 published studies, a previous meta-analysis found that perceived personal competence was considered to be an antecedent of organizational commitment (Mathieu and Zajac, 1990). Building on this previous study, the current study provided more empirical evidence on the positive effect of personal competence on CC and the negative effect on NC. This might shed light that individuals with strong personal competence are a double-edged sword. Even though they can be the employees that have the highest productivity, they can also be the ones who are most likely to leave the organization if they have bad experiences at work. Therefore, organizational management and human resources personnel should pay extra attention to the working experience of individuals with strong personal competence and productivity. They might consider providing timely psychological and material support to such individuals to ensure they have a good experience with the organization.

Emotional quotient, adversity quotient, and job position

The hypothesized positive relationship between trait EQ and job position was rejected. No significant and positive relationship was found between the three aspects of trait EQ and job position, which contradicted previous research findings. For example, Sultana et al. (2016) found that EQ positively predicted bank employees' OCS (i.e., salary) in Pakistan. Moreover, another study found that trait EQ was a significant predictor of job performance beyond the effect of IQ among research and developmental scientists in China (Law et al., 2008) and Malaysian administrators (Jorfi et al., 2012). Thus, it might suggest that even if EQ can positively influence individuals' job performance, it might not necessarily help them to achieve higher positions. Previous studies indicated the importance of one of the important Chinese cultural characteristics of *guanxi* relationships, which can be understood as 'a network of personally defined reciprocal bonds' (Redding et al., 1994, p. 656), on organization positions (Farh et al., 1998; Tsang, 1998; Chen and Francesco, 2000). These contradictory findings indicated that more research is needed on the relationship between trait EQ and OCS, especially in the context of China.

The positive relationship between AQ and job position was partially proved. Specifically, only one aspect of AQ (i.e., acceptance of self and life) positively predicted job position. In other words, individuals who have "adaptability, balance, flexibility, and a balanced perspective of life" (i.e., acceptance of self and life; Wagnild and Young, 1993, p. 175) are usually able to reach a higher position within their organizations compared to those without these characteristics. One possible explanation of this relationship is that, as discussed earlier, people with high levels of self-or life-acceptance tend to have higher loyalty and responsibility (i.e., NC) toward an organization. Such high levels of loyalty and responsibility could help individuals become more successful at their jobs, which in turn could help them reach higher job positions. Therefore, if individuals want to reach a higher position in their work, they might consider increasing their AQ, especially cultivating the ability to accept and balance their self and life.

Contributions and limitations

Aside from the above discussion, several implications can be drawn from the current study. First, numerous researchers have investigated the potential factors that contribute to individuals' career success. Aside from the well-accepted effect of cognitive ability (i.e., IQ) on career success, the current study provides insight into the significant influence of specific types of trait EQ and AQ on both OCS and SCS. For organizational professionals, when considering increasing an organization's overall productivity or employees' commitment toward an organization, it is important to cultivate employees' EQ and AQ, especially their emotional regulation abilities and personal qualities (i.e., perseverance, stable interests, and acceptance of self and life). Meanwhile, human resources professionals might want to pay attention to individuals who have a higher ability to utilize their emotions since they are more likely to see alternative working opportunities in the job market. For individuals, when considering career success, it is important to cultivate EQ-and AQ-related skills. Secondly, most previous studies considered EQ and AQ as a single construct when studying the predictive power of factors related to one's career success (e.g., Mendoza and Hontiveros, 2017; Urquijo et al., 2019). The current study explored, in detail, how specific types of trait EQ and AQ can facilitate individuals to become more successful in their jobs. Thirdly, because of the brief history of AQ and limited research on the topic, the current research provided more empirical evidence regarding its influence on individual career success. Fourth, rather than assessing the commonly used variables to represent individuals' OCS and SCS (i.e., job or career satisfaction, salary, and promotion), the current study employed job position and organizational commitment to represent individuals' OCS and SCS, respectively, and found significant effects of EQ and AQ on them. The results lend support to the possibility of using organizational commitment to represent SCS. More specifically, the

findings of the current research highlight the important role of the organization and its effect on individuals' perception of career success. Future researchers might want to explore this subject in greater detail and provide additional empirical evidence. Finally, most of the previous research on this topic focused on Western cultures; however, the current study, after carefully examining the psychometric structure of the measurements used, provided empirical evidence of the effects of trait EQ and AQ on career success in Eastern culture.

The present study has several limitations that must be overcome in future research. On the one hand, since the participants were recruited in China, some specific aspects of Chinese culture need to be considered. For example, individuals in China are praised more when they are calmer and show few emotions in public settings. When dealing with relationships, especially in the workplace, it is considered wiser to hide or control one's actual emotions, rather than express them. Therefore, one aspect of EQ (i.e., appraisal and expression of emotion) showed no significant predictive power for both organizational commitment and job position. On the other hand, all measurements were developed based on Western cultures, and the content and values embedded in the measurements might not be suitable for the culture and values in China. Even though all measurements were validated in the current study, future studies need to consider the differences between individualism and collectivism.

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 human participants were reviewed and approved by University of Missouri-Saint Louis. The patients/participants provided their written informed consent to participate in this study.

Author contributions

YZ was the corresponding author of the paper. BS contributed to the final approval of the version to be published. All authors contributed to the article and approved the submitted version.

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.

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Emotion regulation as a mediator on the relationship between emotional awareness and depression in elementary school students

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As a cognitive skill, emotional awareness plays a fundamental role in emotional intelligence and significant effect on the development of individuals' social adaptation. However, the role of emotional awareness in children's social adaptation, especially emotional development, remains unclear, the current study sought to determine the significant influence of emotional awareness in children's emotional development. By using cross-sectional and longitudinal study designs, the current study explored the relationship between emotional awareness and children's depression, as well as the mediation effect of emotion regulation on this relationship. The sample comprised 166 Chinese elementary school students (89 girls and 77 boys) ranging from 8 to 12 years old. After adjusting for demographic variables (gender, grade, etc.), the results showed that children with high emotional awareness were less likely to adopt expressive suppression as an emotion regulation strategy and had lower depression levels currently and in the future. In contrast, children with low emotional awareness were more likely to use suppression strategies and showed higher depression levels. Thus, the results indicated that emotional awareness could predict children's current and future depression status. Meanwhile, emotional regulation strategies are an important mediating variable explaining the relationship between emotional awareness and children's depression. Implications and limitations were also discussed.

KEYWORDS

emotional awareness, emotional intelligence, depression, emotion regulation strategy, elementary school children

Introduction

Depression is one of the most common psychological issues among children and adolescents. Its prevalence increases rapidly during puberty (Nolen-Hoeksema, 2002), leading to feelings of sadness, frustration, and helplessness; loss of interest in most activities; and interference with sleep, appetite, concentration, and experiences (Beck, 2005). As a complex compound emotion, depression is dominated by painful experiences that are stronger and more persistent than any single negative emotional experience (Sang and Liu, 2022). The World Health Organization (WHO) estimates that 50% of human mental health issues are experienced by children and

adolescents, for whom depression is the leading cause of illness or disability (World Health Organization, 2019).

The *Report on Development of Youths in China*, released at the end of 2019, stated that approximately 30% of Chinese children and adolescents (under the age of 17) have experienced depressive symptoms and that such symptoms tended to present at a young age. Meanwhile, the *Report on National Mental Health Development in China (2019–2020)* stated that the detection rates of depression and severe depression in elementary school students were approximately 10% and 1.9–3.3%, respectively (Fu et al., 2021). As a developmental emotional issue, depression is—or has become—a major threat to the healthy growth and development of children and adolescents. Numerous studies have concluded that it impairs mental health and social functioning and increases the likelihood of committing suicide (Kessler and Bromet, 2013).

The causes of depression in children and adolescents are extremely complex. Mental health in children and adolescents can be affected by factors including poor parenting, the family environment, and academic and peer pressure. Because childhood is a sensitive period of growth, emotional problems are especially likely to cast psychological shadows that may be difficult to break free from throughout life. However, scholars have reported that depression is strongly connected to children's emotional intelligence (EI) (Nejad and Nejad, 2012; Yang, 2012; Wang et al., 2013; Martínez-Monteagudo et al., 2019). This study sought to identify the elements of EI that impact the severity of depression among children. As detailed below, only a few studies have been conducted on this topic, and none have investigated how the interactions between different elements of EI affect depression in children.

Depression in children and EI

EI, a theoretical framework originally proposed by Mayer and Salovey (1997), is a series of interrelated skills that enable individuals to perceive, understand, use, and regulate emotional events in an effective and adaptive way. They considered that EI should be the ability to (1) perceive, evaluate, and express emotions with precision; (2) access or generate thought-provoking emotions; (3) understand emotions and emotional information; and (4) regulate emotions for emotional and intellectual development (Mayer and Salovey, 1997). Following the successive proposal of multiple EI concepts, they subsequently simplified the construct into four main aspects (Mayer et al., 2000), namely: the capacities for (i) emotional awareness (EA) and expression, (ii) emotions that promote thinking, (iii) understanding and analyzing emotions, and (iv) regulating emotions. Emotion regulation (ER) refers to an individual's ability to regulate their own emotions and those of others effectively, which is predicated on an awareness of emotional events. Monitoring and reflecting on ER facilitates emotional development.

These four aspects are closely related to particular variables that profoundly affect an individual's abilities in areas such as emotional and social adaptations (Martínez-Monteagudo et al., 2019), and are inextricably connected with developmental emotional issues, such as depression. For example, individuals with low EI have difficulties obtaining social support to relieve the psychological stresses that they experience in life; this is compounded by the fact that they also tend to ruminate and have weak psychological resilience (Armstrong et al., 2011). This lack of adaptive ER makes them more likely to experience negative emotions such as anxiety and depression (Yang, 2012). Studies have shown that individuals with low EI score higher in anxiety and depression scales (Martínez-Monteagudo et al., 2019). Children with severe depressive symptoms are also more inclined to process and understand emotional information negatively or pay excessive attention to their own emotions (Gross, 2007). Furthermore, individuals with mood disorders face a range of issues when coping with emotional manifestations, such as incorrect understanding of emotions, negative reactions to emotions, and greater difficulties with emotional recovery (Gross, 2007).

EA, ER strategies, and EI

Mayer and Salovey (1997) defined the perception and management of emotions as parallel branches of EI. In reality, EA is a cognitive ability within the various structures of EI. According to Gross (1998), the attention component of ER (which is applicable to emotional situations) reflects an individual's ability to perceive emotions. However, some researchers have argued that EA is an independent and important foundational component of EI. In Goleman's opinion, EI models share a common core that represents the ability to recognize and regulate ones' emotions and those of others at a general level (Wang et al., 2013). Davies et al. (1998) even suggested replacing the concept of EI with EA. Nevertheless, as the field of EA continues to advance, researchers have gradually reached the consensus that it is a critical foundation and prerequisite for EI (Lane, 2000).

EA is not a novel concept without an origin. Rather, it derived from a deficit of EA in clinical practice and, relatedly, from recognition of the prevalence of alexithymia (Deng et al., 2013). Lane and Schwartz (1987) presented a cognitive-developmental theory of EA and described it as the ability to recognize and describe one's and others' emotions (Lane and Schwartz, 1987; Lane and Smith, 2021). Lane et al. (1990) compared the developmental stages of EA to Piaget's cognitive development model and proposed a five-level EA developmental model. These levels, from low to high, comprise somatic responses; behavioral tendencies; and singular, mixed, and compounded complex emotions. The bottom two levels are implicit responses, while the top three levels are explicit responses.

ER is an important component of EI structures and involves the individual's awareness of their emotions and how to express them (Wang et al., 2007). A key component in this process is the individual's ability to perceive and describe the emotions they are experiencing. The ability to recognize emotions is related to EA; therefore, researchers have proposed that EA is an important basis for other components of EI, such as ER (Salovey et al., 2003). The ER process model proposed by Gross (1998) has been the most influential regarding the application of ER and the classification of ER strategies. Specifically, ER strategies in the situational, attention, evaluation, and reaction stages of Gross's model include the selection and modification of a situation, the allocation of attention, cognitive reappraisal, and expressive suppression. Previous studies have found that cognitive reappraisal and expressive suppression have the most significant effects on the ER process among the strategies (Gross et al., 2006); therefore, the present study focused on these two strategies.

The development of ER skills is generally considered an achievement. Children typically learn how to express and regulate their emotions gradually as they age. However, those who experience internalization–externalization issues during the developmental process may demonstrate a relative lack of EA abilities, which may, in turn, affect their adaptive ER (Stegge and Terwogt, 2007). Specifically, individuals with ER issues tend to adopt maladaptive ER strategies because cognitive reappraisal is more difficult than expressive suppression because it requires additional emotional experiences and information (Gross, 1998; Sheppes et al., 2011).

Based on this existing knowledge, we proposed that individuals deal with emotions in two steps characterized by EA and ER. These steps stress the spontaneous nature of the emotional process and emphasize the need to regulate emotions. In the first step, the individual must analyze their situation and comprehend the nature of the problem before deciding on the optimal response (EA). In the second step, they must set goals and make and evaluate strategic choices (ER) (Gross, 2007). EA is not merely an incidental phenomenon; it helps individuals participate in automated control activities (ER) that facilitate adaptive behaviors (Levenson, 1999). In other words, children must scrutinize their emotions, adjust their attention carefully, and, finally, use their emotions proficiently to gain adaptive skills to regulate their emotions adequately. Therefore, we ultimately proposed that EA is the foundation of EI and that using ER concretely embodies EI.

Relationship between EA, ER strategies, and depression

Researchers have argued that EA involves paying attention to and reflecting on your somatic responses to your emotions. Individuals use EA to extract intrinsic emotional information, infer the meaning of the current interpersonal interaction and related situational needs (Greenberg, 2016), and determine whether ER is necessary. With advancements in EA-related research, researchers have gradually recognized that it comprises an essential element of ER and mental health (Barrett and Gross, 2001). Individuals with poor EA experience emotional instability because they cannot adequately recognize emotions (Thompson et al., 2009). Consequently, they frequently experience related physical symptoms (Lane et al., 2011) and self-doubt (Boden and Berenbaum, 2007). Emotional adaptation issues, such as social anxiety (Charry et al., 2004) and depression (Klemanski et al., 2017), easily emerge in this context.

Researchers have further proposed that EA may be a critical factor in mood swings during adolescence (Somerville et al., 2010). EA has demonstrated a negative correlation with depression during adolescence (Rieffe and De Rooij, 2012; Sendzik et al., 2017). Some studies involving children and adolescents found that poorer EA was often associated with a higher prevalence of clinical depressive symptoms (Klemanski et al., 2017). For example, a survey of 356 Chinese children in grades 4–6 found that EA was significantly negatively correlated with depression and anxiety (Gao, 2016). The baseline level of EA abilities could even be used to predict children's depression level 1 year later (Kranzler et al., 2016). In sum, literature suggests that children's EA abilities substantially affect their depression.

Numerous studies on children's ER strategies and depression suggest that the former is an important factor affecting the latter. Children with good ER can flexibly use various strategies in relation to their environment. A negative correlation between ER and negative emotions has also been identified (Eisenberg et al., 2007). Early studies examined individuals who applied cognitive reappraisal and expressive suppression in specific situations and found that these two strategies were negatively and positively correlated with depression and other psychological disorders, respectively (Aldao et al., 2010). Accordingly, cognitive reappraisal is more adaptive than expressive suppression (Webb et al., 2012). Therefore, cognitive reappraisal is generally regarded as an adaptive strategy and expressive suppression as a non-adaptive strategy.

Meanwhile, researchers have found that children with good ER respond more empathically and are more likely to practice adaptive regulation strategies, such as cognitive reappraisal. In contrast, individuals with poor ER frequently use expressive suppression and demonstrate emotional maladjustment (Chervonsky and Hunt, 2017). A meta-analysis of 35 studies highlighted that adolescents' choices of adaptive ER strategies (e.g., cognitive reappraisal) were significantly negatively correlated with their depressive symptoms, whereas their choices of non-adaptive ER strategies (e.g., expressive suppression) were significantly positively correlated with depressive symptoms (Schäfer et al., 2017).

From the perspective of Beck's (2005) cognitive theory of depression, depressed individuals form a negative cognitive schema based on their genetics and early traumatic experiences, causing them to develop depressive beliefs. These include viewing themselves, the world around them, and the future pessimistically. The schema is activated by situations with a similar emotional valence. During subsequent information processing, the resultant pessimistic thoughts strengthen the individuals' negative cognitive biases through the attention and evaluation that the individuals assign to them (Beck and Bredemeier, 2016). Existing studies have confirmed that rather than being sensitive to emotional stimuli, depressed individuals pay attention to negative emotional stimuli when attempting to resolve their difficulties, resulting in sustained processing of the stimuli (Joormann and D'Avanzato, 2014). Thus, depressed individuals tend to become immersed in their identified negative emotions and then automatically and persistently process information in a non-adaptive way to deal with them. Studies have found that patients with depression showed more obvious symptoms of alexithymia, that is, having difficulty recognizing and describing their own emotions (e.g., Zhang et al., 2017), while ER ability may be an independent trait with no connection to the depressive state. Depression appears to have greater effects on EA than ER. However, studies (e.g., Zhang et al., 2022) have pointed out obvious differences between depressed individuals and ordinary people during their selection of ER strategies, which are affected by factors such as emotional valence and intensity.

As established above, numerous studies have explored the impact of EA on promoting ER, the significance of using ER strategies to manage depression, and the effect of depression on EA and ER. However, there is a lack of research on the relationship between EA, ER, and depression. Although scholars have suggested that these variables are closely related, the functions of the variables in EI remain unclear. In response to this gap in the existing literature, we asked: how is EA (as a cognitive ability) related to ER and emotional development issues (e.g., depression) in children?

According to researchers, EA determines whether ER strategies are successful. In turn, the use of a specific ER strategy affects the outcome of an emotional experience and response. The habitual use of maladaptive ER strategies eventually leads to physical and mental illnesses (Van Beveren et al., 2019). When individuals experience negative emotions, their EA can help them choose adaptive regulation strategies, thereby effectively alleviating these emotions. Conversely, a lack of EA can lead to maladaptive behaviors and persistent negative emotions that cause subsequent issues. Accordingly, we reasoned that ER is involved in the relationship between maladaptation and EA (Barrett and Gross, 2001) and that individuals must thus recognize and understand their emotions when choosing an ER strategy and deciding on the optimal solution.

Some researchers have hypothesized that EA affects depression through ER. Specifically, their findings indicated that individuals who paid more attention to emotional information and could clearly recognize their emotions were more inclined to choose cognitive reappraisal as a strategy, thereby facing fewer emotional adjustment issues (e.g., depression) (Boden and Thompson, 2015). In other words, individuals with high EA considered cognitive reappraisal more effective and used it for ER, thereby avoiding depressive symptoms. However, individuals who paid less attention to, and tended to be confused by, their emotions were more likely to use expressive suppression, resulting in a greater prevalence of depression (Boden and Thompson, 2015). In a study of adolescents, Vine and Aldao (2014) proposed that adverse ER strategies had an obvious mediating effect in the relationship between EA and emotional issues. Poor EA can be a major contributor to the development of depressive symptoms during adolescence if individuals are not adept at using adaptive ER strategies because additional cognitive resources (i.e., good EA) are required to activate such strategies; non-adaptive strategies are automatic and somatic (Van Beveren et al., 2019).

The present study and hypotheses development

Although there is no related empirical research involving children, we deduced from existing research that a lack of EA was related to insufficient ER (Hubbard et al., 2002; Stegge and Terwogt, 2007; Eckland and English, 2019) and non-adaptive ER strategies. These tendencies caused emotional adjustment issues (Eisenberg et al., 2007; Blair et al., 2015), such as childhood depression. Accordingly, we reasoned that a mediating relationship exists between children's EA, ER, and emotional adaptation. However, there is a lack of longitudinal follow-up research on the mechanism by which the various variables interact in child development. Most existing studies on the topic are cross-sectional (Sendzik et al., 2017), and the mutual interactions between the variables during the developmental process are yet to be examined. Thus, the predictive mechanism of EA, ER, and emotional adaptation during child development remains unclear.

Children aged 8–12 are just beginning the transition from childhood to adolescence. They require access to additional ER strategies as they enter the middle-upper grades of elementary school, and the significance of emotional adaptation should become more apparent to them during this time. Meanwhile, lack of EA, which also affects the preference of ER strategies, might become an important risk factor in their future. Thus, it is necessary to investigate their psychological wellbeing by analyzing their EA and depression, especially since children of these ages have accumulated sufficient language skills, emotional knowledge, and social experience.

Therefore, we conducted a cross-sectional study as well as a longitudinal study and used a mediation model to examine the role of EA on children's depression and the significance of ER strategies in this relationship. Ultimately, we sought to determine the significance of EA in children's emotional development and how that significance was produced.

Based on the above, this study hypothesized that EA could predict children's current and future depression levels through ER strategies. Specifically, children's EA abilities were positively and negatively correlated with the application of the cognitive reappraisal and expressive suppression strategies, respectively, while ER strategies had a mediating effect between EA and depression.

We hoped that this study would reveal the impact of the key elements of EI (i.e., EA and ER) on children's depression, as this would assist in finding the right approach to improving school counseling.

Materials and methods

Participants

All of the participants in this study were children from mainland China, followed over 3 years from grades 3–5. The children were recruited from 47 classes in three elementary schools in Shanghai *via* random sampling.

Before conducting the study, the researchers administered the Chinese revision of the Levels of Emotional Awareness Scale for Children (LEAS-C; Wang et al., 2015) to 855 students in grades 3–5 (M_{age} = 9.57, SD = 0.89) to detect differences in ER strategies and depression levels among children with varying EA levels. After referring to previous studies, the top and bottom 27% of participants, based on their total scores for the scale, were used to distinguish between those with high and low EA, respectively (Kelley, 1939). In this study, children with a total score of ≥41.5 on the EA questionnaire were screened as having high EA; those with a total score of ≤33 were considered as having low EA. The final sample comprised 166 children who met the requirement for random selection and voluntarily agreed to long-termparticipation (Table 1).

The results of the independent sample *t* test indicated a significant difference between the high and low EA groups in terms of their total LEAS-C scores, t (164) = 21.97, $p < 0.001$, Cohen's d = 3.43. The score of the high EA group for the questionnaire was M = 43.30, SD = 1.55; that of the low EA group was M = 20.39, SD = 9.32.

Measures

The levels of emotional awareness scale for children

To measures levels of EA, children completed the Chinese revision of the LEAS-C (Wang et al., 2015), which was developed by Bajgar et al. (2005). This scale plots 12 scenarios, each based on two people (the self and others) to elicit one of the four types of emotions (anger, fear, happiness, and sadness). For each scenario (e.g., "Someone who used to criticize you gave you a compliment"), two questions are posed

"How do you feel?" and "How do you think the other person feels?" The scorers (at least two) then rate the participants' responses. Three scores are allocated for each scenario, one each for self-awareness, other-awareness, and total awareness. The total awareness score is the higher of the scores. Each scenario is rated on a 5-point scale. Ratings for each scenario are summed to give a maximum possible score out of 60. Higher scores indicate a higher level of EA in a dimension or overall. In the current sample, internal consistency for self-awareness, other-awareness, and total awareness was 0.95, 0.97, and.93, respectively.

Emotion regulation questionnaire for children and adolescents

The Chinese version of the Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA-C; Chen et al., 2016), which was initially developed by Gullone and Taffe (2012), was used. This questionnaire aims to measure the tendency of children and adolescents to use two ER strategies: expressive suppression and cognitive reappraisal. The questionnaire consists of 10 items. Cognitive appraisal strategies (e.g., "When I want to be happy, I think of something else, such as my teacher praising me today") are calculated by averaging the scores of items 1, 3, 5, 7, 8, and 10. Expressive suppression strategies (e.g., "When I am happy, I am careful not to show it") are calculated by averaging the scores of items 2, 4, 6, and 9. Items are rated on a 5-point Likert scale, ranging from "completely disagree" (1) to "completely agree" (5). Higher scores indicate a higher tendency to use a particular strategy. Cronbach's α for the cognitive reappraisal and expressive suppression dimensions was 0.76 and 0.44, respectively. Since the expressive suppression dimension had only four questions and the participants in this study were from the high and low EA groups, a relatively low internal consistency coefficient was acceptable.

Children's depression inventory

This study adopted the Chinese version of the Children's Depression Inventory (CDI) scale, developed by Kovacs (1992) and revised by Yu and Li (2000). The scale consists of 13 items measuring children's depression-related feelings, thoughts, and behaviors. Each item described three levels of depressive symptoms (e.g., "I am occasionally unhappy," "I am often unhappy," and "I am always unhappy"), and participants are asked to choose the one that best fits their actual situation. After reverse-scoring items 2, 5, 6, 7, 12, and 13, the mean score is calculated, with higher scores indicating higher levels of depression. This questionnaire has been shown to have good reliability and validity (Yu and Li, 2000; Wu et al., 2010; Liu et al., 2015). Cronbach's α of this questionnaire were 0.90 and 0.90, respectively, for the two measurements of the study.

Design and procedure

Before the survey began, informed consent was obtained from each school principal, classroom teacher, and parents of participating students, as well as from the students themselves. In the survey, a single class was taken as a unit and students completed the questionnaires with paper and pencil. The experimenters were graduate students trained in developmental and educational psychology, as well as psychology teachers, and head teachers. Before each test was administered, participants were informed that they were required to answer questions faithfully, with no right or wrong answers, and the principle of confidentiality would be strictly observed.

This survey was conducted twice, 6 months apart, to collect the longitudinal data. The first survey was conducted in the first semester of the 3rd, 4th, and 5th grades (T1 in mid-October of the current year), measuring EA, ER strategies, and children's depression levels. The second survey was conducted in the second semester of the 3rd, 4th, and 5th grades (T2 in mid-May of the following year), and measured children's depression levels. No participants dropped out or were added between the two tests.

The participants were required to complete the LEAS-C, ERQ-CA-C, and CDI assessments at T1, and the CDI at T2. The questionnaires were administered in class and collected immediately upon completion, which took about 30 min and 15 min at T1 and T2, respectively. The LEAS-C questionnaires were collected and scored by two research assistants according to the scoring manual, and the final score for each item and dimension of the individual was calculated by averaging the scores of the two raters.

Data analysis

Descriptive statistical analysis was performed using SPSS 26.0. The bootstrap method of the PROCESS model 4 macro program, developed by Hayes (2013) in SPSS, was used to examine the mediating role of ER strategies between EA and child depression. A mediating effect test was run with 5000 resamples and a 95% confidence interval. If the 95% confident interval for the mediating effect did not contain 0, the effect was considered significant.

Results

Descriptive analyses

The mean and standard deviation of the children's EA, different ER strategies, and level of depression at T1 and T2 are displayed in Table 2.

Expressive suppression strategies and EA ability (high and low scores) were adopted as the dependent and independent variables, respectively. The control variables were demographic variables including the children's gender and grade, parents' educational level, and status of being an only child or not. Analysis of variance (ANOVA) was performed; the results showed that EA had a significant main effect F (1, 145) = 9.67, p = 0.00, η^2 = 0.06. The *post-hoc* test results revealed that children with high EA had significantly lower expressive suppression scores than those with low EA.

Next, ANOVA was performed using cognitive reappraisal strategies and EA abilities (high and low scores) as the dependent and independent variables, respectively, and the demographic variables comprised the control variables. The results showed that the main effect of EA was not significant F (1, 145) = 0.07, p = 0.80, η^2 = 0.00. There was no difference between the children in the high and low EA groups in terms of their cognitive reappraisal scores.

TABLE 1 The demographic variables of the participants in the two groups.

	High EA group (82)	Low EA group (84)	Total (166)
Male	40	37	77
Female	42	47	49
M_{age}	9.62	9.66	9.59
SD	0.78	0.90	0.84
Only child	37.80%	48.81%	44%
Fathers completed high school or above	54.88%	71.19%	68.07%
Mothers completed high school or above	60.98%	67.86%	66.05%

TABLE 2 The mean and standard deviation of the main study variables.

	High EA group		Low EA group	
	M	*SD*	*M*	*SD*
Total awareness (T1)	43.30	1.55	20.39	9.32
Expressive suppression (T1)	2.89	0.81	3.29	0.89
Cognitive reappraisal (T1)	3.69	0.96	3.63	0.86
Depression (T1)	1.37	0.36	1.51	0.49
Depression (T2)	1.33	0.37	1.56	0.44

A 2×2 repeated ANOVA was conducted with depression as the dependent variable, measurement time as the within-subject independent variable (T1, T2), EA (high and low scores) as the between-group independent variable, and demographic variables as the control variables. The results indicated that the between-group main effect was significant F (1, 145) = 7.57, $p = 0.01$, $\eta^2 = 0.05$. The *post-hoc* test showed that children in the high EA group had significantly lower scores on the depression scale than those in the low EA group. The main effect of measurement time was not significant $F(1, 145) = 1.61$, $p = 0.21$, $\eta^2 = 0.01$, nor was the interaction effect between measurement time and EA $F(1, 145) = 1.44$, $p = 0.23$, $\eta^2 = 0.01$. Therefore, the depression variable remained stable for both groups of participants over the two time points.

Analysis of the mediating effect of emotion regulation strategies between emotional awareness and depression

Mediating model in a cross-sectional study

Taking *T1 emotional awareness* as the independent variable and *T1 depression* as the dependent variable (dummy variables, 1 = high EA group, 0 = low EA group), the mediating effect of expressive suppression and cognitive reappraisal strategies was tested after controlling for child gender, grade, parental education, and only child status. The results showed that *T1 expressive suppression* played a mediating role between *T1 emotional awareness* and *T1 depression* (see Figure 1), with an indirect effect size of −0.13, 95% CI = [−0.225, −0.036], and a mediating effect of 80.40% of the total effect. That is, children with higher EA scores were less likely to adopt expressive suppression ($B = -0.44$, $SE = 0.14$, $p < 0.01$) and had lower levels of depression ($B = 0.28$, $SE = 0.03$, $p < 0.001$). The mediating effect of cognitive reappraisal was not significant (see Figure 1), 95% CI = [−0.063, 0.044] between EA and depression. EA was a predictor of cognitive reappraisal ($B = 0.04$, $SE = 0.15$, $p = 0.80$), and cognitive reappraisal was a negative predictor of children's depression at T1 ($B = -0.17$, $SE = 0.03$, $p < 0.001$).

Mediating model in a longitudinal study

Taking *T1 emotional awareness* as the independent variable and *T2 depression* as the dependent variable (dummy variables, 1 = high EA group, 0 = low EA group), the mediating effect of expressive suppression and cognitive reappraisal at T1 was tested after controlling for demographic variables and *T1 depression*. The results showed that *T1 expressive suppression* mediated *T1 emotional awareness* and *T2 depression* (see Figure 2), with an indirect effect size of −0.04, 95% CI = [−0.090, −0.002], and a mediating effect of 43.12% of the total effect. That is, children with higher EA scores were less likely to adopt expressive suppression ($B = -0.25$, $SE = 0.11$, $p = 0.03$) and subsequently had lower levels of depression at T2 ($B = 0.17$, $SE = 0.03$, $p < 0.001$). The mediating effect of cognitive reappraisal was not significant (see Figure 2), 95% CI = [−0.016, 0.007]. Thus, EA was not a predictor of cognitive reappraisal ($B = -0.12$, $SE = 0.14$, $p = 0.40$), and cognitive reappraisal was not able to predict children's depression at T2 ($B = 0.01$, $SE = 0.02$, $p = 0.59$).

Discussion

The results of this study were consistent with the research hypotheses. Specifically, first, in the cross-sectional study, ER strategies played a mediating role in the relationship between EA and children's depression. Children with high EA were less likely to adopt ER strategies involving expressive suppression and had lower levels of depression. By comparison, children with low EA were more inclined to adopt suppressive strategies that led to higher levels of depression. Second, the longitudinal study verified the existence of the mediating effect that ER strategies had on EA and depression. Children with high EA were less likely to adopt ER strategies involving expressive suppression and thus had lower depression levels over time. In contrast, those with low EA tended to adopt expressive suppression strategies that led to higher depression levels over time.

Previous studies on EA and depression in children and adolescents are not uncommon (Somerville et al., 2010; Rieffe and De Rooij, 2012; Gao, 2016; Sendzik et al., 2017). Our cross-sectional findings demonstrated that EA could predict children's depression through ER strategies. Our findings also confirmed that interactions between the three variables were long lasting. This is likely because children with poor EA tend to have insufficient ER abilities (Hubbard et al., 2002; Stegge and Terwogt, 2007; Eckland and English, 2019); moreover, non-adaptive ER or poor ER strategies lead to emotional maladjustment in children (Eisenberg et al., 2007; Blair et al., 2015).

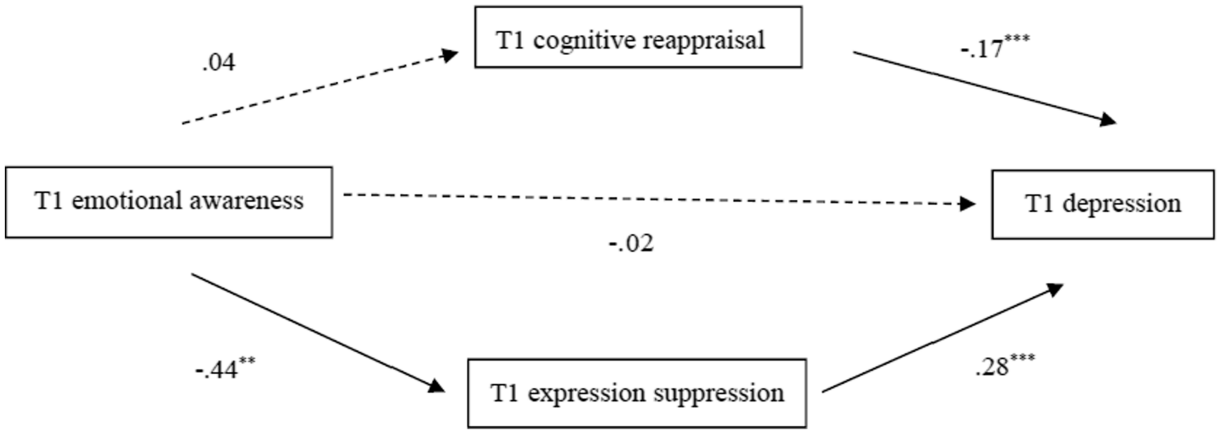

FIGURE 1
Mediating model of emotion regulation strategies between *T1 emotional awareness* and *T1 depression*. Straight lines represent the coefficient is significant. Dashed lines represent the coefficient is not significant. The coefficient from emotional awareness to depression below the center horizontal path represents the direct effect. **p<0.01, ***p<0.001.

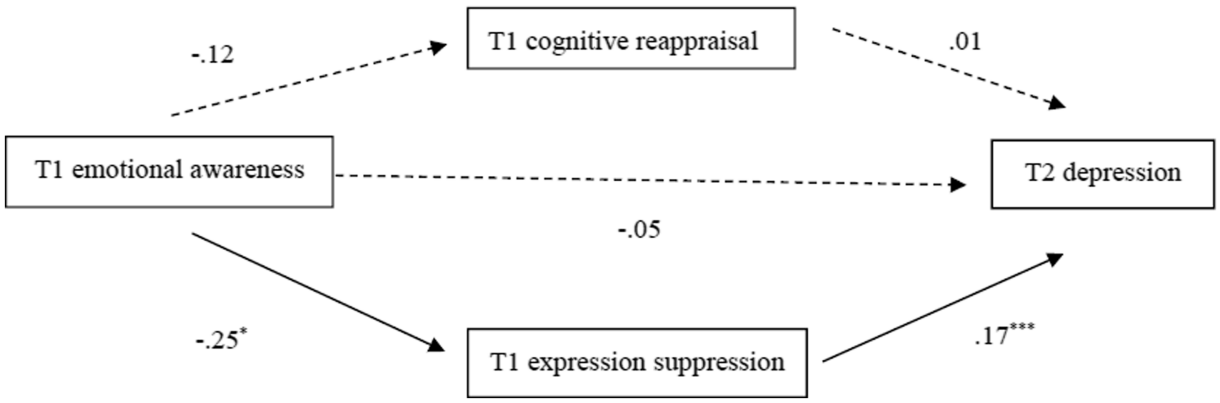

FIGURE 2
Mediating model for emotion regulation strategies between *T1 emotion awareness* and *T2 depression*. Straight lines represent the coefficient is significant. Dashed lines represent the coefficient is not significant. The coefficient from emotional awareness to depression below the center horizontal path represents the direct effect. *p<0.05, ***p<0.001.

The results of the longitudinal study not only demonstrated this reasonable speculation but, more importantly, supplemented the findings of previous studies. Also of critical value are the long-term results established in this study, which introduced a new perspective on depression in children and adolescents. The causes of depression are complex; ER has always been considered closely related to depression because the latter is a developmental emotional issue (Eisenberg et al., 2007; Aldao et al., 2010; Webb et al., 2012; Chervonsky and Hunt, 2017). However, this study confirmed that EA might affect the tendency to select specific ER strategies, thus allowing children's future depression level to be predicted. Minimally, this revealed that children are affected by their own EA levels before regulating the emotions that they experience, and that this impact acts on their future depression levels. Specifically, EA was found to influence the children's choice of expressive suppression strategies significantly, which, in turn, affected their depression. This was consistent with the assertions that (i) lack of EA leads to the tendency to employ maladaptive ER strategies (such as expressive suppression) (Hubbard et al., 2002) and (ii) real situations in which frequent use of expressive suppression as a regulation strategy were associated with depression (Schäfer et al., 2017). These findings pointed to the necessity of including EA in the group of factors that cause depression in children, as well as the formation of at least one action path, namely EA → ER strategy (expressive suppression) → depression in children.

In terms of specific ER strategies, this study found that the expressive suppression strategy had a mediating effect between EA and children's depression, but could not establish whether cognitive reappraisal, an adaptive regulation strategy, played a mediating role between these two variables. This differed slightly from the findings of previous studies (i.e., Eastabrook et al., 2014; Subic-Wrana et al., 2014; Van Beveren et al., 2019). In fact, existing findings on the mediating role of cognitive reappraisal are inconsistent. For example, Van Beveren et al. (2019) found that this strategy played a mediating role between EA and depression in adolescents, but this effect was not identified by Boden and Thompson (2015). Although a lack of EA affects children's ER to a certain extent (Hubbard et al., 2002), some researchers believe that there is no direct relationship between EA level and the tendency to use cognitive reappraisal. Individuals who apply this strategy may be unaffected by EA during their tasks (Szczygieł et al., 2012).

The results of existing cross-sectional studies showed a strong relationship between cognitive reappraisal and depression. In one such study of children aged 10–12, the researchers found that the employment of cognitive reappraisal strategies negatively predicted the level of depression: the more frequent the use of such strategies, the lower the level of depression (Gullone and Taffe, 2012). A similar result was found among adolescents: cognitive reappraisal was more closely associated with depression in individuals than expressive suppression (Schäfer et al., 2017). However, some studies suggested that the development of children's ER strategies is influenced by their cognitive abilities and social experiences. Some researchers proposed that children do not learn to use cognitive methods to regulate their emotions until they are 8 or 9 years old (Garnefski et al., 2007), meaning that their use of cognitive reappraisal strategies is unstable before that age. For example, one study found that the propensity to use cognitive reappraisal changed with age: compared with elementary school children, adolescents in high school were significantly more inclined to use cognitive reappraisal (Jiang et al., 2008). In contrast, this study found that the use of expressive suppression remained stable and did not reflect differences with development over age (Jiang et al., 2008). Cognitive reappraisal could not effectively predict children's future depression levels in this study. Other researchers pointed out that the use of ER strategies is related to the potency and intensity of the stimuli that individuals face. Individuals tend to employ cognitive reappraisal when faced with high-intensity negative stimuli, but not when faced with high- or low-intensity positive emotions or low-intensity negative emotions (Zhang et al., 2022).

In summary, the cognitive reappraisal strategy did not demonstrate a mediating effect in this study. There was also no difference between children with varying EA abilities in their tendencies to use that strategy; however, the strategy could predict children's current depression levels in cross-sectional studies. This might be because the applications of the cognitive reappraisal strategy were not always affected by EA, as the children's ER skills were still developing and they still lacked sufficient cognitive abilities to use it. Their application of cognitive reappraisal strategies was unstable at that age and thus, this variable was not always associated with depression. Alternatively, it could be because the children were not subjected to intensive negative emotional experiences during this study. Ultimately, this study revealed that the expressive suppression strategy played a mediating role between EA and children's depression and that children with poor EA abilities were more inclined to adopt this strategy, which led to higher levels of depression.

Implications

This study aimed to broaden knowledge about children's current EA abilities and depression to offer insights useful to researchers, educators, and pediatric clinical psychologists. Specifically, our findings may help such professionals make timely adjustments to their educational goals, methods, and interventions.

At present, approximately 30 million children and adolescents under the age of 17 in China have suffered or are suffering from various emotional disorders and behavioral issues (Jiang and Lei, 2021), which may adversely affect their development. Unfortunately, parents and teachers presently lack highly effective treatment and intervention methods for children and adolescents suffering from depression; they cannot even detect abnormalities in children at an early stage and in a timely manner. Parents and teachers often only pay attention to these issues when the symptoms have developed to the point that they can no longer be ignored.

We believe that an important component of school and family education should be the cultivation of emotional adaptation in children and adolescents. Adults must help youth learn effective ER methods (e.g., increasing their conscious thinking about emotions and being able to view difficulties and negative events rationally) and actively intervene. Clinical studies involving adults have shown that the level of EA was an important variable for the effectiveness of clinical interventions (Beutel et al., 2013) and that there might be a strong correlation between EA and interventional effects (Lane et al., 2020).

However, intervening in the EA abilities of elementary school children alone will not necessarily improve their anxiety and depression (Gao, 2016); the relationship between EA and depression may be affected by other important factors, such as ER. This study's identification of the EA → ER strategies → depression path establishes that the risk of emotional issues in children can be reduced by optimizing and improving their EA abilities. During follow-up research, it is necessary to further investigate the scheme for optimizing children's EA and the use of adaptive ER strategies (i.e., cognitive reappraisal) by children with different EA abilities. Doing so will clarify the impact of EA on the choice of ER strategies and its interventional effects on emotional adaptation.

Additionally, this study established that EA not only predicted children's current depression through ER strategies but also predicted their future depression levels. This may help professionals approach their work from multiple perspectives based on the specific path identified in this study and reduce mental health risks in children caused by insufficient EA. Professionals may also offer youth further supports to improve their emotional adjustment and ability to cope with stress. For example, they may develop relevant 6–8 week courses training students in EA (e.g., improving their ability to recognize expressions and being exposed to situations involving various emotions), change their cognitive evaluation through cognitive ER strategies, and regulate emotion-related behavioral tendencies to change maladaptive emotional behaviors (Gross, 2007).

As another example, the OECD proposed that learning social and emotional skills can help children face new challenges and adapt rapidly to a changing society (OECD, 2021). The oft-emphasized Social and Emotional Learning course includes important content such as EA, pressure management, and coping, and is being accepted by increasing numbers of schools. When students are taught social and emotional skills, the effect on the students is considerable (Durlak et al., 2011). The transition from childhood to adolescence is particularly sensitive to increases in social and emotional skills, which may shape children's behavior and lifestyles to achieve better personal and professional outcomes (OECD, 2021).

Meanwhile, we hope to combine real cases from daily life in our future research to propose effective prevention and intervention strategies from multiple perspectives, including those of parents, teachers, students, and managers. This will help us apply our research findings to practice.

Limitations

Despite the revelations and contributions of this study, some elements must be further explored in future studies to enrich research in the field of children's EA and depression. First, there is a need to improve and develop an appropriate measurement tool, especially for children. The LEAS-C, which was applied in this study, undoubtedly posed a certain degree of difficulty for our participants when answering the questions. They had to report all their own and others' emotional experiences in each situation either in writing or orally; accordingly, the questionnaire took them nearly 30 min to complete. Subsequently, multiple trained professionals were needed to score the questionnaires, each of which similarly took nearly 30 min. Some researchers have tried to improve the scale by adjusting the style of the questions, including more points for scoring (Veirman et al., 2016) or using computer programs for scoring (Barchard and Picker, 2018). However, they could not resolve the problems concerning completing and scoring the questionnaire, which were time-consuming and labor-intensive. There may also be negative effects on the scoring of the scale, especially when the participants are children (Veirman et al., 2016). This issue should be addressed in future studies.

Second, the ERQ-CA-C questionnaire used to measure children's ER strategies in this study was based on the ER process model, which was developed based on the Emotion Regulation Questionnaire (ERQ) intended for adults. The ERQ examines the ER strategies commonly used by children and adolescents aged 10–18. However, it only contains two ER strategies: cognitive reappraisal and expressive suppression. The number of questionnaire items is also limited (with only four items for expressive suppression), which is not conducive to measuring the dimensions accurately. Moreover, it does not involve any specific situations for eliciting and regulating emotions. Additionally, some researchers proposed that children are unable to regulate their emotions through cognitive means until they are 8 or 9 years old (Garnefski et al., 2007). The participants of this study were 8 or older, and might have been in the "transitional zone" in terms of developing ER strategies; this could possibly lead to inaccurate measurements when using the questionnaire. In future research, it is necessary to develop an ER questionnaire suitable for children under 10 years old and involves additional everyday situations and ER strategies.

Third, future studies should use an appropriate number of samples and duration for data tracking. The sample size of this study was relatively small because of the Covid-19 pandemic, which made it challenging to track more participants off-line. Further, the data in this study were limited to students in grades 3–5 and only collected over two school terms. This was due to the limitations of the conditions, such as the complexity of filling out the questionnaire and students having graduated. With the grade 5 students about to finish elementary school and move on to middle school, it was difficult to track their data over a third school term to analyze developmental trends or draw more convincing developmental conclusions. In the future, researchers may start data tracking earlier or select samples of students from schools offering 9-year compulsory education.

Conclusion

This study found that EA negatively predicts current and future levels of depression in children. Unlike children with low EA, those with high EA were less likely to adopt ER strategies involving expressive suppression. In turn, they demonstrated lower levels of depression and were more likely to continue to demonstrate lower levels of depression in the future. Based on these results, we proposed the following possible path for using EA to predict children's current and future mental health: EA → ER strategies → depression. This offers a new perspective useful for intervention in clinical and educational practice.

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

The studies involving human participants were reviewed and approved by University Committee on Human Research Protection, East China Normal University, China. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

Author contributions

RW contributed to the design of the work, data collection, drafting the article, and its critical revision. HL contributed to the data analysis and interpretation. BS and YZ contributed to the final approval of the version to be published. All authors provided critical feedback and shaped the manuscript.

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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

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Detection and analysis of graduate students' academic emotions in the online academic forum based on text mining with a deep learning approach

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Purpose: The possibility of mental illness caused by the academic emotions and academic pressure of graduate students has received widespread attention. Discovering hidden academic emotions by mining graduate students' speeches in social networks has strong practical significance for the mental state discovery of graduate students.

Design/methodology/approach: Through data collected from online academic forum, a text based BiGRU-Attention model was conducted to achieve academic emotion recognition and classification, and a keyword statistics and topic analysis was performed for topic discussion among graduate posts.

Findings: Female graduate students post more than male students, and graduates majoring in chemistry post the most. Using the BiGRU-Attention model to identify and classify academic emotions has a performance with precision, recall and F1 score of more than 95%, the category of PA (Positive Activating) has the best classification performance. Through the analysis of post topics and keywords, the academic emotions of graduates mainly come from academic pressure, interpersonal relationships and career related.

Originality: A BiGRU-Attention model based on deep learning method is proposed to combine classical academic emotion classification and categories to achieve a text academic emotion recognition method based on user generated content.

KEYWORDS

academic emotion, emotion recognition, emotion classification, graduate mental health, deep learning

1. Introduction

Graduate education is an important part of higher education. In the pursing of a master or doctoral degree, graduate students have been actively carrying out scientific research achievements. They take advantage of their intelligence and make the best use of higher quality scientific and technological resources. At the same time, they are also facing great pressure (Scott and Takarangi, 2019). Graduate students' mental health concerns have been discussing for nearly

10 years and have attracted more and more attention (Gewin, 2012). These achievements and stress are expressed in many ways, of which emotions are mostly significant. Emotions have a great influence on human learning, memory, motivation, mental health, and neurological function. Positive emotions can increase the level of dopamine in the brain, which in turn affects the function of memory, learning attention, and the ability of creative problem solving (Ashby and Isen, 1999; Meinhardt and Pekrun, 2003; Ainley et al., 2005), meanwhile, negative emotions will reduce learning motivation and effort. Pekrun et al. (2002) first clearly put forward the concept of academic emotion in early 21st. Academic emotions refer to various emotional experiences related to students' academic work in the teaching or learning process.

However, emotions are not easy to identify sometime. We cannot just ask some other graduate students with serial rude and personal questions such as "Are you happy doing your research today?" or "Why are you so angry about your teammates?" (Gratz and Roemer, 2004). So, if we want to discover the hidden emotions of graduate students, we first need them to be willing to express their emotions. With the continuous development of network technology, various social platforms have become centers for discussions and opinions (Sobkowicz et al., 2012). In such an anonymous environment, topics are being discussed, opinions are being published, and emotions are being expressed. Meanwhile, opinion mining methods based on machine learning and deep learning technologies have been widely accepted (Ramakrishnan et al., 2020), the task of sentiment analysis and emotion recognition for large-scale data sets has become feasible (Sánchez-Núñez et al., 2020). Thus, performing a data mining on the topics and comments published by these graduate students is a worthwhile path to discover their emotion states and care about their mental health, and our research mainly focuses on the following research questions:

(1) What is the current state and distribution of graduate students who publish information on social platforms?
(2) Based on these students' posts, how can we discover the hidden academic emotions?
(3) What are these graduate students really talking about online?

To address these issues, we conducted the following research. We performed our research on real Internet user generate contents. First, we conduct a descriptive statistical analysis on the collected data, to find out the distribution of posters' information. Second, we transformed the task of discovering academic emotions from posters' topics and replies into a supervised deep learning based classification model with natural language processing methods to recognize and classified the content into several emotion categories. At last, a semantic based topic evolution analysis has been conducted to find out what are the posters really discussing about specifically.

2. Related studies

2.1. Academic emotion recognition and measurement

Academic emotion recognition can be considered as the process of discovering hidden emotions from data and research in the studying process of students. Linnenbrink and Pintrich (2002) ran a dichotomy between positive and negative valence as an early exploration on academic emotion recognition and classification. From the research method and technology aspect, three types of academic emotion studies are widely conducted: empirical studies based on qualitative or quantitative questionnaires, model-based academic emotion recognition and measurement, and case studies based on meta-analysis. The Achievement Emotions Questionnaire (AEQ) is an important foundational questionnaire structure for the first type if studies. Pekrun et al. (2011) conducted AEQ and classified academic emotion into 9 categories as enjoyment, hope, pride, relief, anger, anxiety, shame, hopelessness, and boredom from three aspects as learning-related emotions, class-related emotions, and exam-related emotions. Based on these categories, researchers have expanded the applicable field of AEQ and proposed more new dimensions such as AEQ-S (Bieleke et al., 2021), AEQ-ES (Lichtenfeld et al., 2012) and AEQ-PE (Fierro-Suero et al., 2020). The second type of studies focuses on the optimization of academic emotion models. These studies approached on the construction of academic emotional models, such as OCC model (Clore and Ortony, 2013), categorical emotion models (D'mello and Graesser, 2007; Sreeja and Mahalaksmi, 2015) and dimensional emotion models (Sreeja and Mahalakshmi, 2017) are helpful for more accurate and comprehensive descriptions of the emotional state and can provide some references for the development of research work related to emotion recognition. The third type of studies is based on different cases, using meta-analysis method to comprehensively analyze the influencing factors of academic emotions. MacCann et al. (2020) discussed the relationship between emotional intelligence and academic performance. Camacho-Morles et al. (2021) analyzed the how could activity achievement emotions influence on academic achievement.

Recent studies have been conducted primarily on specific groups or by incorporating specific environmental factors. Wang et al. (2017) discussed the relationship between academic emotion and psychological well-being among Chinese rural-to-urban migrant adolescents. Wu et al. (2022) used questionnaire survey to study whether taking important exams during the COVID-19 pandemic would have an impact on students' academic emotion and found that there was a certain negative deactivate correlation. Fried et al. (2022) ran an assessment of mental health, academic emotion, and resilience among undergraduate and graduate students, found that graduate students generally feel more stressed about their studies.

Meanwhile, the research on academic emotion recognition from artificial intelligence approach mainly focuses on the practical exploration of emotion recognition in the fields of natural language processing (Nandwani and Verma, 2021), computer vision, speech recognition, and physiological information recognition, mainly using text mining, speech recognition, and facial expression recognition, gesture recognition, biological information recognition and other technologies (Feng et al., 2020).

2.2. Emotion recognition based on text

Sentiment classification and analysis are important research front in the field of natural language processing, and emotion analysis is considered an extension and complement (Thelwall et al., 2012). Sentiment classification usually only focuses on the binary, whether it

is positive or negative (Martín-Valdivia et al., 2013; Younis, 2021). However, according to emotional psychology research, although positive and negative are important emotional dimensions, there are still many other emotional types and emotional intensity measurement criteria, and positive and negative cannot meet the needs of emotional classification (Cornelius, 1996).

Both unsupervised and supervised approaches are used in research of emotion detection. Unsupervised approaches mainly including dictionary-based and rule-based methods. Mac Kim et al. (2010) used three datasets to build up an emotion word dictionary as a classification category, and classified the emotion texts into angry, fear, joy, and happiness. Agrawal and An (2012) added a discussion of syntactic relations based on emotional words, built a recognition model, and found that the accuracy rate has improved. Supervised approaches are mainly based on machine learning models (Asghar et al., 2019; Hasan et al., 2019; Tiwari et al., 2017), based on deep learning models or hybrid models (Basiri et al., 2020; Xu et al., 2020; Singh et al., 2021), and transfer learning techniques (Ahmad et al., 2020).

Research on academic emotions has been widely carried out, and many questionnaires are used for different research subjects. However, these methods are not suitable for academic emotion recognition process based on large-scale datasets. Meanwhile, the achievement of text-based emotion analysis, we can easily use these methods and techniques for academic emotion recognition research.

3. Data and methodology

3.1. Data collection

The dataset used in our research needs to meet two main requirements. First, to achieve opinion mining, it should be user generated content; Second, it should be posted by graduate students. We choose to collect the posts and comments from "Xiaomuchong"[1], a famous Online Academic Forum in China, which focuses on provide a place for postgraduate students to exchange academic opinions, discuss study methods, and share daily lives. The forum has more than 5 million topics, 140 million comments and 25 million registered users. Besides the considerable amount of data capacity, the registration restrictions are critical, it requires postgraduate certification, and it is highly recommended to provide the registers major status. In this study, we focus on the academic emotions, so we need to make a preliminary limit to the data source just from the "postgraduate study mood" section.

We collected the web page text content of the Xiaomuchong website through a web spider program written in python for 2 weeks, and the data set contains three types of useful information: topic information, detail information and poster information. The topic information is the dataset of topics posted by the website users. It contains the title of the topic, the post time, the latest reply time, the id of the topic poster and the volume of views and replies. The detail information contains the whole detail content of the dataset. Each reply to every topic in our dataset is collected. It contains the replied detail text content and the replier's information such as id and reply time. The poster information contains the personal information of both posters and repliers, such as age, gender and what they are majoring in. Finally, we collected 18,831 topic items, 511,269 detail items and 131,755 poster information items and stored in MongoDB.

3.2. Academic emotion recognition method

3.2.1. Academic emotion recognition framework

We used Bi-GRU, a deep learning model, for training and testing to achieve the task of identifying academic emotions. The pipeline of the entire model includes three main steps, which is shown in Figure 1.

The first step is data pre-processing. For Chinese text, before the word vector embedding task, it is necessary to perform a word segmentation on the text. The second step is data labeling, it is essential in supervised learning model training. In the word embedding process, due to the necessity to train and test on different models and compare the results, we used a pretrained word2vec model instead of randomly initialized word vectors. We selected a Chinese word vector library developed by Tencent Artificial Intelligence Laboratory (Song et al., 2018). This library has more than 8 million Chinese words, and contains many emerging words and network terms, which is very suitable for machine learning or deep learning downstream tasks based on user generated content. After the word vector embedding step, the Chinese words after word segmentation can be converted into word vectors of 200 dimensions. The last step is model training. We split the dataset into training set and test set, and through multiple iterations of multiple epochs, we finally got a stable classification model and tested it on the test set.

3.2.2. Data labelling

We labeled the dataset into four categories with academic emotion tags among "Positive activating," "Positive deactivating," "Negative activating" and "Negative deactivating." Due to the large amount of data, perform manual labeling method on global data set is not appropriate. To ensure the efficiency and accuracy of data labeling result, we divide the process into two steps. The first round of labeling process is unsupervised labeling, and the second round is conducted by combining unsupervised and manual labeling. Unsupervised labeling is to determine whether the target text contains emotional words corresponding to the dimension. We first constructed an emotional word list based on academic emotion categories (Pekrun et al., 2011) and an existing Chinese emotional ontology (Xu et al., 2008), which contains the dimensions of academic emotion classification and the emotion words related to each dimension (As shown in Table 1). The ontology contains several attributes to each word, including lexicon, emotional category, and emotional strength.

Three conditions occurred during the process. First, there is only one emotional word in the text, which can be directly labeled with the corresponding dimension. Second, the text does not contain any emotional words, and it will be marked as invalid data. The third condition is the most complicated. If the text contains multiple emotional words, a method for calculating academic emotional strength was conducted to present the emotional tendency. For an unlabeled text, the academic emotional strength

1 A forum for academic information exchange among researchers. http://muchong.com/bbs/

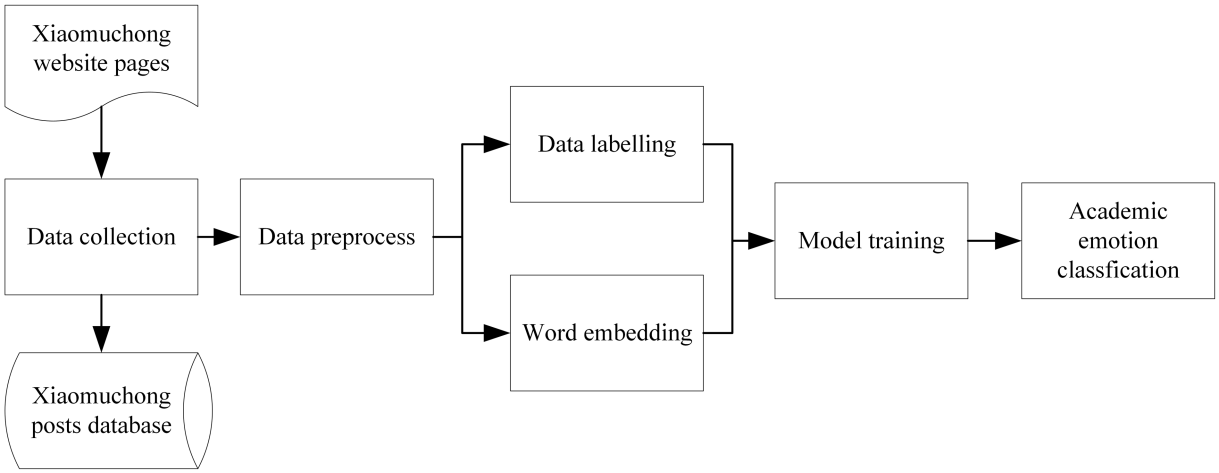

FIGURE 1
Academic emotion recognition data process pipeline.

TABLE 1 Academic emotion dimensions.

Academic emotion dimension		Emotional word categories (translated from Chinese)
Dimension	Sub-dimension	
Positive activating	Enjoyment, hope, joy	Happy, respect, praise, believe, love, wish
Positive deactivating	Relaxation	Relieved, comfort
Negative activating	Anger, fear, guilt, thinking, panic, shy, jealousy	Anger, fear, guilt, thinking, panic, shy, jealousy
Negative deactivating	Disappointment, boredom	Disappointment, sadness, bored, abomination, derogatory, doubt

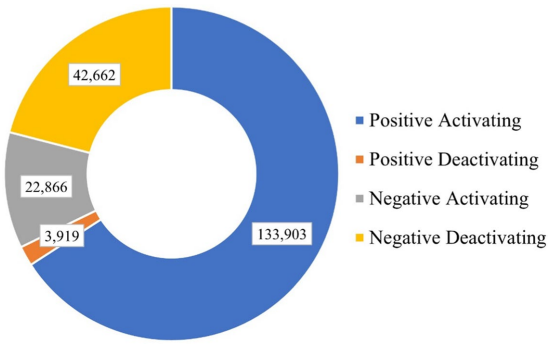

FIGURE 2
Academic emotion dimensions labeling distribution.

of one dimension can be calculated as the sum of the emotional strength of all emotional words belongs to this dimension, and the text can be labeled as the academic emotion dimension with the max emotional strength. For example, in an unlabeled text "今天做完了实验，真开心, 但导师却挑剔的说结果不够好 *(I'm really happy that I finished the experiment today, but my supervisor was critical and said that the result was not good enough)*," there are two emotional word <开心 *(happy)*, 挑剔*(critical)*> in this text which belongs two emotional word categories < *happy*, *derogatory* > and two academic emotion dimensions < *Positive activating*, *Negative deactivating* >. According to the emotional ontology, emotional strength of word "happy" is 7 and "critical" is 5, thus the academic emotion dimension strength of this text can be calculated as < *Positive activating:7, Positive deactivating: 0, Negative activating: 0, Negative deactivating:5* >, 7 is the max strength value, so this text will be labeled as "Positive activating."

However, this unsupervised data labeling method is suitable for conditions where the text length should not be too long. If there are more than 10 emotional words in one unlabeled text, then it can be classified as long text (Deng and Ren, 2021). We manually checked these long texts, selected items with obvious emotional tendencies and marked them, and discarded other items. Finally, 203,350 detail items are labeled, and the distribution of each dimension of academic emotion are shown in Figure 2.

3.2.3. BiGRU-attention model

From natural language processing aspect, the task of identifying academic sentiment from textual content can be considered as feature based text sequence classification, so among deep learning models and frameworks, a recurrent neural network (RNN) that can extract and process sequence features is conducted. GRU (Gated Recurrent Units) and LSTM (Long-short Term Memory) are both optimized recurrent neural network models (Chung et al., 2014), which are suitable for dealing with long sequences in the sequence model. Compared with the traditional RNN model, update mechanism has been added to enhance the memory ability and reduces the chances of gradient disappearance and gradient explosion. These two models both have a large scale of applications in the fields of text classification, machine translation, and speech recognition. As an improvement of the LSTM model, the GRU model simplifies the input gate and forget gate into one update gate in the unit of hidden layer (Yang et al., 2020). A gated recurrent unit contains an update gate z_t and a reset gate r_t. At time t,

according to the output of previous stateh h_{t-1} and current input x_t, z_t and r_t can be formulated as:

$$z_t = \sigma\left(W_z \times \left[h_{t-1}, x_t\right]\right)$$

$$r_t = \sigma\left(W_r \times \left[h_{t-1}, x_t\right]\right)$$

After inputting the previous gated state, a reset gate can calculate an updated $(h_{t-1} \times x_t)$, then combine the new data with the current input x_t, a gated recurrent unit calculates the new state h_t as:

$$h_t = \tanh\left(W_r \times \left[h_{t-1} \times r_t, x_t\right]\right)$$

tanh is used as the activation function. This h_t is the function of current input x_t , also considered as the candidate hidden layer. r_t can control the memory size, combines current h_t and previous h_{t-1} to calculate the final hidden layer state. Finally, the current h_t calculation formular is updated as:

$$h_t = \left(1 - z_t\right) \times h_{t-1} + z_t \times h_t$$

Here z_t is the gate control signal, and $z_t \in \left[0,1\right]$, it controls the forgetting amount of information. The closer the value is to 0, the more information needs to be forgotten.

However, in sentiment classification tasks, use RNN model to extract text features has certain defects, that is, the one-way RNN model can only extract the former context features, but the latter context features are also very important. Using a bidirectional recurrent neural network structure can effectively solve this problem (Tang et al., 2019), and we conducted a bidirectional GRU network. The Bi-GRU model solves the sequence features in the text, and to achieve the classification function of the model, we need to adopt a classification structure. For the four classifications of the results, we employ a softmax classifier for concatenation. In addition, since we have performed word segmentation on the text, the importance of words will affect the classification results of the model, so an attention layer is added between the softmax layer and the hidden layer. The structure of the entire classification model is shown in the Figure 3.

Meanwhile, to figure out the performance of the model we adopted, we also used machine learning classification algorithm support vector machine, multinomial Naive Bayes and one-way GRU neural network as the baseline for comparison.

4. Results and discussion

4.1. Descriptive statistical analysis of posts

The research data we have collected has been since the establishment of the Xiaomuchong website from 2010 to 2020. Finally, we collected 18,831 topic items, 511,269 detail items and 131,755 poster information items. The year and month distribution of topics is shown in Figure 4. From 2010 to 2015, these topics did not get much discussion, but after November 2016, the volume of topics increased dramatically and reached a peak around 2017 to 2019. Although in 2020 there was a small decrease in the volume of topics, but there is still a lot of attention on the topic of academic emotion among graduate students.

Meanwhile, to figure out which topics get the most discussion, we draw boxplots based on replies to those topics as shown in Figure 5. From the overall aspect, the mean and median of the volume of replies to the topics show the post time of the topic is related to the volume of replies. The earlier a topic is posted, the more exposure it gets, and therefore more replies are performed. Most topics received less than 1,000 replies, but there were also some topics that got more than 3,000 replies, with the most reaching an astounding 5,227, which is a topic about "PhD thesis defence successfully passed" posted in 2017.

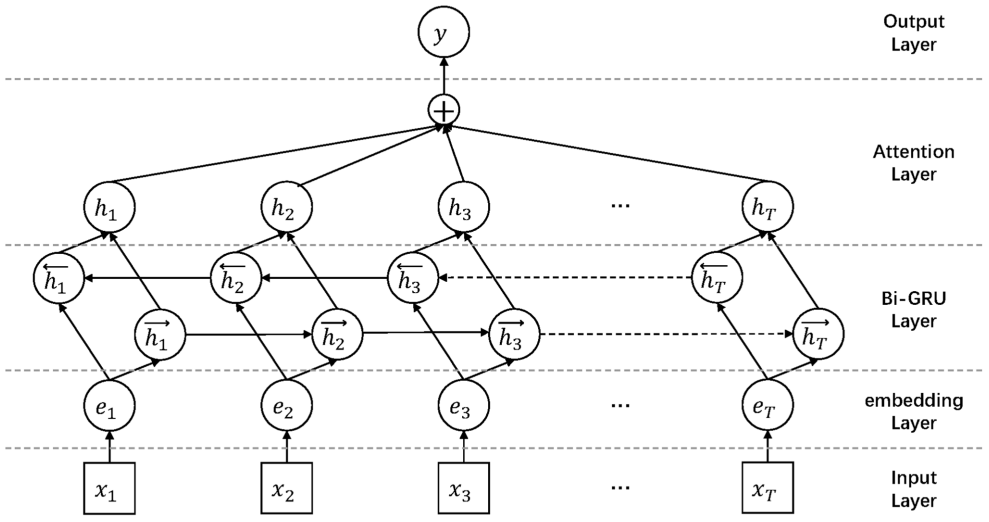

FIGURE 3
BiGRU-Attention classification model structure.

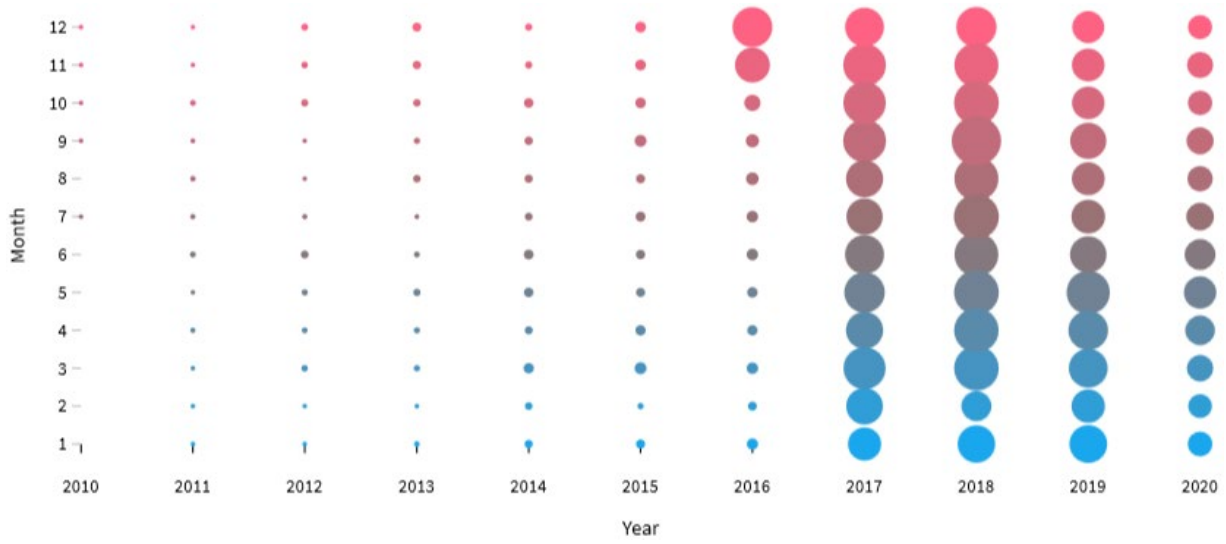

FIGURE 4
The year and month distribution of the topics.

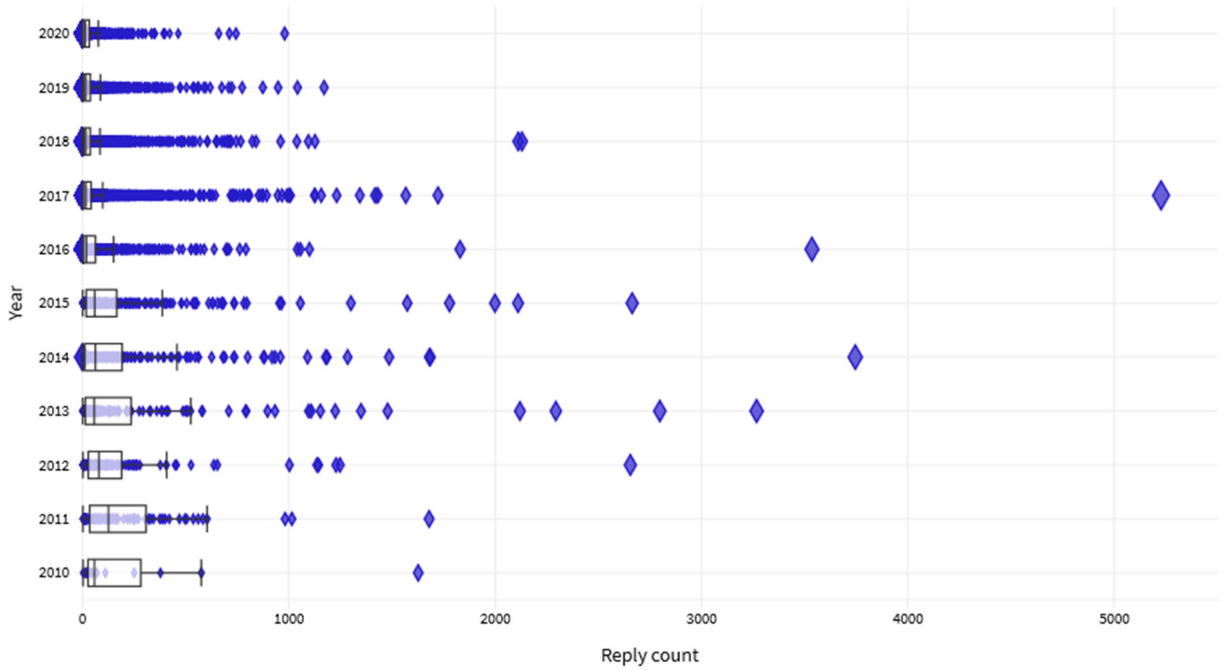

FIGURE 5
The distribution of the hot topics.

4.2. Descriptive analysis of posters' gender and major

To find out the academic emotions hidden in viewpoints from multiple perspectives, it is also very important to conduct statistical analysis on the direct data that can be obtained, such as the distribution of posters' gender and major.

The gender distribution of the posters is shown in the Figure 6. Surprisingly, nearly half of the posters (about 46.38%) chose not to set gender or keep gender confidential. When it comes to personal situations like sentiments and emotions, even in online communities that share opinions anonymously, people still tend to keep personal information such as gender in secret. Among the posters who set their genders, 21.80% of them selected as 'Male' and 31.82% of them selected as 'Female'. In such online communities, female graduate students are more willing to express their thoughts and opinions.

As a graduate student, different majors have different academic pressures. For example, the students majoring in engineering may suffer from the unsatisfactory optimization of the experimental model and not

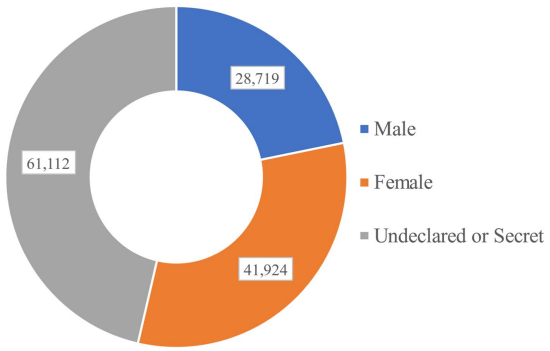

FIGURE 6
The gender distribution of the posters on Xiaomuchong.

get enough ideal experimental data, Meanwhile, the students majoring in literature might suffer from lack of inspiration and creation of new chapters. It is important to figure out the distribution of the posters' majors. However, it is inappropriate to show the distributions directly because there are too many different majors, and some majors are quite alike. So, we classified the majors into 13 main subjects and 111 subcategories manually according to *Catalogue of Degree Granting and Talent Training Subjects* published by the Ministry of Education of the People's Republic of China.[2] At last, we conducted a statistical analysis of the subjects of the posters' majors, and the result is show in Figure 7.

We can find out that the volume of posters on online platforms varies widely among graduate students in different majors. From the main subject level, the "engineering" subject not only has the largest total volume of posters, but also has the most kinds of subcategories. Due to the sensitivity and the quantity of samples collected, the volume of posters belonging to military science is the least, with no more than 100 records. Obviously, the difference between the majors of the article is more significant from the subcategory level. Among the graduate students who post on the Xiaomuchong website, the students majoring in "chemical" are the most, reaching 30,317. This is not an accidental phenomenon and there have been many conclusions about the academic pressure and academic depression of graduate students majoring in chemistry (Rodrigues, 2020; Stockard et al., 2021). Meanwhile, the second place is the students majoring in "material science and engineering" with 13,915. These are the only two majors with over 10,000 records. Is this phenomenon because the students of these two majors are more inclined to express their opinions and views online? Or do they have more academic emotions to express? We found some valuable reasons from other literature (Tang et al., 2018; Woolston and O'Meara, 2019). One of the main reasons is that students in these two majors, especially graduate students, face greater academic pressure. The daily work of these graduate students in these two majors is based on a giant number of experiments. A lot of work means extra working hours, which leads to a lack of work-life balance, anxiety, and depression.

2 The Catalogue is according to the version published in 2018 by MOE. http://www.moe.gov.cn/s78/A22/xwb_left/moe_833/201804/t20180419_333655.html

4.3. Result of academic emotion classification

We randomly selected 203,350 data records to obtain the training set at a ratio of 80% and rounded them to integers. The training set contains 160,000 data records, and the remaining 43,350 are used as the test set.

In the performance evaluation of the classification model, we mainly carried out two aspects. The first is to measure the overall model performance, using overall indicators for evaluation. Then, to discover the classification effect of each category, we also evaluated the precision, recall and F1score of each category. For the overall metrics, we selected macro average score for evaluation. The results are shown in Table 2 (PA: Positive activating, PD: Positive deactivating, NA: Negative activating, ND: Negative deactivating).

Comparing between different models, deep learning models perform better than machine learning models. We can find that the BiGRU-Attention model we used has the best scores on various indicators all above 95%, shows that the model has good performance. The comprehensive score of the one-way GRU model has also reached more than 80%, which is also fair enough. However, performance of the machine learning models, multinomial NB and svm, are both unsatisfactory. The svm model can barely reach 70% in all three indicators, while the naive Bayes model performs even worse, only slightly more than 60%.

Furthermore, we can find that the classification model has good performance on all four categories. The PA (Positive Activating) classification with the best effect has a score of more than 98% in all three indicators. This category has the largest sample size and a larger range of emotional words, which can have better recognition effect. The worst result of the four categories is PD (Positive Deactivating), with a F1 score of 93% and a recall 89%. Just focus on the score of this one category, the performance of the model is good enough, but there is a gap of close to 5 to 10% with the scores of the other three categories. This phenomenon occurs because this category PD (Positive Deactivating) is one of the academic emotions which is most difficult to articulate or to define. According to Pekrun et al. (2011)'s research, academic emotions in the category of PD (Positive Deactivating) are considered to have positive sentiment, but a negative effect on academic efforts. For example, if a graduate student completes light work with ample time constraints, he will perceive it as an "easy" task and will feel "relieved" and "comfortable." Then such emotions will have a negative effect on the following work, which may lead graduate students to think that research and learning are very simple, which is not conducive to their concentration on tasks. But somehow the emotional words of are very close to the PA (Positive Activating) category. Thus, "happy" and "relieve" are very easy to distinguish, but it is difficult to define whether "satisfaction" will have a positive or negative impact on academic efforts. This is the main reason for the low recall rate of this category.

In general, in such a high-dimensional multi-classification natural language processing task, using a deep learning model based on a recurrent neural network combined with an attention mechanism to build a classification model can achieve good performance with more than 90% of the comprehensive scores. The performance indicators can support some Chinese text-based academic emotion recognition applications based on such a model.

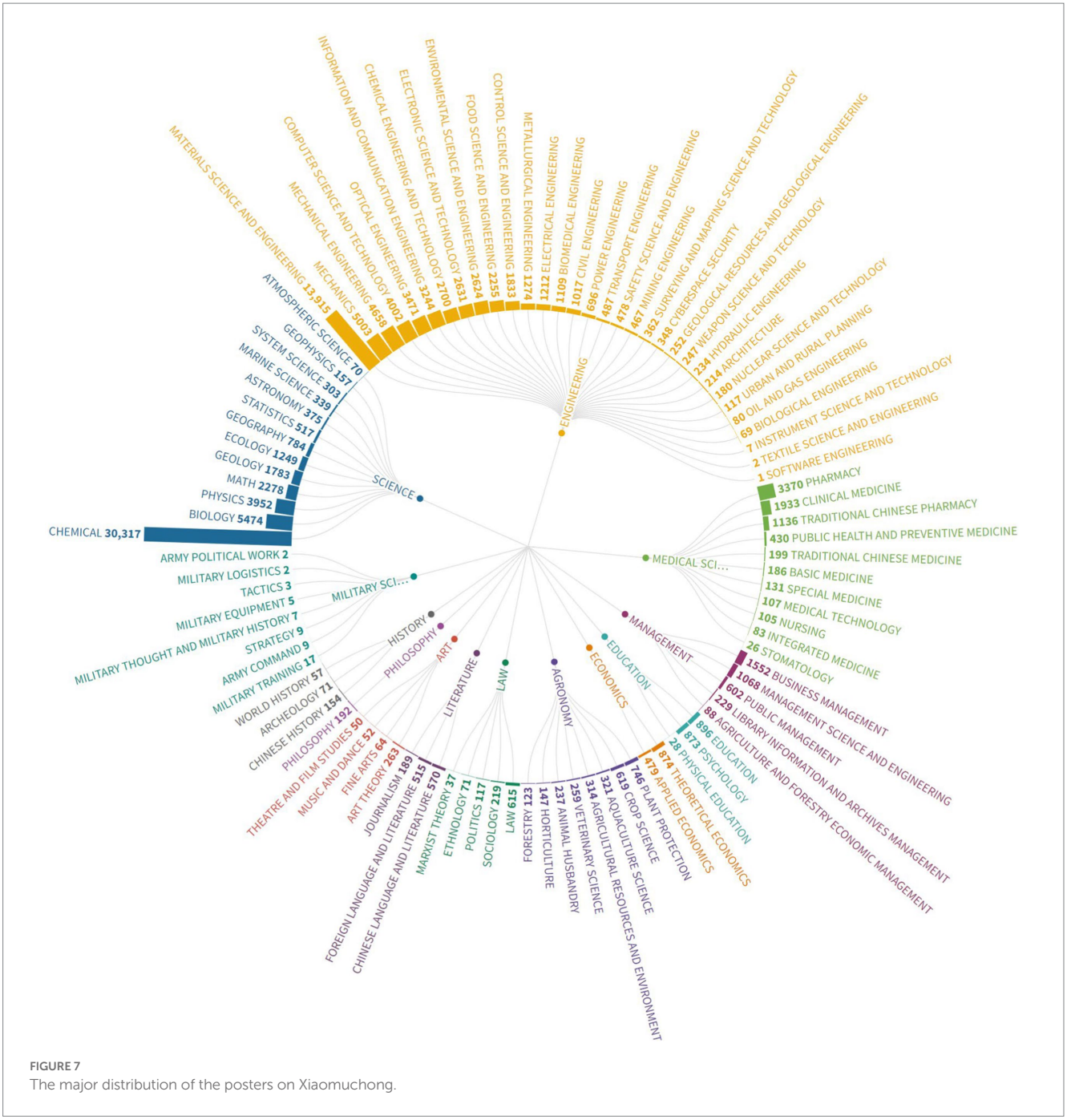

FIGURE 7
The major distribution of the posters on Xiaomuchong.

4.4. Topic analysis of graduate students' emotional engagement

Discovering hidden academic emotions from posters can effectively help us deal with the academic stress of graduate students, but it is not enough to know that what are they really talking about or worrying about. To have a further understanding of current graduate students using online platforms, it is necessary to bring up this discussion to semantic and topic level.

In addition to identifying the hidden graduate academic emotions from the website's posts, to truly understand the specific topics that the graduates are discussing, we have carried out more detailed discussions and analysis. After the text pre-processing operation, we not only construct the recognition model of the obtained corpus, but also conduct a simple topic analysis on the collected topics. Through word frequency statistics, we excluded keywords with term frequency less than 1,000, finally, we can know high-frequency words as shown in Figure 8.

We continue to use the Chinese word vectors obtained in the word vector embedding step and conducted a k-means algorithm to cluster the words in each topic and post, determined $k = 8$ by calculating the silhouette coefficient, and finally divided the results into eight categories unsupervised. Based on these eight clusters, we invited 3 experts in postgraduate admissions employment and postgraduate mental health to summarize and manually classify them to improve the readability of the results. Finally, we divided these subject headings

into the following three categories: academic pressure related topics, interpersonal related topics, and career related topics.

4.4.1. Academic pressure related topics

Academic pressure is a major aspect of postgraduate students expressing academic emotions. The academic emotional pressure of postgraduates is not only good or bad academic exam score performance, but also includes the pressure of scientific research achievements, such as experiments and papers. The high-frequency words related to the academic pressure of graduate students include "papers," "projects," "laboratories," and "scientific research," etc. Academic pressure, that is, the dual pressure from study and scientific research, is the topic that postgraduates are most concerned about, and may also be the major source of postgraduate pressure. Accompanied by such academic pressure, psychological problems or practical problems may occur among graduate students. Psychological problems can lead to mental illness, such as depression, obsessive–compulsive disorder, anxiety disorder, and even lead to schizophrenia, etc. (O'Connor and Yanos, 2021). Suicidal behavior is not uncommon for master and doctoral students (Poreddi et al., 2021). On the other hand, practical problems are mainly focused on "how to graduate." In China's postgraduate training program, the number of scientific research achievements of postgraduates within the school duration is closely related to whether they can successfully graduate and obtaining a graduation certificate and a degree certificate. Therefore, for graduate students, publishing academic papers and conducting scientific research is not only the accumulation of their own interests or enthusiasm, but also a necessary factor to ensure that they can successfully graduate.

TABLE 2 Performance comparison for each model.

Model	Indicators	Overall (Macro average)	Categories			
			PA	PD	NA	ND
BiGRU-attention	Precision	0.97	0.98	0.96	0.98	0.95
	Recall	0.95	0.99	0.89	0.96	0.96
	F1	0.96	0.98	0.93	0.97	0.98
GRU	Precision	0.85	0.86	0.84	0.86	0.83
	Recall	0.83	0.84	0.82	0.84	0.81
	F1	0.82	0.83	0.81	0.83	0.80
Multinomial NB	Precision	0.65	0.66	0.64	0.66	0.63
	Recall	0.64	0.65	0.63	0.65	0.62
	F1	0.62	0.63	0.61	0.63	0.60
SVM	Precision	0.72	0.73	0.71	0.73	0.7
	Recall	0.70	0.71	0.69	0.71	0.68
	F1	0.71	0.72	0.70	0.72	0.69

4.4.2. Interpersonal related topics

Another important emotion topic comes from lack of social interaction. The high-intensity research and study of graduate students makes their life trajectory very simple. The daily life of most graduate students during the semester is to commute among the laboratory or classroom, dormitory and canteen. They do not have the opportunity, nor the extra energy, to engage in social activities. This situation is more prominent among Chinese students (Moore-Jones, 2022). The high-frequency words related to the interpersonal pressure of graduate students include "friends," "relationships," "lovers," and "families," etc. The lack of social activities and the unmet need for friendship are mutually influencing and sometimes reinforcing (Suwinyattichaiporn and Johnson, 2022). Somehow, the need for a spouse or couple cannot be ignored in the social emotions of graduate students. Keywords like couples, boyfriends and girlfriends, and marriage also have high word frequencies. Among these posts, many of them are marriage and friendship posts. For graduate students who are socially deficient, this may be a relatively effective way for them to be more familiar with, or

FIGURE 8
High frequency words word cloud. $N_{word\_freq} > 100$, translated.

to hope for O'Day and Heimberg (2021). There is also a certain number of posts discussing family and relationships. These discussions are not the same as those about finding the other half, which are mostly about the relationship between graduates themself and their parents. According to China's higher education system, graduate students at the master's level are usually around 25 years old, and those at the doctoral level are around 27–30 years old. At this age, the relationship with parents is at a low standard in lifetime (Kremer, 2016). There is a significant work–family conflict (WFC) between graduate students and their parents (Dolson and Deemer, 2022), which can be simply summarized as the income level of graduate students is incomparable with work, parents need to continue to provide help for their children's lives, and the material and mental pressure that children bear in this relationship as graduates are seriously facing.

4.4.3. Career related topics

Finally, one of the most frequently discussed topics online for graduate students is related to personal career development. These topics are like the WFC mentioned in the previous section, but more about the concerns of the graduate students themselves about their personal career development. The high-frequency words related to the career pressure of graduate students include "work," "career," "job," and "income," etc. These pressures and emotions arise from comparison. We all know that academic qualifications and degrees can determine the type and starting point of your future work, but in actual working environment, personal career development is often influenced by a variety of factors, among which working years is a very important consideration (Tang et al., 2008; Purohit et al., 2020). This brings up the first comparison, the comparison between peers. Compared to their peers, if they did not continue to study for a master's or doctoral degree but started working after graduating from an undergraduate or junior college, their income level is likely to be higher than that of fresh graduate students due to the accumulation of working years (Yusuf et al., 2020). Another comparison is with one's own efforts. Pursuing a master's degree can take 3 years or more, and a doctorate requires at least 6–7 years of additional study time compared to a bachelor's degree. It is really a matter of willpower and endurance, and a lot of mental work. But the input–output ratio of a graduate student's first job is often suboptimal, the value created, and the income obtained may not be satisfied with what the graduate student thinks is equivalent. These two comparisons are very easy to make graduate students have a psychological gap and self-doubt, thinking that their efforts are worthless, have no prospects, and have not improved their living standard. Not only in China, but many graduate students all over the world have the same worries and anxieties (Are et al., 2018; McConnell et al., 2018; Sharif et al., 2019).

5. Conclusion

Measuring academic emotions is an important way to discover graduate students' learning status and mental health. Due to the concealment and diversity of academic emotions, it is difficult to discover hidden them from texts using traditional methods. The academic emotions and academic pressures of graduate students is a long-standing concern and is receiving increasing attention. The peculiarity of graduates' academic emotions is that their stress sources are not only from their studies, but also from research, family, and career planning. At the same time, with these academic pressures, there is no effective way to express and talk about these academic emotions that graduate students generate. In the long run, it is very easy to form psychological problems and lead to serious consequences. Many studies have analyzed and excavated academic emotion.

To address the three research questions we raised, we conducted a series of academic emotion recognition and analysis methods on large-scale datasets. For our first research question, our research conducted a statistic analysis of the collected postgraduates' posts on Xiaomuchong platform, mainly gender and major, and find out excludes users who do not want to disclose their gender or who do not fill in their gender, female post more on the platform. According to the majors marked by posters, we found that graduate students in science and engineering published most of the posts on the platform, especially majoring in chemistry. This is determined by the features of the major and the way in which the research work undertaken is carried out. For our second research question, we transform the academic emotion recognition task into a series process of constructing, training, and testing an emotion classification model based on user-generated text content. Aiming at the shortcomings of traditional academic emotion recognition research in the application of large-scale data sets, we constructed a pipeline based on recurrent neural network, which can identify and classify academic emotions unsupervised, and has a relatively ideal model performance. At last, for our third research question, based on the word vectors, we performed a topic analysis among the graduate students' posts. We clustered graduate posts on the Xiaomuchong platform into three main categories: academic pressure related topics, interpersonal related topics, and career related topics. We also discussed the main problems and sources of stress faced by graduate students from these three main categories. There are also deficiencies in our research that need to be improved in future research. The first is the problem of data labeling. The use of vocabulary-based heuristic rules may be insufficient. Consider using a decision tree model instead. Second, the topic of posts is not necessarily a simple emotional expression, but also a relevant topic discussion. The information organization provided only through the website may be insufficient. Consider a better way to filter the data set.

Data availability statement

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

Author contributions

QX: research design and paper writing. SC: data collection and data analysis. YX: paper revision and editing. CM: paper writing. All authors contributed to the article and approved the submitted version.

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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

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Mediation effects of positive and negative affect on the relationship between emotional intelligence and life satisfaction in rural school teachers

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Few studies have investigated the ways in which the specific facets of trait emotional intelligence (EI), positive affect (PA), and negative affect (NA) influence individuals' general life satisfaction, especially in teachers. This study explored the effects of three facets of trait EI [appraisal and expression of emotions (AEE), utilization of emotion (UE), and regulation of emotions (RE)] and two typical affects (PA and NA) on teachers' general life satisfaction. The participants were 577 Chinese rural school teachers (ages 18–49years) who completed three questionnaires—the Schutte Self-Report Emotional Intelligence Test, Positive and Negative Affective scale, and Satisfaction with Life Scale. After validating the scales, a structural equation modeling analysis showed that trait EI, PA, and NA had a significant and positive effect on teachers' general life satisfaction. PA played a partial mediating role between trait EI and life satisfaction. Furthermore, this study found that PA significantly and positively mediated the relationship between AEE, UE, RE, and life satisfaction. These results suggest that teachers with higher EI are more likely to have positive emotions, thereby enhancing their general life satisfaction, and that understanding the role of one's own and others' emotions and increasing positive emotions may be the key to improving teachers' general life satisfaction. Future implications and the study limitations are discussed.

KEYWORDS

emotional intelligence, positive affect, negative affect, life satisfaction, mediation effects

Introduction

Over the past two decades, the use of emotional skills has been increasingly linked to positive life outcomes in many theoretical and empirical studies (MacCann et al., 2020). Additionally, previous analyses have demonstrated reliable associations between different emotional intelligence (EI) instruments and health indicators (Schutte et al., 2007; Martins et al., 2010), indicating that the skillful use of emotions can lead to higher rates of positive emotional states and reduced negative emotions. In this regard, some studies have demonstrated a link between EI and life satisfaction (LS) and concluded that the former can help people better understand associated psychological processes, such as LS and positive emotions (Zeidner et al., 2012). Related research has suggested that those with higher levels of EI are better able to cope with daily stress and difficulties, form lasting relationships, and experience greater social support (Zeidner et al., 2012). In addition, Schneider et al. (2013) found that those with higher EI are

more resilient, allowing them to better adapt to changes under stressful conditions and view stress as an opportunity rather than a threat. Ultimately, having EI enables the use of increased resources and adaptive strategies, leading to long-term emotional benefits (Salovey et al., 2000). Thus, we hypothesize that emotional skills have a two-way effect, i.e., while they can reduce negative emotions in response to stressful events, they can also increase the prevalence and duration of positive emotions over time (Zeidner et al., 2009). Consequently, EI is considered an indicator of psychological adjustment and a major factor in overall well-being (Mayer and Salovey, 1995). Thus, we expect to find significant correlations between EI and LS indicators.

Emotional intelligence

Salovey and Mayer (1990) first discussed EI by dividing it into the following three categories of adaptive abilities: the appraisal and expression of emotions (AEE), regulation of emotions (RE), and utilization of emotions (UE) in problem-solving. Although emotion is at the heart of this model, it also encompasses social and cognitive functions related to AEE, RE, and UE. Goleman's (1995) influential book *Emotional Intelligence* introduced many important correlates to EI and extended its structure to some extent to include specific social and communication skills that are influenced by emotional understanding and expression. Cooper and Sawaf's (1997) well-known book *Executive EQ* outlined an EI model that links specific skills and tendencies through four building blocks: emotional literacy, well-being, depth, and alchemy. Beginning with the origin of EI as a concept, it has been understood as a set of interrelated abilities (Salovey and Mayer, 1990; Mayer and Salovey, 1997; MacCann et al., 2014) and an eclectic combination of many personality traits (Petrides and Furnham, 2003; Boyatzis and Sala, 2004; Tett et al., 2005; Bar-On, 2006), but the term EI came to be used to cover many different characteristics and concepts (Zeidner et al., 2004; Landy, 2005; Murphy and Sideman, 2006), leading to considerable confusion and misunderstanding of what EI is or should be (Ashkanasy and Daus, 2005; Gohm et al., 2005; Mayer, 2006).

To clarify the concepts in this field, researchers have developed two measurement models: ability EI scales and self-rating EI scales (Mayer et al., 2000). Ability EI scales require test-takers to demonstrate their knowledge by providing responses based on emotion-related information, whereas self-rating EI scales require participants to rate their agreement with a series of statements about themselves, thus reflecting their EI level. In related research, self-reported measures of EI were found to be more predictive of social functioning performance than performance measures (Brackett et al., 2006). In addition to the distinction between the two measurement models, there is a similar distinction between two theoretical EI models: mixed models and ability models. Mixed models primarily point to a broad compositional structure that leads to emotionally intelligent behavior, including emotion-related abilities, personality traits, and motivational factors (Bar-On, 2006; Petrides et al., 2007). Conversely, ability models define EI as a cognitive ability similar to language or numeracy but with its content focused on emotions rather than words or numbers (MacCann et al., 2014). Ashkanasy and Daus (2005) further distinguished between two rating scales: ratings of EI abilities and ratings of mixed models. The former are sometimes referred to as "self-perceptions of EI and emotional self-efficacy" (Qualter et al., 2012). Moreover, a recent meta-analysis divided EI measurement into ability, self-rated, and mixed EI (MacCann et al., 2020). In this study, we argue that there are two distinct types of assessments based on theoretical and empirical evidence (Joseph and Newman, 2010; O'Boyle et al., 2011): ability EI and mixed EI. The following describes the main ability models of EI and major mixed models of EI.

Mayer and Salovey (1997) developed a modified EI model consisting of the following four branches of EI: (a) perception, appraisal, and expression of emotions; (b) emotional facilitation of thinking; (c) understanding, analyzing, and employing emotional knowledge; and (d) reflective RE to promote emotional and intellectual development. Based on these four branches, the Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT) became the best-known assessment of ability EI (Mayer et al., 2003). Additionally, there are some alternative measurements for only one or two of the four branches (e.g., Freudenthaler and Neubauer, 2007; MacCann and Roberts, 2008) as well as the predecessor of the MSCEIT (i.e., the MEIS; Mayer et al., 2000). The youth versions of the MSCEIT and MEIS have frequently been used in research in the field of schooling (Rivers et al., 2012). The Schutte Self-Report Emotional Intelligence Test (SREIT) developed by Schutte et al. (1998) was one of the earliest scales to assess self-reported EI. Specifically, the SREIT is a 33-item scale based on an earlier definition of EI than the four-branch hierarchical model proposed by Salovey and Mayer (1990). Wong's Emotional Intelligence Scale is another measure of EI that utilizes this earlier definition with four components: perceiving one's own emotions; perceiving others' emotions; using emotions; and managing emotions (Law et al., 2004). Subsequently, the Self-Rating Emotional Intelligence Scale was developed to accurately capture the four-branch model of EI. This 19-item scale consists of 5 subscales: perceiving emotions; using emotions; understanding emotions; managing one's own emotions; and managing others' emotions (Brackett et al., 2006).

Appraisal and Expression of Emotions theoretically includes the ability to recognize one's own emotions (i.e., internal stimuli); the ability to express emotions in response to external stimuli; the ability to accurately express one's emotions; the ability to distinguish between true and false emotions; and the knowledge of display rules for emotional expression in different cultural contexts (Salovey and Mayer, 1990; Mayer and Salovey, 1997; Mayer et al., 2016). However, in actual tests of EI, AEE is primarily used to measure an individual's capacity to identify the type and intensity of an emotion present in external stimuli, such as facial expressions, micro expressions, tone-of-voice, body postures, landscapes, and evocative art (Nowicki and Duke, 1994; Matsumoto et al., 2000; Mayer et al., 2003; Schlegel et al., 2014). Once an emotion is perceived, it serves as an input for cognitive systems (Mayer et al., 2001). In this regard, individuals can understand the domain-specific knowledge of emotional content, which includes knowledge about emotions and emotion-related phenomena. According to Mayer et al. (2001), AEE is the central locus for abstract processing and reasoning about emotions and emotional information, including a vocabulary of emotional terms, the antecedents and consequences of emotions, the ways in which emotions may combine or change over time, and the possible effects that particular situations may have on an individual's present or future emotions (Salovey and Mayer, 1990; Mayer and Salovey, 1997; Mayer et al., 2016).

Regulation of Emotion refers to regulating one's own and others' emotions to achieve desired outcomes, such as personal development

(Mayer and Salovey, 1997; Mayer et al., 2001, 2016). Because it involves managing one's own and others' emotions (i.e., intrinsic and extrinsic RE; Gross and Thompson, 2007; Gross, 2008), this facet includes knowledge about RE and related cognitive strategies (Mayer et al., 2016). RE is also based on personal goals, such as upregulating and downregulating emotions to achieve personal growth. Hence, RE not only represents knowledge regarding how to regulate emotions but also serves as an important motivating factor in deciding when and why to regulate emotions (Mayer et al., 2001).

Utilization of Emotion refers to using emotion and affective information as an input or guidance for cognitive tasks or decision-making. It involves using existing emotions to guide task selection or approaches and generate new emotions to help accomplish specific tasks (Mayer et al., 2016). In this case, positive emotions can lead to innovative thinking because they give individuals a broad perspective, whereas anxiety is a form of hypervigilance to threats, i.e., when using existing emotions, individuals use their current emotional state as a key reference (Fredrickson, 2001; Bar-Haim et al., 2007). Additionally, tasks can be chosen to take advantage of emotional states, which may contribute to performance. For instance, one might choose to welcome new colleagues when in a good mood but wait to attend a funeral or other solemn occasion until the mood becomes more serious.

Emotional intelligence and life satisfaction

LS, an important aspect of individual subjective well-being (Kjell et al., 2016), reflects an individual's overall evaluation of their life experience (Diener et al., 2002; Schimmack et al., 2004). Factors influencing LS have been discussed in previous studies, including financial status (Johnson and Krueger, 2006; Boyce et al., 2010; D'Ambrosio et al., 2020), educational level (Kousha and Mohseni, 1997; Meeks and Murrell, 2001; Park et al., 2020), and self-esteem (Utsey et al., 2000; Diener and Diener, 2009; Liang et al., 2020). The factors influencing LS have attracted the attention of researchers because it has a significant impact on physical and psychological health (Strine et al., 2008; Garcia and Moradi, 2013; D'Ambrosio et al., 2020) and is an important component of subjective well-being (Diener, 1984). Positive affect (PA) and subjective well-being have been found to predict greater job dedication and loyalty as well as lower rates of burnout and turnover (Rhoades and Eisenberger, 2002). Rural teachers are generally less satisfied with life than urban teachers (Qiao and Lina, 2019). In view of the work pressures that teachers face, exploring the factors influencing their LS and examining PA and negative affect (NA) will help them better cope with their daily life and work.

EI plays a nonnegligible role among the many factors that affect LS. Individuals with high trait EI report higher LS (Urquijo et al., 2016). This positive association remains significant after controlling for many sociodemographic variables (e.g., Extremera and Fernández-Berrocal, 2005; Gohm et al., 2005; Ruiz-Aranda et al., 2014). Another study found that trait EI is more strongly associated with LS than performance-based EI (Sánchez-Álvarez et al., 2016). The conceptualization and assessment of EI are controversial, but two main ideas are accepted. The first views EI as a set of skills, similar to cognitive intelligence. For instance, Salovey and Mayer (1990) defined ability EI as "the subset of social intelligence that involves the ability to monitor one's own and others' feelings and emotions to discriminate among them and to use this information to guide one's thinking and actions" (p. 189). The second approach primarily considers EI as a set of traits, similar to personality, with Petrides et al. (2007) defining trait EI as "a distinct and compound construct that lies at the lower levels of personality hierarchies" (p. 283).

Previous research has examined the association between trait EI and LS in diverse population samples, namely, in university graduates (Amdurer et al., 2014), university employees (Hafiz and Chouhan, 2015), and employees of secondary schools. This result was also obtained in groups of teachers (Mehta and Mehta, 2015) and undergraduates (Afolabi and Balogun, 2017). However, little attention has been paid to rural teachers. One study found that the LS of rural teachers in China is generally not high (Qiao and Lina, 2019). Among rural teachers who lack resources and face greater pressure, studying the relationship between LS and trait EI will not only enable the adoption of steps to improve the physical and mental health of rural teachers but also help develop measures to stimulate their enthusiasm for education and teaching.

The positive effects of trait EI on LS are well established, but the exact mechanism of this effect remains unclear. Several studies have identified the mediating role of numerous variables, such as self-evaluation characteristics, perceived stress, and social support (e.g., Zeidner et al., 2012; Kong and Zhao, 2013; Sun et al., 2014; Urquijo et al., 2016). Here, we attempt to identify the mechanisms behind this association from the perspective of PA and NA. In particular, for rural teachers, we investigate how they use their emotional resources and abilities to improve their own LS and the mechanisms behind the improvement (Hypothesis 1).

Moderators of the emotional intelligence/life satisfaction relationship

Positive and negative affect

PA and NA are generally considered related to LS and subjective well-being (Diener et al., 1990, 1991), and the relationship between these two affects and LS has different intensities and effects (Kuppens et al., 2008). It is generally accepted that trait EI is negatively associated with NA and positively associated with PA (e.g., Mikolajczak et al., 2007; Gallagher and Vella-Brodrick, 2008; Mikolajczak et al., 2008; Schutte and Malouff, 2011; Koydemir et al., 2013). What is the relationship between trait EI and affective experience? As a facet of trait EI, RE is considered to be closely related to changes in PA and NA. The reappraisal of PA is related to increased PA, and the suppression of PA is associated with decreased PA and increased NA (Nezlek and Kuppens, 2008). RE strategies of suppression and rumination are associated with increases in NA and decreases in PA, and rumination, reappraisal, distraction, and social sharing are associated with increases in PA (Brans et al., 2013). Furthermore, PA and NA are considered to mediate the relationship between RE strategies and sleep quality (Latif et al., 2019). Diener's (1984) tripartite expression of subjective well-being is very simple, incorporating LS, PA, and NA. Later studies supported this compositional structure and showed invariance across groups from middle childhood to adulthood (Huebner and Dew, 1996). However, although follow-up studies have confirmed the generality of the association between PA, NA, and LS, the structure linking LS, PA, and NA remains ambiguous

(Busseri, 2018). Research conducted among teachers has shown a strong link between PA and LS (Hamama et al., 2013).

Scholars have noticed a strong link between PA and NA as well as LS and EI. PA and NA are envisioned in a model as mediating the link between EI and LS, i.e., people with good EI experience more PA and less NA, leading to higher LS (Zeidner et al., 2012). EI may promote the use of abundant resources and adaptive responses, resulting in long-term emotional benefits (Sánchez-Álvarez et al., 2016). Generally, individuals who experience happiness more often and experience less NA are empirically found to be more satisfied with their lives (Garcia and Moradi, 2013; Koydemir et al., 2013). One study found that EI affects LS through the chain mediation effects of social support-PA and social support-NA and showed that high EI can promote well-being in terms of social support and emotion (Kong et al., 2019). Gignac (2006) used structural equation modeling (SEM) to show that a specific indirect effect of trait EI on LS was significant through PA, but no significant indirect effect was found through NA. Using the same technique, Kafetsios and Zampetakis (2008) showed that PA and NA at work mediate the relationship between EI and job satisfaction. These results suggest that individuals with higher EI scores tend to experience less NA and more PA, leading to increased job satisfaction.

However, some methodological issues have arisen in previous studies. First, Kafetsios and Zampetakis (2008) only tested aggregate indirect effects through PA and NA, not specific indirect effects. Preacher and Hayes (2008) found that the significance of total indirect effects was not a necessary prerequisite for significant specific indirect effects in multiple mediation models. Second, Gignac's (2006) results were obtained in a very small sample ($N = 107$), which may lead to nonsignificant mediation effects for negative effects. Barrett (2007) asserted that SEM analyses based on a sample of less than 200 should be rejected unless the population itself is small or limited in size. Further, the studies cited above generally discuss trait EI as a single variable, without further exploring how the subdimensions of trait EI and LS are related in terms of the mediating effects of PA and NA. Finally, teachers have been identified as an occupational group that experiences high levels of stress (Greenglass et al., 1997; Van der Doef and Maes, 2002; Pascual et al., 2003), and PA and subjective well-being have been found to predict stronger work dedication and loyalty in addition to lower burnout levels and turnover rates (Rhoades and Eisenberger, 2002). However, the LS of rural teachers is generally not high (Qiao and Lina, 2019). With respect to the work pressure faced by teachers, exploring the impact paths of their LS and positive and negative emotions can help them better cope with daily life and work (Hypothesis 2).

Facets of emotional intelligence

Three potential mechanisms can explain the relationship between EI and LS. First, teachers with high EI may be better equipped to manage negative emotions triggered by the school environment. Common emotions among teachers include burnout, disappointment with negative feedback, learning new technology/topics, and stress from challenging projects (Roeser et al., 2013; Carroll et al., 2022). Teachers with better emotion management skills may also experience LS and professional growth from difficult experiences. If this mechanism is at play, then the emotion management branch of EI should show the strongest correlation with LS.

The second mechanism proposed for the relationship between EI and LS involves social needs in education. Specifically, teachers who possess higher EI may be better equipped to manage their lives and develop better relationships with their students, colleagues, and respective families (Jennings and Greenberg, 2009), which can directly affect LS, such as easier access to resources or improved achievement. Additionally, it can have indirect effects due to the social support network it provides to help manage stress. If this is the case, the RE branch of EI should show stronger effects than the other branches.

Third, MacCann et al. (2014) suggested that EI may be an element of intelligence similar to teachers' adeptness at languages or other academic subjects, allowing them to become emotionally intelligent. This overlap between EI and teaching skills may explain why teachers with higher EI have higher LS. It is believed then that the larger vocabulary and greater ability to express feelings associated with high EI can help rural teachers manage their daily tasks more effectively and serve as a foundation for their long-term development and career growth.

However, the findings of previous studies have been inconsistent in terms of the relationship between different facets of trait EI and LS. The level of emotional self-efficacy of trait EI (Petrides and Furnham, 2003) may have been the main factor determining the positive direction of its relationship to LS. Emotional self-efficacy directly affects individuals' emotional state in negative situations and indirectly affects how individuals respond to setbacks and obstacles. However, Palmer et al. (2002) found that regarding trait EI, only clarity of feelings was significantly associated with LS, whereas Liu et al. (2013) found that in an undergraduate student sample, there was no significant correlation between the emotional appraisal of others and LS. A recent study found that one trait EI component (RE) and two adversity quotient facets (tenacity and optimism) significantly and positively predicted general LS (Zhao et al., 2021). Holinka (2015) showed a negative correlation between the interpersonal trait EQ-i (Emotional Quotient-Inventory) subscale and overall LS.

The relationship between trait EI and LS requires further in-depth research. This study explores the relationship between the subdimensions of trait EI and LS, and the results may help researchers in related fields develop a better understanding of facets of trait EI and their relationship to LS (Hypothesis 3).

Rural school teachers

In rural areas of central China, teachers have a unique set of circumstances. First, preschool education has been rapidly growing (although not universally), and the government has been working to promptly popularize such education. This indicates that kindergartens and primary schools often include crossover teaching staff, who may transfer from primary school to junior high school or from junior high school to senior high school. This phenomenon reflects the urbanization of education in China and the lack of professional identity among teachers. Second, rural teachers are often responsible for taking care of a large number of "left-behind" children (i.e., children whose parents are not present), which requires significant energy and can create extra strain on the teachers. Furthermore, because many students at these schools are boarders, the class teachers must take on the role of life teachers due to the lack of such dedicated individuals. Finally, due to the shortage of specialists in various subjects, such as music, physical education, and art, rural teachers are

often required to provide interdisciplinary lessons. To this end, they must develop a diverse set of new knowledge and skills to support their teaching in addition to their pre-service training, which can be daunting and stressful (Qiao and Lina, 2019). Due to the increased teaching pressure and self-learning challenges faced by rural teachers, it is hypothesized that teachers with higher EI will be better able to cope with such challenges. Furthermore, high EI can help rural teachers increase their positive emotions and decrease their negative emotions. Consequently, they improve their LS, thereby enabling them to stay more active and productive in their daily teaching and fostering long-term benefits for their career development.

Methods

This study validated the model for the mechanism by which the trait EI of teachers influences their LS through PA and NA and further explored the relationship between the facets of trait EI, PA, and NA in relation to LS. As noted, our study mainly addressed two issues. First, to test the validity of the model, we used a mediation model implemented with SEM to test the simultaneous mediation of PA and NA. Second, because mediation models show the relative importance of mediators (Bravo et al., 2018; Park et al., 2020), the independent mediating roles of PA and NA in the link between trait EI and LS were considered in our study, and we investigated which mediators show a more critical role in the link.

Participants

A total of 577 participants were included in this study, all of whom were living in county areas in central China, that is, rural areas that are governed under the category of county-type administrative regions in China. Among these, 148 were male (26%) and 429 were female (74%). The average age of the participants was 28.40 years (SD = 6.75). The participants had an average of 15 years of education (SD = 0.627), and most had a university degree (97.57%). Nearly two-thirds were married (65.34%). More than three-quarters of the participants (79%) had no part-time administrative job. The sample was made up of 72.27% teachers at the primary level and 24.96% at the junior high school level. Nearly 60% of the participants were second-level teachers or below, which is representative of the average level of teachers of basic education in China. Thus, the data analysis of these 577 teachers can be regarded as reflecting the psychological characteristics of Chinese rural teachers of basic education. Although the study participants have certain structural differences, there still existed strong homogeneity due to homogeneity among the rural areas of central China. The survey data analysis also reveals some commonalities. In the subsequent analysis, structural differences in terms of subjects such as age, gender, and teaching level were controlled (Table 1).

Data collection

All data used in this study were collected online *via* questionnaires. Three measures were used, one for trait EI, PANAS, and general LS. Additionally, basic demographic information was collected from all participants.

Measures

In this section, we first evaluate the theoretical context of each core measurement (EI\PA\NA\LS) and then test the reliability and validity of their scales using Bartlett's test, the Kaiser–Meyer–Olkin (KMO) test, and Cronbach's alpha coefficient.

Emotional intelligence

Trait EI was measured using the SREIT developed by Schutte et al. (1998). SREIT is a short (33-item) self-reported measure of EI developed based on Salovey and Mayer's (1990) earlier EI model. Schutte et al. (1998) argued that the original EI model of Salovey and Mayer (1990) and the revised EI model of Mayer and Salovey (1997) are the most cohesive and comprehensive models of EI. The former is more suitable for conceptualizing aspects of an individual's current state of emotional development. The 33-item SREIT, refined by Schutte et al. (1998) on the basis of these models, is succinct, operable, and rigorous. It is precisely for these reasons that we chose trait EI as a tool for testing the relationship between EI and LS.

The overall reliability coefficient of the 33 measurement indicators in this study was 0.938. Additionally, Bartlett's test value for chi2 was 8,495 ($p = 0.000$), and the KMO test value was 0.947, thus indicating a significant correlation between the indicators. The commonality between the indicators was high, meaning that they could accurately reflect the latent variable EI. In this set of 33 items, the representations of the different categories of the model were roughly proportionate to those in the conceptual model of Salovey and Mayer (1990). In all, 13 items were drawn from among those generated for the AEE category of the SREIT. 10 from among those generated for the RE category, and 10 from among those generated for the UE category. The reliability

TABLE 1 Basic statistics of participants.

Outcome	Mean	Standard deviation	Minimum	Maximum
Gender (male = 1)	0.26	0.43	0	1
Marital status (married = 1)	0.65	0.47	0	1
Age	28.40	6.75	18	49
Part-time job or not (no part-time job = 1)	0.79	0.41	0	1
Teaching level (nursery = 1, primary = 2, junior high = 3, senior high = 4)	2.26	0.50	1	4
Years of education	15.05	0.626	9	16

coefficient of AEE used in this study was 0.807, the chi2 of the Bartlett test was 1738.352 ($p = 0.000$), and the KMO test value was 0.857, indicating that the AEE category had an acceptable degree of homogeneity and commonality. The reliability coefficient for RE was 0.838, the chi2 of the Bartlett test was 1782.662 ($p = 0.000$), and the KMO test value was 0.889, indicating that the internal consistency of the RE category was strong and there was high correlation between items. The reliability coefficient of the UE category was 0.8239, the chi2 of Bartlett test was 1582.466 ($p = 0.000$), and the KMO test value was 0.880, indicating that the UE category had strong internal consistency and the correlation between items was high. Because the scales used in this study were developed and validated in a Western setting, we performed a confirmatory factor analysis (CFA) to ensure that culturally similar constructs were used across all scales, except the CD-RISC, which has been validated against a Chinese population (Yu and Zhang, 2007).

Positive and negative affect

The Positive Affect and Negative Affect Scale (PANAS) was compiled by Watson et al. (1988) and revised by Lin et al. (2008). Answers were given on a 5-point scale (1 = very slight or none at all, 5 = very strong) to indicate the extent to which the emotion described was experienced in the previous week, and negative and positive impact scores were calculated separately, with higher scores indicating greater impact. In this study, Cronbach's alpha coefficients of the PA and NA subscales were 0.949 and 0.949, respectively. Moreover, Bartlett's test values for chi2 were 5905.597 ($p = 0.000$) and 5488.154 ($p = 0.000$), respectively, whereas the KMO test values were 0.949 and 0.936, respectively. Correlation between the specific items was significant, and the degree of commonality was high, indicating that this instrument can reliably reflect PA and NA intensity of the respondents.

Life satisfaction

LS was measured using the Life Satisfaction Scale (SWLS) developed by Diener et al. (1985). The SWLS is a short, 5-item general LS scale wherein participants indicate the extent to which they agree with certain statements using a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree). This study used a 6-point scale; the midpoint of the 7-point scale was removed to avoid midpoint effects or social desirability bias (Garland, 1991). The overall reliability of the five items was good, with an alpha reliability coefficient of 0.949. The alpha of each specific item was greater than 0.9. Moreover, Bartlett's test value for chi2 was 5488.154 (p = 0.000), whereas the KMO test value was 0.936. Correlation between the specific items was significant, and the degree of commonality was high, which reliably reflects respondents' overall LS intensity (Table 2).

Basic demographic information

The present study collected basic demographic information, including gender, urban–rural category, education level, marital relationship status, and school administrative part-time status.

Procedure

The Chinese version of the questionnaire used in the study was developed *via* back-translation (Brislin, 1986). First, the original English version was translated into Chinese by two individuals who were fluent in English. Second, the Chinese version was translated back into English by two other individuals who were unfamiliar with the original English version. Third, the translated versions were compared, and adjustments were made to ensure that the Chinese version was comparable with the original English version. Fourth, a panel of five researchers reviewed the Chinese and original English versions to finalize the version used in this study.

The participants were recruited *via* social media in the early fall semester of 2022, during the COVID-19 pandemic. Because the lockdown in China was relatively eased during this period, the teaching life in the school was somewhat normal. Those who were willing to participate in the study were provided with an informed consent form and web link to respond to the questionnaires online. The participants were required to sign the informed consent form before completing the surveys. Participation was voluntary, and participants could withdraw from the process at any time. Because the participants were anonymous, no personal information was collected. No financial compensation was provided to the participants. The study was reviewed and approved by the East China Normal University institutional review board.

TABLE 2 Reliability and validity test of core measurements.

	Cronbach's alpha	KMO test value	Bartlett's test value for chi2
EI (overall)	0.938	0.947	8495.032***
AEE	0.807	0.857	1738.352***
RE	0.838	0.889	1782.662***
UE	0.824	0.880	1582.466***
PA	0.949	0.949	5905.597***
NA	0.949	0.936	5488.154***
LS	0.949	0.936	5488.154***

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

Data analysis

This study adopted a combination of data-driven and theory-driven methods for analyses. First, this study used a data-driven GLASSO model to establish an association network of all variables to present the original relationships among variables. This method has now attracted attention in the field of psychometrics, especially to screen core variables, verify the measurement structure, and explore the relationship among variables (Epskamp et al., 2018; Epskamp and Fried, 2018). In our analysis, we used R Studio to call the GLASSO degree package to implement this function and used the social network analysis tool Gephi to visualize the results of the model. Additionally, to prevent false correlations and multicollinearity among the indicators, the penalty term lambda was set to 0.1 in the model parameter setting.

Second, according to the theoretical framework of the current study and the analysis results of the GLASSO model, we used an SEM to test its core content and ensure the robustness of the core mechanism. In the software tool, we used the Structural Equation Module in STATA 17 to complete the second step analysis.

Results

Variable network based on GLASSO model

Figure 1 presents the analysis results of the GLASSO model. This model is also a visual representation of the correlation coefficient matrix and the measurements from the reliability and validity tests. Furthermore, it shows the potential structure of each measurement dimension. The network has four subgroups (communities), which correspond to the four types of measurement that this study focused on, and the structure of the four measurements was relatively clear. We found that the EI subgroup influenced the variables of the PA subgroup, which indirectly affected LS. Some EI variables also directly affected LS. However, the network connections between the EI and NA subgroups were relatively sparse, which indicates that the correlation between the two types of variables (EI and NA) was relatively low. Furthermore, there were relatively few connections between NA and LS variables, and the relationship between the two may not be obvious.

In addition, we found that the five variables—EI33, EI28, EI5, EI4, and EI1—had a marginal position in the network, with deviations in their subgroup classification (EI33, EI28, and EI5), thereby indicating that the structural directivity of these five indicators was relatively weak. We tested the five variables using CFA and found that their contributions to the measured latent variables were relatively low, with factor loadings less than 0.4. Therefore, to ensure the accuracy of the following analysis, we eliminate them from the SEM analysis.

The influence mechanism of EI on teachers' LS

Full model

We used a higher-order factor model in the SEM to verify the complete impact mechanism. Figure 2 shows the estimation results of the full model. The overall fitting of the complete model was acceptable and had a certain explanatory power (RMSEA = 0.06, SRMR = 0.06). Specifically, we found that teachers' EI significantly affected their PA; its standardized path coefficient was 0.48 (z-value = 14.24, $p = 0.000$), hence indicating that teachers with higher EI were more likely to express PA. The expression of PA also improved teachers' LS, with a standardized coefficient of 0.38 (z = 8.85, $p = 0.000$). Additionally, EI directly affected teachers' LS. The standardized coefficient of this path was 0.24 (z = 5.49, $p = 0.000$), that is, teachers with higher EI had higher LS. Therefore, PA partly explained why teachers with different EI had differences in LS; it was an important mediating factor between EI and teachers' LS, and its mediating effect accounted for 43.18% of the total effect. The intermediary ratio is relatively high. Meanwhile, the effects of EI on NA (z = 1.15, $p = 0.252$) and NA on LS (z = 2.15, $p = 0.031$) were relatively low. Although the influence path of NA as a mediator variable has not been confirmed, this study found that NA

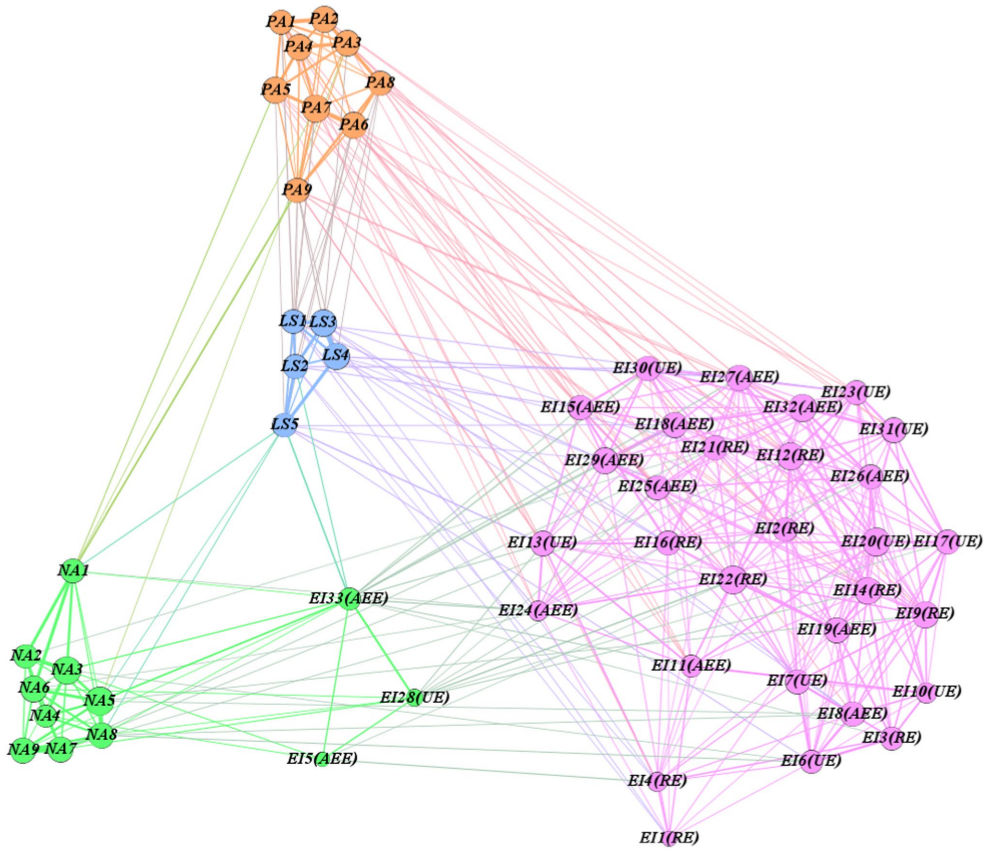

FIGURE 1
Variable network based on GLASSO model (Lambda = 0.1).

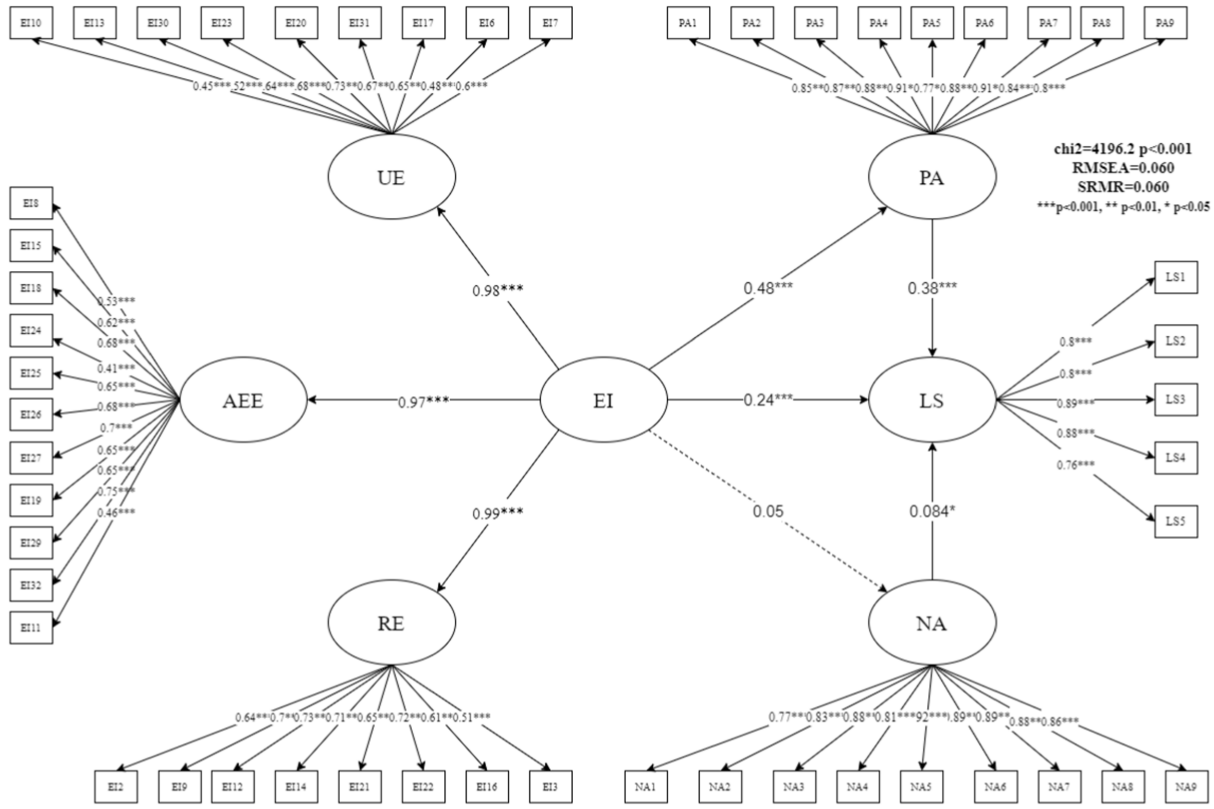

FIGURE 2
Estimation results of a higher-order factor model of the influence mechanism of teachers' emotional intelligence.

had a weak impact on LS in the complete model and its standardized path coefficient was only 0.084. This result is consistent with the results of the GLASSO model, that is, EI influenced teachers' PA and changed their attitudes toward life.

The analysis results of the three subdimensions

Figure 3 shows the analysis results of the AEE subdimension model. The fitting index of the model was acceptable (RMSEA = 0.065, SRMR = 0.068). The model results showed that the total effect of AEE on outcome variable LS was 0.44 [0.26 + (0.49 × 0.37)]. PA played an intermediary role between AEE and LS. Improvements to AEE can promote PA, and its normalized path coefficient was 0.49 (z = 13.81, $p = 0.000$). Furthermore, improvement in PA can lead to higher LS among teachers, with a standardized path coefficient of 0.37 (z = 8.70, $p = 0.000$). Therefore, by promoting PA, AEE also promoted teachers' LS. PA, with a mediating ratio of 41.08%, was an important mediating variable for the AEE and LS path. In addition, the mediating role of NA in this model was not confirmed, and the effect of NA on LS was not significant, whereas the data for the normalized path coefficient of AEE on NA showed a very small value of 0.12.

Figure 4 shows the analysis results of the UE subdimension model. The fitting index for the UE model was slightly weaker than that of the AEE subdimension model, with RMSEA = 0.068 and SRMR = 0.07, which are relatively general in terms of the specific index values but may still have certain explanatory significance. The results of the model in Figure 4 show that the total effect of UE on LS was 0.37 [0.19 + (0.45 × 0.41)]. PA was also an important mediating variable in the influence path from UE to LS, and the mediating ratio was 49.27%. Improvement in UE can positively promote PA, with a normalized coefficient of 0.45 (z = 11.78, $p = 0.000$). Furthermore, improvement in PA promoted rural school teachers' LS, and its standardized coefficient was 0.41 (z = 9.47, $p = 0.000$). Similar to the results of the previous model, the mediating effect of NA was not significant.

Figure 5 shows the results of the RE subdimension model. The fitting index of the RE model was similar to that of the UE model (RMSEA = 0.069 and SRMR = 0.073). These are relatively general as index values but are important for the topics discussed in this paper. The results of the model in Figure 5 show that the total effect of RE on outcome variable LS was 0.42 [0.19 + (0.45 × 0.41)]. RE indirectly promoted rural school teachers' LS scores by promoting PA. The normalized path coefficient for RE to PA was 0.49 (z = 13.76, $p = 0.000$), and the path coefficient of PA to LS was 0.38 (z = 8.56, $p = 0.000$). PA played a significant mediating role in this path relationship, with a mediating ratio of 43.69%. Consistent with the results of the previous four models, the mediating effects of NA were not confirmed. NA had a weak effect on LS, and the effect of RE on NA was not significant.

Overall, among the three subdimensions, AEE had the largest overall effect on outcome variable LS, followed by RE, and UE was the smallest. Among these three influence paths, PA played a mediating role in all three subdimension models. The mediating effect of PA was the highest in the UE model, followed by the mediating effect in the RE model, and the smallest in the AEE model. In the three subdimensions, AEE directly affected LS to improve LS. Furthermore, improvement in AEE, RE, and UE promoted PA, which improved

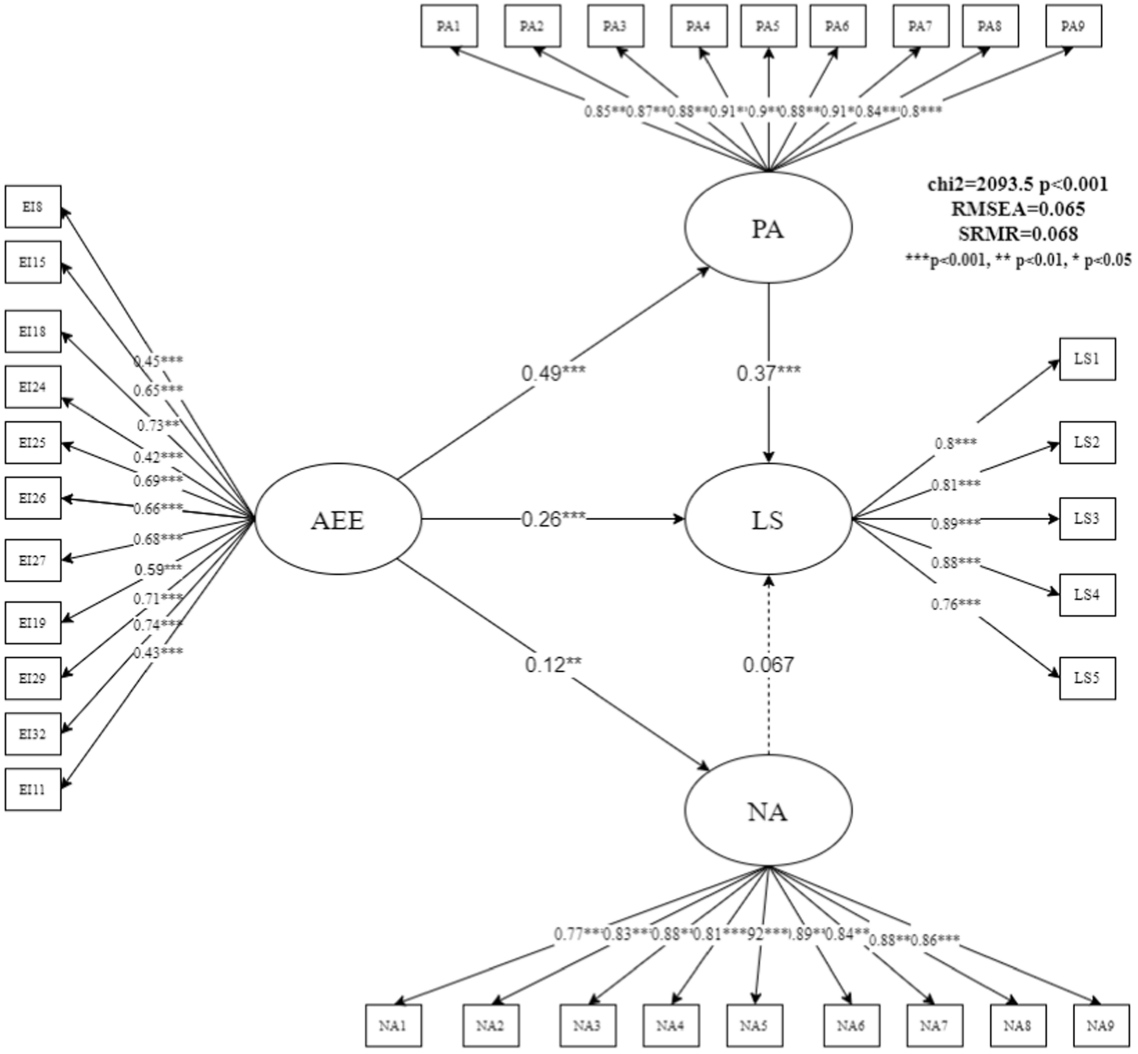

FIGURE 3
Structural equation model estimation results of AEE affecting life satisfaction.

teachers' LS. However, the mediating effect of NA was not confirmed by the data in the full model or the three subdimension models. Therefore, trait EI was more likely to have an indirect impact on teachers' LS through the regulation of PA or have a direct impact on LS.

> *Hypothesis 1*: Overall, higher trait EI is associated with higher levels of LS.

This study examined the differential effects of traits EI, PA, and NA on individual rural teachers' overall LS. Specifically, we found that self-reported trait EI significantly affected the performance of PA, indicating that higher EI was more likely to be associated with PA and correspondingly, the display of PA also increased LS. Meanwhile, this study found that self-reported trait EI could significantly affect the level of PA and thus influence LS levels, indicating that rural teachers with higher EI may demonstrate higher levels of PA and thus higher LS. Taken together, these findings may contribute to a deeper understanding of the links between these factors by suggesting that trait EI may influence LS primarily from a PA perspective. Therefore, the association between trait EI and LS was confirmed in a large sample of rural school teachers in China, a result that is consistent with the findings in previous literature (e.g., Schutte and Malouff, 2011; Kong et al., 2012; Urquijo et al., 2016; Zhao et al., 2021). These results suggest that EI is an important personal resource for LS.

> *Hypothesis 2*: PA and NA play a mediating role between trait EI and LS.

Regarding the second hypothesis, a specific indirect effect of trait EI on LS was demonstrated through PA, supporting the affective mediation model (Zeidner et al., 2012). Furthermore, this finding is consistent with the fact that affective experience is particularly important to judge a person's LS (Eid and Larsen, 2008; Kuppens et al., 2008; Garcia and Moradi, 2013; Koydemir et al., 2013). Thus, these results are consistent with those of previous studies that highlighted the important role of PA and NA in the EI–LS relationship (Kong and Zhao, 2013; Liu et al., 2013; Kong et al., 2019). Using a mediation model, the results extend previous

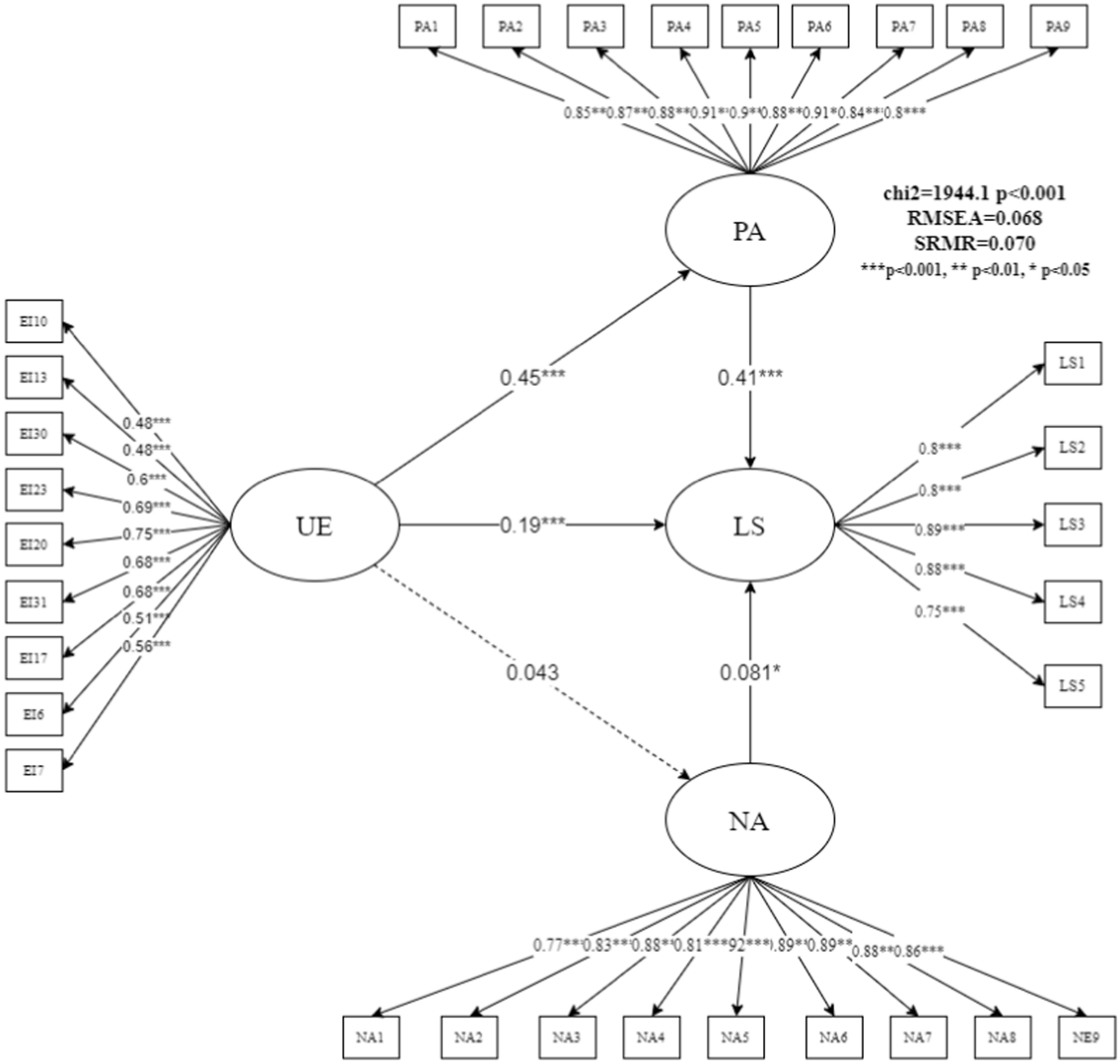

FIGURE 4
Structural equation model estimation results of UE affecting life satisfaction.

research by revealing that affective experiences may independently contribute to the EI–LS link in Chinese rural school teacher populations.

We found that PA was the strongest mediator in the relationship between trait EI and LS, thereby suggesting that PA may play a more important role than NA in this relationship. Conversely, the path of trait EI affecting LS through NA was not been supported by the data, which showed that the Chinese rural teacher population in the sample did not change their NA intensity because of their level of EI, which is consistent with Gignac (2006). This finding is broadly consistent with previous results that in addition to social support, resilience quotient, resilience, and so on, PA plays a crucial role in the relationship between trait EI and LS (Kong and Zhao, 2013; Zhao et al., 2021). This may be because people with high EI are better able to perceive, use, and regulate their emotions than those with low EI, thereby experiencing PA with a higher frequency and degree and having a positive emotional life (Sánchez-Álvarez et al., 2016).

Hypothesis 3: The three facets of trait EI influence LS through the mediating effects of PA and NA.

Regarding the third hypothesis, most previous studies have considered trait EI to be a single construct associated with LS (e.g., Hafiz and Chouhan, 2015; Mehta and Mehta, 2015; Afolabi and Balogun, 2017) or only found its RE category to be positively correlated with general LS (Zhao et al., 2021). This study found that among the three subdimension models, RE has the best model fit (AIC = 36407.088, BIC = 36707.779). Among the three influence paths, PA played a mediating role in all three subdimension models. Thus, improvements in the three facets of trait EI, namely, the AEE, RE, and UE categories, promoted PA, thereby improving rural school teachers' LS. The effects of the three facets on NA were small and mostly statistically unconfirmed. This finding validates the proposition that people regulate their own and others' emotions to achieve personal goals and that achieving these goals will enhance their PA, which may ultimately lead to higher LS (Brackett et al., 2010; Table 3).

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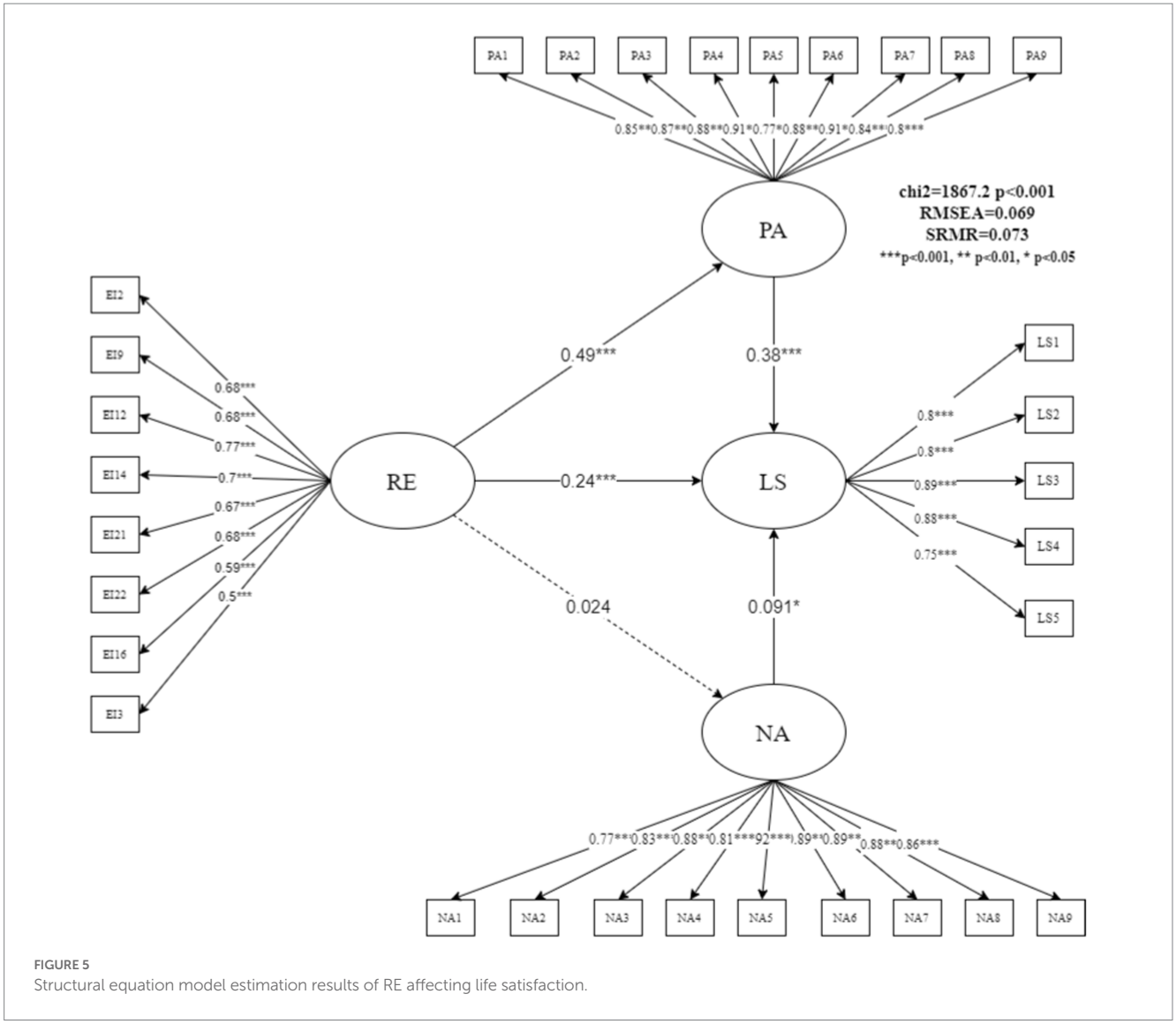

FIGURE 5
Structural equation model estimation results of RE affecting life satisfaction.

TABLE 3 Fitting index of the structural equation model.

	Chi2	RMSEA	SRMR	AIC	BIC
EI (full model)	4196.2***	0.060	0.060	60319.451	60546.750
AEE model	2093.5***	0.065	0.068	40826.774	40162.328
UE model	1944.1***	0.068	0.070	37229.582	37552.062
RE model	1867.2***	0.069	0.073	36407.088	36707.779

(1) ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$; (2) Because the sample size in this study was 577, which is relatively large, the chi-square test in the fitting index was significant.

Discussion

Why does emotional intelligence predict life satisfaction? Insights based on the mediation effects of positive and negative affect

In the Introduction, we suggested three mechanisms that explained why EI could be correlated with LS. First, those with higher EI may be better able to regulate negative feelings, such as anxiety, stress, and disappointment, which are all connected to LS (Roeser et al., 2013; Carroll et al., 2022). If this is true, RE could be responsible for these effects. Second, those with higher EI might be better at navigating their social world and building stronger relationships with students, colleagues, and their respective families (Jennings and Greenberg, 2009). Thus, RE would be responsible for the effects. Third, the appraisal and expression of emotional abilities may overlap with the need for educational proficiency and subject matter understanding. For teachers to be more successful, they must become better at comprehending human emotion and displaying knowledge; those that

possess such skills are more likely to have positive experiences in school (MacCann et al., 2014). In this case, the knowledge reserve of appraisal, understanding, and expression (a facet of EI) will have the most significant impact. We elaborate on the importance of these three mechanisms in the following sections.

Mechanism 1: Is the regulation of emotion the key ingredient in emotional intelligence?

Teaching is an emotionally draining profession that can have negative effects on teachers' well-being (Luque-Reca et al., 2022). In particular, rural teachers may be at risk due to the pressure of teaching and caring for students while learning new teaching skills. To obtain higher LS, such individuals must make the most of their positive emotions (Szczygieł and Mikolajczak, 2017). Negative emotions can have a similar effect, and those with higher RE can reduce the duration of such emotions, which can increase LS. Another possible explanation is that teachers who perceive themselves as being successful in managing their emotions may experience a sense of self-efficacy, which can lead to increased PA and higher LS (Vergara et al., 2015). Hence, the ability to regulate emotions is crucial for rural teachers. The model results from the EI facets suggest that PA and NA partially mediate the correlation between RE and LS.

Mechanism 2: Does emotional intelligence affect life satisfaction through interpersonal processes?

There is evidence that higher EI is associated with stronger relationships within school settings (Lopes et al., 2004, 2005). Similarly, higher EI has been found to be an effective predictor of social support within the educational environment (Ciarrochi et al., 2001; Kong et al., 2012). Rural teachers with strong EI skills may be more capable of managing their lives and cultivating positive relationships with students, colleagues, and their respective families (Jennings and Greenberg, 2009). In the three facet-level subdimensional models, RE has the best model fit (AIC = 36407.088, BIC = 36707.779). As shown in the AEE and UE models, RE also has an indirect impact on LS through PA in addition to its direct impact, which is more likely to result from making it easier for rural teachers to access resources or improve achievement. Meanwhile, the indirect effect of RE on LS is more likely due to the help it provides to build a social support network for managing stress. According to the results, RE is more about improving PA, which has an indirect impact on LS. For example, teachers resonate with students in daily teaching to obtain more positive feedback, thereby improving their sense of accomplishment and LS.

Mechanism 3: Is the appraisal and expression of emotion required for life satisfaction?

In Mechanism 3, we expected that the AEE facet of EI would be the strongest factor in predicting LS. However, the empirical model results did not support this assumption. In contrast, we found that the AEE model had the least predictive accuracy (AIC = 40826.774, BIC = 40162.328). Previous studies have shown that the perception and understanding facets of ability EI are the most important factors in predicting students' academic performance in the school environment (MacCann et al., 2020). Therefore, we question why the AEE model has the least explanatory power for LS. We believe that the SREIT scale used in this study does not include the understanding-branch subscale, making the use of the scale different from previous research. The potential overlap between EI and teaching skills appears to be less important for their LS possibly because larger vocabularies and better expressive skills are not characteristic of teaching and school life in rural areas. Moreover, rural teachers are usually required to teach using textbooks and relying on examinations instead of exploratory teaching. Thus, the characteristics of this teaching mode do not necessitate more vocabulary knowledge and the ability to express oneself. In comparison, rural teachers may benefit more from having the ability to regulate and appropriately use emotions than from having a large vocabulary and expressive abilities.

Limitations

This study has some limitations. First, the data were collected through self-reporting tools that may be somewhat subjective. Multiple assessment methods should be used to reduce this bias. Second, although our study used GLasso and SEM, two statistical methods with differing orientations, for data analysis and obtained a relatively robust correlation result, there may be some flaws in the causal inference of the conclusion due to the failure to use panel tracking data or standard randomized experimental data. Third, the results of this study can only be applied to rural teachers in central China, and there are insufficient cross-cultural inferences for the conclusions. In future research, we hope to use a more scientific research design and adopt superior statistical methods to conduct in-depth cross-cultural discussions on research issues. Fourth, because the participant data were collected through online questionnaires, there may be certain deviations due to the characteristics of Internet transmission and filling quality. However, we have considered various factors, such as school level, gender, and age, in the process of distributing the questionnaires; therefore, the participant data can reflect the situation of rural teachers in central China. Fifth, the participant data were collected in the fall semester of 2022, that is, during the COVID-19 pandemic, which may have caused teachers to face more pressure than ever before in teaching and life. In this regard, because the impact of EI on LS may vary, we look forward to conducting comparative studies between the pandemic and post-pandemic periods in future research. Finally, although we found that most of the teachers started teaching at the age of 22 years (after graduating with a bachelor's degree), some of them began teaching at the age of 18 years. Considering the potential impact of teaching age on teachers' LS and EI, the absence of this control variable could introduce some bias in the research results. Thus, future studies should focus on the significance of this variable.

Implications

This study thoroughly explored how trait EI, PA, and NA relate to general LS. Instead of analyzing trait EI, PA, and NA as a single structure, this study focused on each trait EI substructure and the predictive ability of PA and NA and elucidated potential relationships among trait EI, PA, NA, and LS. By examining these specific facets of trait EI, PA, and NA, our results have implications for teacher groups in particular. Our findings may lead to the development of better individual and group staff counseling programs for teachers that take AEE, RE, UE, and their combined effects into account. Effective intervention strategies can be implemented to improve LS, and these programs can help teachers better cope with workplace stressors. Additionally, most research in this field focuses on Western culture. The results of this study have enriched the literature by providing additional empirical evidence regarding the relationship among trait EI, PA, NA, and LS, with a focus on Eastern cultures and rural school teacher groups. More specifically, rural school teachers in Eastern cultures tend to face more multifaceted job stress than teachers in Western cultures; they need to work with students from families with financial difficulties by accounting for the impact of different family backgrounds on student performance and by coping with other factors. Thus, the relationship between teachers' emphasis on family and social factors and their personal LS was stronger. Future practitioners should keep this in mind when intervening with individuals from Eastern cultures.

Data availability statement

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

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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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.

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Age and gender differences in expressive flexibility and the association with depressive symptoms in adolescents

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Objective: This study investigated age and gender differences in the ability to flexibly enhance and suppress facial expressions according to situational demands, known as expressive flexibility (EF), as well as its relationship with depressive symptoms in adolescents.

Methods: The participants included 766 Chinese high school students aged between 12 and 18years (mean age=14.96years, standard deviation=2.04; 52.2% female). Data on EF and depressive symptoms were collected using self-report questionnaires.

Results: Girls scored higher on enhancement abilities than boys, but with no significant gender difference in suppression abilities. There were also no significant age-related differences in enhancement and suppression abilities. Only enhancement ability was negatively associated with depressive symptoms.

Conclusion: The development of EF abilities was stable among adolescents, with varying effects in terms of gender, and the importance of EF and enhancement abilities in reducing depressive symptoms in adolescents was highlighted.

KEYWORDS

expressive flexibility, age difference, gender difference, depressive symptoms, adolescents

1. Introduction

Emotional intelligence, as a multi-dimensional construct, is defined as a set of interrelated mental processes that include appraisal, expression, and regulation of one's own and others' emotions, as well as the utilization of emotions in problem-solving (Salovey and Mayer, 1990). Researchers usually consider emotional intelligence as a trait or ability, namely, as trait emotional intelligence (TEI) or ability emotional intelligence (AEI). Specifically, TEI refers to a constellation of emotion-related self-perceptions and dispositions assessed by self-report questionnaires (Petrides et al., 2007), while AEI is regarded as an emotion-related cognitive ability measured *via* maximum performance tests (Mayer et al., 2008). Previous studies have reported that both TEI and AEI are associated with different physical, psychosomatic, and mental health domains or indicators in populations of various ages (Costa et al., 2021). However, despite fruitful findings on emotional intelligence and its various dimensions, expressive behaviors (especially facial expressions), as a specific emotional expression dimension have been relatively understudied and remain poorly understood. As more than half of all expressive behaviors are

considered to be associated with the face (Aylett et al., 2021), there is a need to investigate the regulation of facial expressions in greater depth.

As a mirror of the internal affective state, the display of emotions has been considered to reflect emotions accurately. However, a recent meta-analysis revealed only a mild-to-moderate correlation between observation-based expressions and self-reported emotions (Durán et al., 2017). Indeed, individuals are likely to exaggerate or suppress their facial expressions to achieve particular goals in some instances. For example, individuals may exaggerate joyful expressions to impart positive impressions to others or suppress expressions of anger to avoid conflict with others. Furthermore, as emotional situations are inherently dynamic (Aldao, 2013; Aldao and Tull, 2015), the flexible use of expressive exaggeration and inhibition is crucial for individuals' mental health outcomes (Bonanno et al., 2004; Bonanno and Burton, 2013; Aldao et al., 2014).

Expressive flexibility (EF) refers to the ability to flexibly enhance and suppress facial expressions to fit contextual demands (Bonanno et al., 2004). Bonanno et al. (2004) first developed an EF task to evaluate individuals' ability to upregulate and downregulate their facial displays of emotions. In this task, participants are instructed to look at blocks of emotion-provoking images, then either enhance their expressions, suppress their expressions, or behave normally. Thereafter, participants' overt emotional expressions are recorded and rated by trained observers who are unaware of the instructions and type of stimulus. Enhancement ability is then measured as the difference between the enhancement and normal conditions, while suppression ability is determined in terms of the difference between the suppression and normal conditions. In addition, EF ability has been calculated by subtracting the absolute value of the difference between enhancement and suppression scores from their sum (Westphal et al., 2010). In each case, higher scores represent better corresponding abilities.

As the previous EF task had certain disadvantages, such as low ecological validity, Burton and Bonanno (2015) developed the Flexible Regulation of Emotional Expression (FREE) scale. In this scale, adult participants are asked to indicate the extent (ranging from 1: unable to, to 6: very able to) to which they can exaggerate or inhibit their facial expressions in an array of hypothetical social scenarios. Enhancement and suppression scores are then obtained by summing the corresponding items, while the EF score is computed by subtracting the absolute difference between the enhancement and suppression scores from their sum. Higher scores indicate better flexibility in regulating emotional expressions. Several other scales have also been developed to evaluate the EF abilities of different populations, including the adolescent FREE scale for Chinese adolescents (Zhang et al., 2018), the Chinese version of the FREE scale for Chinese adults (Chen et al., 2018), and the Child and Adolescent Flexible Expressiveness (CAFE) scale for Chinese children and adolescents (Wang and Hawk, 2020). Notably, the structure and scoring formula of these scales are identical to those of the FREE scale.

Some studies have suggested that EF and/or its components (enhancement and suppression abilities) develop stably in adulthood. For example, cross-sectional research has shown that younger and older adults are equally capable of following instructions to exaggerate and inhibit facial expressions in response to emotion-eliciting images (Emery and Hess, 2011), film clips (Kunzmann et al., 2005), and musical excerpts (Sandrine et al., 2015).

However, to date, only three studies have investigated the effects of age on EF and its two components during childhood and adolescence, and the conclusions have been inconsistent. In a study by Wang and Hawk (2020), Chinese elementary and junior middle school students were asked to complete the CAFE scale to assess their self-reported EF abilities. The results indicated that, compared to their counterparts in junior middle school, participants in elementary school had significantly higher scores in all aspects (enhancement, suppression, and overall EF). In contrast, Wang and Hawk (2019) had also employed the EF task to evaluate observed EF abilities among Chinese elementary and junior middle school students across two waves at 6-month intervals. The results revealed a significant increase in the participants' expressive enhancement, suppression, and flexibility abilities from Wave 1 to Wave 2. However, there were no significant differences between the elementary and junior middle school participants in any of the three scores. More importantly, Wang and Hawk (2019, 2020) argued that these inconsistent results may reflect the curvilinear growth trajectories of EF abilities during adolescence. In addition, Haag et al. (2022) developed the Flexible Regulation of Emotional Expression Scale for Youth (FREE-Y) to assess expressive enhancement, suppression, and flexibility in American adolescents and revealed no significant age differences in any of the three scores.

It is important to point out that, while contradictory results from the above studies may reflect nonlinear growth trajectories of EF abilities during adolescence, this interpretation was not adequately tested (especially in Chinese adolescents) due to the relatively narrow age range of the adolescent participants (aged 9–15 years old) in the studies of Wang and Hawk (2019, 2020). Therefore, the effects of age differences on EF abilities during adolescence remain unknown and require further investigation.

Three studies have also examined sex differences in EF abilities (Wang and Hawk, 2019, 2020; Haag et al., 2022), with inconclusive results. Specifically, Wang and Hawk (2019, 2020) collected cross-sectional and longitudinal data on the effects of gender on EF abilities among Chinese youth. The findings revealed that girls scored higher than boys in expressive suppression ability but not in expressive enhancement or flexibility abilities. In contrast, Haag et al. (2022) assessed EF abilities in American youth and found that girls had higher scores than boys in expressive enhancement ability but not in expressive suppression or flexibility abilities. These major inconsistencies in study findings highlight the need for further research.

Existing evidence suggests that the ability to both enhance and suppress outward expressions is associated with positive interpersonal outcomes (e.g., better friend-rated adjustment, life satisfaction, health-related quality of life, and peer acceptance). It is also associated with negative intrapersonal outcomes (e.g., lower friendship quality, distress, post-traumatic stress disorder, and anxiety; Bonanno et al., 2004; Westphal et al., 2010; Rodin et al., 2016; Strickland and Skolnick, 2020; Wang et al., 2020; Lenzo et al., 2021; Sardella et al., 2021; Shangguan et al., 2022; Wang et al., 2022). Furthermore, deficits in this ability in adults are associated with social anxiety (Maccallum et al., 2021), complicated grief (Gupta and Bonanno, 2011), and in patients diagnosed with Alzheimer's disease (Henry et al., 2009) or schizophrenia (Henry et al., 2007).

Several studies have specifically investigated the association between EF abilities and depressive symptoms in adults. A pioneering

study revealed that EF and suppression abilities were significantly associated with fewer depressive symptoms, while enhancement ability was not (Burton and Bonanno, 2015). Chen et al. (2018) replicated these findings with Chinese adults. In contrast, Rodin et al. (2016) reported that a higher observed enhancement ability, but not suppression ability, was significantly associated with decreased severity of depression and PTSD in combat veterans. A follow-up study demonstrated that the levels of observed EF abilities were predictive of a 1-month decrease in depressive symptoms and anxiety in college students with low context sensitivity (Southward and Cheavens, 2017). In addition, Chen and Bonanno (2021) identified predominant latent profiles of emotion regulation flexibility and found that all inflexible regulators exhibited greater depressive symptoms.

However, to the best of our knowledge, only two studies have evaluated the potential link between EF abilities and depressive symptoms in adolescents (Wang and Hawk, 2020; Haag et al., 2022). Wang and Hawk (2020) adopted the CAFE scale and the Child Depression Inventory (CDI) to measure self-rated EF abilities and depressive symptoms in elementary and junior middle school students from mainland China. The results showed that expressive enhancement, suppression, and flexibility were significantly associated with fewer depressive symptoms. Haag et al. (2022) utilized the FREE-Y and the CDI-2 to assess American adolescents' self-reported EF abilities and depressive symptoms. The findings revealed that expressive enhancement, suppression, and flexibility were significantly negatively correlated with depression. However, it should be noted that the participants in Wang and Hawk (2020) study were older Chinese children and early-age adolescents, with no participants in middle or late adolescence, while the participants in Haag et al.'s study were American adolescents.

Despite being an essential aspect of emotional intelligence, the flexible regulation of facial expressions is a relatively neglected field of research. Specifically, existing research on EF has largely focused on the developmental characteristics (i.e., age and gender) of EF and its relationship with depressive symptoms in adults (Haag et al., 2022). However, to our knowledge, no study has directly investigated age and gender differences in EF, as well as the association between EF and depressive symptoms, in Chinese adolescents. On the one hand, compared to adulthood, adolescence is not only a period for youth to rapidly develop their emotion regulation skills (Zimmermann and Iwanski, 2014; Ahmed et al., 2015; Lennarz et al., 2018), but also a challenging stage in terms of potential emotional dysregulation problems, especially depressive symptoms (Lee et al., 2014; Schäfer et al., 2017; Young et al., 2019). On the other hand, compared to Western cultures, Chinese culture places greater emphasis on suppression rather than expression of emotions to promote relational and social harmony (Fischer et al., 2004; Chen et al., 2020), which may result in inconsistent conclusions pertaining to the developmental characteristics of EF and its link with depressive symptoms.

Based on the above considerations, the present study aimed to examine the effects of age and sex on EF as well as the association between EF and depressive symptoms, using well-validated self-report questionnaires in a large sample of Chinese adolescents aged 12–18 years. First, given that no direct research was identified on these aspects and that the findings from related studies have been contradictory, the present study had no specific hypothesis on the effect of age on enhancement, suppression, and overall EF abilities (Hypothesis 1). Second, in line with previous studies (Wang and Hawk, 2019, 2020), it was hypothesized that female participants would score higher than their male counterparts in suppression ability, but not in expressive enhancement or flexibility abilities (Hypothesis 2). Third, based on prior research (Wang and Hawk, 2020; Haag et al., 2022), it was hypothesized that EF, as well as enhancement and suppression abilities, would be significantly associated with fewer depressive symptoms in adolescents (Hypothesis 3).

2. Methods

2.1. Participants

A total of 766 adolescents ($N = 766$, 52.2% females) aged between 12–18 years [$M = 14.96$, standard deviation (SD) = 2.04] were recruited from six schools in the Sichuan, Shandong, and Shaanxi Provinces of China. All participants were Han Chinese, which is the major ethnic group in China. The participants were divided into seven age groups:12 years ($N = 113$), 13 years ($N = 130$), 14 years ($N = 98$), 15 years ($N = 84$), 16 years ($N = 124$), 17 years ($N = 106$), and 18 years ($N = 111$). The design and data collection procedures were approved by the Ethics Committee of East China Normal University (Approval Number: HR 121-2019). Informed consent was obtained from the parents or guardians of the students.

2.2. Measures

2.2.1. Expressive flexibility

EF in participants was measured using the AFREE scale (Zhang et al., 2018). The scale has been validated in terms of evaluating self-perceived EF and its two components (enhancement and suppression) in Chinese youth. This 25-item scale asks adolescents to indicate their ability to modulate their facial expressions in a series of standardized hypothetical positive and negative contexts. The scale responses range from 1 (not at all) to 6 (very much), and it includes expressions such as "I can exaggeratedly express my compliments when friends tell me they have won a prize in a competition which I am not interested in." Enhancement and suppression scores are computed separately by obtaining the sum of the relevant items whereas the EF score is computed by subtracting the absolute difference between the enhancement and suppression scores from their sum. Higher scores indicate better corresponding abilities. In the current study, the AFREE scale showed appropriate internal consistency (Cronbach's $\alpha = 0.87$) as well as suppression (Cronbach's $\alpha = 0.85$) and enhancement (Cronbach's $\alpha = 0.83$) assessment consistency.

2.2.2. Depressive symptoms

Depressive symptoms in adolescents were assessed using the Chinese version of the Center for Epidemiologic Studies Scale-Depression (CES-D; Radloff, 1977; Chen et al., 2009). This 20-item scale requires participants to respond to descriptions such as "I felt that I could not shake off the blues even with the help from my family or friends" and then rate how frequently each depressive symptom occurred in the past week, ranging from 0 (rarely or none of the time) to 3 (most of the time). Thereafter, four items are reverse-scored and summed to provide a total score, with a higher total score indicating

TABLE 1 Means, standard deviations and correlations for all the main variables.

	M	SD	Expressive flexibility	Enhancement	Suppression
Age	14.96	2.04	−0.030	−0.031	−0.018
Gender			−0.107**	−0.128***	−0.048
Expressive flexibility	109.93	15.87	—		
Enhancement	57.99	9.67	0.812***	—	
Suppression	51.94	9.81	0.818***	0.328***	—
Depressive symptoms	15.64	8.70	−0.080*	−0.123**	−0.019

M, mean; SD, standard deviation; *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

more depressive symptoms. The CES-D demonstrated good reliability in this study (Cronbach's $\alpha = 0.83$).

2.3. Statistical analyses

IBM SPSS Statistics 21.0 software (IBM Corp, 2012) was used for the data analysis. First, analysis of variance (ANOVA) and multivariate analyses of variance (MANOVAs) were conducted, with age and gender as the between-subjects variables, to investigate age and gender differences in expressive enhancement, suppression, and flexibility abilities. Second, Pearson correlations and hierarchical linear regressions were performed, with age, sex, and EF abilities as predictor variables and depressive symptoms as the predicted variables. Specifically, in Model 1, depressive symptoms were regressed on age, gender, and EF ability; in Model 2, depressive symptoms were regressed on age, gender, enhancement, and suppression ability. This approach was undertaken to evaluate the relationship between EF ability and depressive symptoms.

3. Results

3.1. Age and gender differences in EF among Chinese adolescents

An age group × gender ANOVA with EF scores revealed no significant main effect for age ($F(6, 752) = 0.64$, $p = 0.695$, $\eta_p^2 = 0.005$), a significant main effect for gender ($F(1, 752) = 3.97$, $p = 0.047$, $\eta_p^2 = 0.005$), and no significant effect for the interaction between age and gender ($F(6, 752) = 1.03$, $p = 0.406$, $\eta_p^2 = 0.008$) on EF. In addition, a *post hoc* comparison showed a marginally significant gender difference in the EF scores, ($F(1, 752) = 3.41$, $p = 0.065$, $d = 0.13$), with girls ($M = 100.98$, SD = 18.83) scoring higher than boys ($M = 98.46$, SD = 18.80).

An age group × gender MANOVA with enhancement and suppression scores revealed no significant main effect for age (Wilks' $\lambda = 0.992$, $F(12, 752) = 0.533$, $p = 0.894$, $\eta_p^2 = 0.004$), a significant main effect for gender (Wilks' $\lambda = 0.984$, $F(2, 752) = 6.148$, $p = 0.002$, $\eta_p^2 = 0.016$), and no significant effect for the interaction between age and gender (Wilks' $\lambda = 0.988$, $F(12, 752) = 0.758$, $p = 0.695$, $\eta_p^2 = 0.006$) on EF. Additionally, univariate *post hoc* analyses showed that gender had a significant effect on enhancement scores ($F(1, 752) = 12.163$, $p < 0.001$, $\eta_p^2 = 0.016$), although its effect on suppression scores was not significant ($F(1, 752) = 2.238$, $p = 0.135$, $\eta_p^2 = 0.003$). Moreover, the *post hoc* test showed that girls ($M = 59.17$, SD = 9.23) had higher enhancement scores than boys ($M = 56.70$, SD = 9.99), $F(1, 752) = 12.163$, $p = 0.001$, $\eta_p^2 = 0.016$, $d = 0.26$.

3.2. Relationship between EF and depressive symptoms among Chinese adolescents

The results of the Pearson correlation analysis indicated that EF was significantly correlated with fewer depressive symptoms ($r = -0.080$, $p = 0.027$). Notably, enhancement ability ($r = -0.123$, $p = 0.001$) was significantly associated with fewer depressive symptoms, whereas suppression ability was not ($r = -0.019$, $p = 0.604$; see Table 1).

Additionally, hierarchical linear regressions were conducted to ascertain the extent to which certain factors (age, sex, EF, and enhancement and suppression abilities) could predict the levels of depressive symptoms. The results showed that neither age nor gender significantly predicted the levels of depressive symptoms in any of the models. In Model 1, EF significantly predicted fewer depressive symptoms. In Model 2, enhancement ability, but not suppression ability, significantly predicted lower depressive symptoms (see Table 2).

4. Discussion

From the perspective of emotional intelligence, the present study used a large sample of Chinese adolescents to investigate the effects of basic characteristics (i.e., age and sex) on EF and the relationship between EF and depressive symptoms. The results revealed that EF and its two components (i.e., enhancement and suppression) remained stable throughout adolescence. Moreover, contrary to the second hypothesis, female participants reported higher scores than their male counterparts in EF and enhancement abilities but not in suppression ability. Additionally, self-reported levels of EF and enhancement abilities were found to be significant predictors of fewer depressive symptoms, but not suppression ability.

4.1. Age differences in EF among Chinese adolescents

The current study found no significant effects for age on any aspect of self-rated EF ability (overall EF, enhancement, and suppression) among Chinese adolescents. These findings are inconsistent with those

TABLE 2 Regression analyses for the prediction of depression by expressive flexibility among adolescents.

		Depressive symptoms						
		B	SE	*β*	*p*-value	Adj. R^2	F_{change}	R^2_{change}
Model 1						0.005	2.244	0.009
Step 1	Age	0.208	0.154	0.049	0.178			
Step 2	Gender	−0.068	0.629	−0.004	0.914			
Step 3	Expressive flexibility	−0.036	0.017	−0.079*	0.029			
Model 2						0.013	3.497	0.018
Step 1	Age	0.201	0.153	0.047	0.191			
Step 2	Gender	−0.247	0.631	−0.014	0.695			
Step 3	Enhancement	−0.118	0.034	−0.131**	0.001			
	Suppression	0.022	0.034	0.024	0.520			

Negative values indicate a decrease in depressive symptoms.

obtained from two related studies (Wang and Hawk, 2019, 2020) but are in agreement with those of other previous studies (Kunzmann et al., 2005; Westphal et al., 2010; Emery and Hess, 2011; Sandrine et al., 2015; Haag et al., 2022). Using a sample of older children and younger adolescents, Wang and Hawk (2019) reported mixed results regarding changes in EF abilities over time. They argued that these inconsistent findings may reflect a trough in the development of EF abilities during early adolescence. However, this hypothesis was not fully verified because the study participants were older children and younger adolescents, with no older (middle-to-late) adolescents involved. Through expanding the age range of participants, the present study was able to directly examine how EF abilities develop with age in both younger and older adolescents. The results showed that EF (including enhancement and suppression) abilities were stable throughout Chinese adolescence, which was consistent with conclusions drawn from a recent study conducted in American adolescents (Haag et al., 2022).

Furthermore, related studies on age-associated changes in EF abilities among adults have revealed that levels of EF and/or its two components (enhancement and suppression) remain relatively stable during adulthood (Kunzmann et al., 2005; Westphal et al., 2010; Emery and Hess, 2011; Sandrine et al., 2015). This study corroborated these findings in showing that EF abilities remain stable during adolescence. One possible explanation for this finding is that EF develops primarily earlier in childhood (Wang and Hawk, 2019), and thus exhibits a stable developmental trajectory during adolescence. Future research with younger and older children is needed to fully test this hypothesis.

More broadly, this study revealed that, as a core facet of emotional intelligence, EF has a trait-like quality, which may provide further empirical support for the trait approach to emotional intelligence and for regarding emotional intelligence as an affective characteristic of personality (Quattropani et al., 2022) or as a lower-order personality construct (Petrides et al., 2007). Considering the multi-dimensional nature of emotional intelligence, more research is needed to confirm this finding.

4.2. Gender differences in EF among Chinese adolescents

The results further showed that girls scored higher than boys in overall EF and enhancement abilities, but not in suppression ability. These findings differed from those reported previously (Wang and Hawk, 2019, 2020), which showed that Chinese females had better scores than males in suppression ability, but not in EF or enhancement ability. Nevertheless, the findings of this study can be explained from the perspective of social gender roles. Compared to individualistic cultures (e.g., American culture), collectivist cultures (e.g., Chinese culture) place greater emphasis on maintaining interpersonal harmony and encourage people to care more about the interpersonal consequences of emotion regulation behaviors (Matsumoto et al., 2008; Wei et al., 2013). Thus, Chinese females and males are encouraged to suppress their emotions when necessary (Deng et al., 2013), leading to similar expressive suppression levels in both genders. Moreover, given the established positive relationships between the levels and ability of expressive suppression among Chinese adults (Chen et al., 2020), it is possible that female adolescents are as efficient as male adolescents in concealing their facial expressions, corroborating the present results on suppression. Although suppressing emotions is generally preferred by individuals from a Chinese cultural background, females still express their emotions more freely than males (Zhao et al., 2014). Therefore, compared to their male counterparts, female teenagers tend to be more expressive and subsequently develop greater expressive abilities. This might explain the gender differences in expressive enhancement ability observed in the present study. However, caution should be taken when interpreting the effect of sex on overall EF scores because this effect had borderline significance ($p = 0.065$), and the effect sizes were relatively small ($d = 0.13$).

It is worth noting that, despite focusing on different dimensions of emotional intelligence, relevant research has also reported significant gender differences. A recent study found that adolescent boys showed higher levels of emotional intelligence in terms of self-emotion appraisal, use of emotions, and regulation of emotions, whereas adolescent girls presented higher levels of other-emotion appraisal (Costa et al., 2021). Notably, theoretical studies have suggested that the existence and magnitude of gender effects on emotional intelligence may be influenced by cultural and educational factors (Gebregergis et al., 2020). Given this context, cross-cultural research may be beneficial to test the above explanations concerning gender-related effects on emotional intelligence and its dimensions in adolescents, and gender-specific interventions could be designed to improve their EF.

4.3. Relationship between EF and depressive symptoms among Chinese adolescents

After controlling for age and sex, the results showed that higher EF and enhancement abilities were predictive of lower levels of depressive symptoms, while suppression ability was not. These findings accord with those of previous studies on the association between EF and depressive symptoms in older Chinese children and younger adolescents. Wang and Hawk (2020) also found that EF and enhancement abilities were significantly associated with lower levels of depressive symptoms but, in contrast to our study, they found that suppression ability was significantly associated with fewer depressive symptoms. Nevertheless, the results of this study may be attributed to the social norms surrounding the suppression and expression of emotions in China. Given that suppressing emotions is generally more contextually adaptive than expressing them in Chinese culture, Chinese people are more inclined to practice expressive suppression in their daily lives. Moreover, the Chinese may have a greater ability to suppress rather than express their emotions due to their collectivist culture. Therefore, the association between suppression ability and depressive symptoms may be less pronounced than the association between enhancement ability and depressive symptoms.

Similar to the present study, Rodin et al. (2016) reported that enhancement ability, but not suppression ability, was a significant predictor of lower levels of depressive symptoms and of PTSD symptoms in American combat veterans. Even though the participants in the study by Rodin et al. (2016) were from an individualistic rather than a collectivist culture, they were encouraged to suppress their emotional responses in work-related situations. Therefore, Rodin et al. (2016) results indirectly support our interpretation of our results concerning the closer association between enhancement ability and depressive symptoms. Further studies are needed to directly verify this interpretation in Chinese participants. Overall, the findings of this study suggest that EF and enhancement ability, but not suppression ability, are predictive of lower levels of depressive symptoms in Chinese adolescents.

Although previous studies have found that self-reported emotional intelligence is negatively related to depressive symptoms in adolescents (Fernández-Berrocal et al., 2006; Salguero et al., 2012; Resurrección et al., 2014; Gomez-Baya et al., 2017; Gardner and Lambert, 2019), this study is the first to investigate the potential relationships between a core facet of emotional intelligence (i.e., EF) and its dimensions and depressive symptoms in adolescents. The findings of the current study, namely, that enhancement and suppression abilities exhibit distinct influences on depressive symptoms, clarify the specific impact of enhancement and suppression abilities on adolescents' depressive symptoms. They also suggest possible mechanisms underlying the influence of emotional intelligence on emotional well-being during adolescence. A recent empirical study reported that enhancement ability is associated with three specific TEI dimensions, namely, well-being, emotionality, and sociability, whereas suppression ability is associated with a fourth dimension, namely, self-control (Quattropani et al., 2022). It would be helpful to explore the role of EF as a mediator between emotional intelligence and psychological health. More importantly, specific interventions may be designed to boost adolescents' emotional intelligence by cultivating EF and eventually decrease their depressive symptoms.

4.4. Limitations

This study had some limitations. First, it focused on a critical aspect of emotional intelligence, that is, the flexible utilization of enhancement and suppression. However, other aspects, such as having a flexible choice in terms of enhancement or suppression, are also important and require further investigation. Second, this study adopted a cross-sectional design to examine the development of EF and its association with depressive symptoms. However, this approach does not allow for an analysis of intra-individual changes in EF over time. It was also not possible to determine whether EF abilities were antecedents, concomitants, or consequences of the depressive symptoms. Therefore, future research employing longitudinal or experimental designs is necessary to address these deficiencies. Third, this study measured EF using the AFREE scale. Although the AFREE scale has been previously validated to assess EF abilities among Chinese teenagers, this self-report approach is susceptible to several methodological issues (e.g., social desirability). Therefore, further studies should use combined approaches (e.g., self-report scales, lab-based tasks, and realistic social interaction) to comprehensively evaluate the role of flexibility in regulating emotional expressions. Fourth, this study focused solely on the expressive regulation of general positive and negative emotions. According to previous empirical research on Chinese undergraduate students, greater suppression of sadness was associated with lower levels of depressive symptoms, while greater suppression of happiness was associated with higher levels of depressive symptoms (Zhou et al., 2016). Therefore, future research is needed to explore the specific ability or abilities involved when modulating emotional expression in individuals with depressive symptoms when confronted with discrete emotions (e.g., sadness, happiness, and fear). Finally, the participants of the present study were recruited exclusively from China. Since the distinct display rules for emotional expression in Chinese culture, which is considered a collectivist culture, it is necessary for future research to examine the cultural influence on the age and gender effects of EF, as well as its association with depressive symptoms in other cultural contexts (e.g., more individualistic culture).

5. Conclusion

To the best of our knowledge, this study is the first to assess EF in relation to age and gender in younger and older Chinese adolescents and the association of EF with depressive symptoms. The findings revealed that EF abilities remained stable throughout adolescence, that girls had greater expressive flexibility and enhancement abilities than boys, but not suppression ability, and that overall EF and enhancement abilities significantly predicted lower levels of depressive symptoms, while suppression ability did not. These findings deepen understanding of EF abilities and emotion regulation deficits among individuals with depressive symptoms.

Data availability statement

The datasets presented in this article are not readily available because the datasets generated and/or analyzed during the

current study are not publicly available due to time limitations. Requests to access the datasets should be directed to SZ, zhangshaohua0224@126.com.

Ethics statement

The studies involving human participants were reviewed and approved by The Ethics Committee of East China Normal University (approval number: HR 121-2019). Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

Author contributions

SZ: study design, data collection, analyses, interpretation, writing an original draft, and visualization. JL: clinical evaluations. BS: study design and clinical evaluations. YZ: study design and clinical evaluations. All authors contributed to the article and approved the submitted version.

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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

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Emotional intelligence matters in hospitality education: contributions of emotional intelligence, fluid ability, and personality to hospitality grades

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Introduction: According to recent meta-analyses, emotional intelligence can significantly predict academic performance. In this research, we wanted to investigate a particular group of students for which emotional intelligence should be crucial. Namely, we examined whether emotional intelligence, conceptualized as an ability, uniquely contributes to academic performance in hospitality management education beyond fluid intelligence and personality.

Methods: Using a battery of tests and questionnaires in an online survey, we analyzed if fluid ability, the Big-Five personality dimensions, and ability-based emotional intelligence predict six module grades in a sample of N = 330 first-semester students at a Swiss-based hospitality school.

Results: We found that the ability to manage other people's emotions is more predictive of module grades than fluid ability if the courses involve substantial parts of interactive work. Complementarily, the more a module focuses on theoretical knowledge or abstract subject material, the more fluid ability predicted performance. Other abilities and factors – emotion understanding, emotion regulation, the students' age, conscientiousness, and openness – predicted performance only in specific modules, hinting that the didactic methods and grading procedures are complex and involve various skills and dispositions of the students.

Discussion: Given that the hospitality education and industry are buzzing with interactions with peers and guests alike, we provide evidence that interpersonal and emotional competencies are vital to hospitality curricula.

KEYWORDS

ability emotional intelligence, academic performance, fluid ability, hospitality education, personality

Introduction

Research in the field of higher education is replete with studies that point to cognitive intelligence as the single most important factor in predicting an individual's academic performance, most frequently measured by GPA score or SAT results (Mohzan et al., 2013; Ahmed et al., 2019). Notwithstanding its long-lasting predominance in the academic education literature and its indisputable relevance, this traditional stream of research is regularly being adjourned by a growing body of studies focusing on measuring the impact of other skills on academic performance in higher education settings (e.g., Rozell et al., 2002; Jaeger and Eagan, 2007; Nasir and Masrur, 2010; Shipley et al., 2010; Brackett et al., 2011; Sánchez et al., 2013;

Wang, 2019; MacCann et al., 2020; Zhoc et al., 2020; Goh and Kim, 2021). Persistence, motivation, determination, stress management, and engaging in fruitful relationships with academic instructors and classmates are all associated with academic performance but also relate to the construct of emotional intelligence (Goh and Kim, 2021).

The term 'emotional intelligence' (EI) was coined by Salovey and Mayer (1990), who defined the concept as the ability to perceive, understand, regulate, and harness emotions in the self and others. From this original definition emerged studies that showed that EI could be measured as an ability (Ciarrochi et al., 2000; Mayer et al., 2016) or as a personality trait (Petrides et al., 2007). Extant research provides evidence that just like cognitive intelligence and personality, EI is positively associated with academic performance, job behavior, and success in life (van Rooy and Viswesvaran, 2004; Richardson et al., 2012; Perera and DiGiacomo, 2013; Sánchez et al., 2013; Wolfe and Kim, 2013; Choi et al., 2019; Zhoc et al., 2020). Educational environments require students to acquire and employ knowledge, study diligently, develop competencies, and be curious and critical. In these environments, students engage with their study material independently, but they must also interact with peers and teachers to attain good grades. Past research has established two groups of predictors of academic achievement: cognitive intelligence and personality traits. Cognitive intelligence explains a student's capacity to reason about (novel) material, grasp abstract concepts, and use them to build knowledge. As such, intelligence is a stable predictor of grades (Laidra et al., 2007; Bergold and Steinmayr, 2018). However, a large capacity for learning is not always sufficient for achievement, and students' personality traits come into play, influencing their approaches toward learning. Students' conscientiousness (their willingness to work hard) was observed to be a prime predictor of academic achievement alongside cognitive intelligence, yet important roles are also found in openness (their curiosity and motivation to engage with subject material) and agreeableness (their tendency to behave in cooperative ways; Duff et al., 2004; Poropat, 2009; Verbree et al., 2021). With capacity (intelligence) and willingness (personality) providing essential contributors to academic grades, the picture of academic success seemed still incomplete, especially if learning environments are emotional, focus on developing individual competencies and interpersonal skills, and bustle with human interaction. Therefore, the potential contributions of EI to academic achievement have garnered more and more interest (Wolfe and Kim, 2013; Wolfe et al., 2014; Wilson-Wünsch et al., 2016).

MacCann et al. (2020) recently published a comprehensive large-scale meta-analysis (anchored in both high-school and university contexts) that estimates the extent to which EI predicts academic performance. Their analysis revealed a small to moderate association between EI and academic performance. The strength of this association was related to how EI was conceptualized and measured: EI was a stronger predictor of academic performance when measured using the ability approach (i.e., skill-based), as opposed to the 'self-rated' or 'mixed' approaches that lean closer toward personality-based concepts.

MacCann et al. (2020) suggest that the link between EI and academic achievement is threefold: First, EI helps cope with emotions in academic life (e.g., manage stress and stay motivated). Coherently with this interpretation, Mohzan et al. (2013) showed that students who are more confident that they understand and appraise their own emotions correctly also have a better propensity to regulate themselves in a stressful education environment. Zhoc et al. (2020) discovered that a higher self-reported EI translates to better academic performance *via* stronger cognitive and social engagement at university, which enables students to make university life experiences and challenges positive and rewarding. What is more, hospitality students who scored higher in self-reported EI seem more likely to pursue a career in hospitality (Walsh et al., 2015).

Second, EI is beneficial for building relationships while at university. For example, Goh and Kim (2021) reported that the academic performance of hotel management students was associated with emotionality, a facet of trait EI. They argue that emotionality (i.e., the subjective capacity to perceive and express emotions adequately) helps students to work effectively with others on group assignments and build a supportive network with classmates and teachers.

Third, EI is related to academic achievement because when measured as an ability, it moderately overlaps with cognitive intelligence (MacCann et al., 2014), thereby forming an association with grades. In a meta-analysis, Miao et al. (2019) report strong associations between service quality and all models of EI, yet the association is most substantial with ability EI.

Because EI seems to cover what intelligence and personality do not (sufficiently), hospitality professionals have demonstrated interest in integrating emotional competencies into hospitality curricula. Promoting EI should propagate the students' professional performance as they are more adept at dealing with emotions on the job (their own, their peers', and customers'), and it also brings benefits to the classroom: In the learning setting, the basis for developing skills and competencies is mutual support, a good learning atmosphere, and a rewarding social life (Gibbs and Slevitch, 2019;Wolfe et al., 2014).

Taken together, we can confidently conclude that students' cognitive ability and personality affect their academic performance. EI also contributes to academic achievement, but if measured *via* self-report, it taps more into personality and less into the ability space. Some researchers raised concerns about the suitability of self-report measures to describe actual emotional competencies in the hospitality domain (Boz and Koc, 2021). However, we are unaware of studies in hospitality management education that employed an ability measure of EI. Thus, we aimed to elucidate the association between a performance-based measure of ability EI and the academic performance of hospitality students. We investigated the predictive power of single emotional abilities (as opposed to a global EI score) beyond cognitive ability and personality regarding several module grades of hospitality students using hierarchical regression analyses. We expect EI to explain distinct portions of variance in the grades beyond cognitive ability and personality.

The results of our study can have many relevant implications for researchers and practitioners. In theoretical considerations, we can further develop our understanding of how ability EI complements cognitive intelligence and personality in predicting academic success. Namely, we aim to elucidate the critical emotional component embedded in almost any human interaction in the context of hospitality. In practical terms, the focus on specific EI competencies - assessed with performance-based measures - contributes valuable indications for hospitality professionals (Wolfe et al., 2014; Koc and Boz, 2020). Thus, it is useful to see whether and which competencies identified by ability EI can provide unique advantages and therefore be used to inform hospitality education practices and curricula (Wolfe, 2017).

TABLE 1 Modules and related courses.

Module	Courses	Activities	Gradings
Food & Beverage workshops I	– Bakery and pastry making – Catering – Events: management and operations – Fine dining cuisine – Fine dining restaurant and lounge bar	90% practical (group exercises), 10% theory	MCQ, transferable skills[1]
Food & Beverage workshops II	– Bar and restaurant outlets – International cuisine – R&D design lab – Stewarding	90% practical (group exercises, shift work), 10% theory	MCQ, transferable skills[1]
Wine & spirits	– Global spirits – Oenology and wine-producing regions	90% practical (workshops, tastings), 10% theory	Written exams
Rooms division	– Front office and spa – Housekeeping	50% practical (operational tasks, service management), 50% theory	MCQ, transferable skills[1]
Introduction to business tools	– Applied mathematics and Excel for business hospitality management	100% theory (autonomous study, online lessons)	PC-based assessment, quiz
Introduction to hospitality management	– French[2] – Introduction to Business English[2] – Hospitality concept discovery – Introduction to F&B management – Rooms division operations – Sustainable hospitality culture	100% theory (lectures, work in class, excursion)	Written exams

MCQ = multiple choice questionnaire.
[1]Teachers evaluate the students' attitude, teamwork and communication, self-development, and other course-specific criteria (e.g., development of versatility) by awarding points.
[2]Language courses were mandatory only for specific students (e.g., native French speakers did not have to take French); therefore, not all students received grades on these courses.

Method

We examined how EI (i.e., emotion recognition, understanding, regulation, and management), fluid ability, and personality (extraversion, agreeableness, conscientiousness, emotional stability, and openness) predict the grades of hospitality school students in six different modules.

Participants and procedure

The participants were first-semester students at the École Hôtelière de Lausanne (EHL), an internationally renowned hospitality school in Switzerland. Students were recruited at the start of each academic year between fall 2019 and fall 2021 (five cohorts: students can start with the fall or spring semester). The students completed two online surveys administered *via* Qualtrics.[1] The first survey assessed emotional abilities, and the second survey fluid ability and personality. Students did not receive monetary compensation for their participation, but each cohort had a debriefing workshop during their last semester at the school. By the end of the first semester, the hospitality school provided the anonymized students' grades. In total, 642 students completed the emotional abilities survey, and 416 students finished the fluid ability and personality survey. Finally, 330 students' data were complete. The final sample comprised 217 females and 113 males. Age ranged from 18 to 29 years, with a mean age of 19.64 years ($SD = 1.45$). Nearly half of the students originated from Switzerland ($n = 137$; 41.5%), yet most indicated nationalities outside Switzerland ($n = 193$, 58.5%). All participants provided signed consent.

Measures

Module grades

The hospitality school provided the grades of six modules (Table 1). Within each module, students attended one to six courses. The mean course grade constitutes the final module grade. The courses teach various skills related to business management, administration, and technical skills in gastronomy and housekeeping. Depending on the subject matter of the module, the coursework differs in the degrees of practical and theoretical work. For example, in the modules *Food & Beverage workshops I*, *II*, and *Wine & Spirits*, activities involve team exercises, taking on shifts in local restaurants, but grading also includes teachers' evaluation of students' transferable skills (e.g., teamwork or attitude).

In contrast, the modules *Introduction to business tools* and *Introduction to hospitality management* comprise mostly business school subject material that students acquire by attending classes, lectures, or engaging in self-study. The grading system ranges from 1 (lowest score) to 6 (highest score), with scores below 4 indicating a failed course. If students did not complete a module and received no grade, we coded their grade as a missing value.

1 https://www.qualtrics.com

Emotional abilities

Students completed the Geneva emotional competence test (GECo; Schlegel and Mortillaro, 2019) in English ($n = 285$) or French ($n = 43$). The GECo assesses four emotional abilities. First, in the emotion recognition subtest, short video clips are presented in which actors use para-and non-verbal behavior to portray a specific emotion. Participants must choose the correct answer from a list of 14 emotions (see also GERT-S; Schlegel and Scherer, 2016). Second, the subtest on emotion understanding presents short vignettes that describe various contexts, sometimes including components of emotions (e.g., descriptions of physiological phenomena or cognitive appraisals of the situation). Using the information presented in the vignette, the participants must deduce the correct emotion felt by the protagonist. The correct answers are based on the component-process model of emotion (Scherer et al., 2001). Third, in the emotion regulation subtest, short scenarios are presented, and the participant is asked to imagine him-or herself in that situation and indicate two behaviors that they would most likely show to minimize negative emotions. In each scenario, the responses represent two adaptive and two maladaptive regulation strategies, according to Garnefski et al. (2001). Finally, the emotion management subtest presents workplace conflict scenarios in which another person experiences anger, fear, sadness, or inappropriate joy. The participant is asked to select one response they would typically show to influence the emotion of the other person. The responses reflect the conflict management strategies described by Thomas (1992). The correct option is the one that is appropriate in consideration of various situational factors, such as time pressure, stakes, or organizational norms. The GECo takes about 50 to 60 min to complete and provides scores for each subtest and a total score from 0 to 1.

Fluid ability

Psychometric and neuroimaging evidence suggests a vast overlap of fluid ability and general intelligence, making it a reliable estimate of overall cognitive ability (Blair, 2006; Bergold and Steinmayr, 2018). We employed the English version of the Culture Fair Intelligence Test (CFT; Cattell and Cattell, 1957) to measure fluid ability. The CFT assesses the ability to analyze figure series, classify figures, solve figure matrices, and infer rules from figural presentations. Participants were presented with the four series of tasks and asked to solve as many as possible within 3 min for each subtest (4 min on the fourth subtest). The CFT comprises 56 tasks, and scores can range from 0 to 56. The total time to complete the CFT is about 15 min.

Personality

We used the English ($n = 282$) or French version ($n = 48$) of the Ten Item Personality Inventory (TIPI; Gosling et al., 2003) to assess extraversion, agreeableness, conscientiousness, emotional stability (reverse neuroticism), and openness. Participants indicated their agreement to sentences describing themselves with different adjectives on a scale from 1 (*completely disagree*) to 7 (*completely agree*). We report mean scores for each personality dimension. The TIPI takes about 5 min to complete.

Results

All data was used. Missing values (i.e., incomplete module grades) were excluded pairwise (correlations) or listwise (regression). Analyses were run in IBM SPSS version 27. First, we report descriptive statistics of the module grades and examine the influences of students' gender, age, and nationality. Then we report descriptive statistics of fluid ability, personality dimensions, and emotional abilities, and again analyze relationships with gender, age, and nationality. Finally, we report hierarchical regression analyses of the predictors (step 1: demographics, step 2: fluid ability and personality, step 3: emotional abilities) onto the six module grades to determine any incremental validity of emotional abilities beyond fluid ability and personality.

Module grades

Means, reliabilities, and correlations of the module grades are presented in Table 2. Some modules only incorporate a few courses, so we calculated split-half reliabilities (Spearman-Brown coefficient) to gage the consistency of the course grades used to compute each module grade. Reliabilities range from 0.481 (*Introduction to hospitality management*) to 0.675 (*Food & Beverage workshops I*), indicating that the course grades within one module have some degree of heterogeneity. In other words, if a student receives a good grade in one course, they do not necessarily receive a good grade in another course of that same module. This variability can derive from the differences between the courses within a module in terms of content, structure, delivery mode, or grading procedure. All module grades are moderately or highly correlated, ranging from $r = 0.335$ to $r = 0.716$ (all $ps < 0.001$).

Males achieved slightly better grades on *Introduction to business tools* ($M = 4.77$, $SE = 0.081$) than females ($M = 4.53$, $SE = 0.072$), $F(1, 314) = 4.39$, $p = 0.037$, $\eta^2 = 0.014$. Age correlated with the grades on *Food & Beverage workshops I* ($r = 0.199$, $p = 0.001$) and *II* ($r = 0.201$, $p < 0.001$), *Rooms division* ($r = 0.177$, $p = 0.001$), and *Wine & Spirits* ($r = 0.156$, $p = 0.005$). Comparing Swiss to non-Swiss nationalities, participants from Switzerland received higher grades in three modules: First, in *Wine & Spirits* ($M = 5.11$, $SE = 0.044$; compared to $M = 4.92$, $SE = 0.044$), $F(1, 318) = 9.15$, $p = 0.003$, $\eta^2 = 0.028$. Second, in *Food & Beverage workshops I* ($M = 4.93$, $SE = 0.035$; compared to $M = 4.80$, $SE = 0.028$), $F(1, 296) = 7.99$, $p = 0.005$, $\eta^2 = 0.026$. Finally, also in *Food & Beverage workshops II* ($M = 4.93$, $SE = 0.044$; compared to $M = 4.82$, $SE = 0.032$), $F(1, 306) = 4.60$, $p = 0.033$, $\eta^2 = 0.015$.

Predictors

Means, reliabilities, and correlations of fluid ability, personality, and emotional abilities are presented in Table 3. We calculated McDonald's ω (Hayes and Coutts, 2020) to estimate the reliabilities of the GECo and CFT. Reliabilities ranged from acceptable to good, with estimates on emotion regulation (0.485) and emotion management (0.607) evoking some caution. Because the TIPI uses only two items per dimension, we calculated Spearman-Brown Coefficients. Reliability was good for conscientiousness (0.727), extraversion (0.640), and openness (0.690), barely acceptable for emotional stability (0.501), and low for agreeableness (0.224).

Emotion recognition, emotion management, and emotion understanding significantly correlated among themselves, while emotion regulation correlated only with emotion management ($r = 0.24$, $p < 0.001$). This result has been observed before. It is argued

TABLE 2 Module grades: descriptive statistics, internal consistencies, and correlations.

Module	*N*	*M* (*SD*)	Reliability[1]	Correlations				
				1.	2.	3.	4.	5.
1. Food & Beverage workshops I	298	4.85 (0.38)	0.675					
2. Food & Beverage workshops II	308	4.87 (0.46)	0.616	0.716***				
3. Wine & spirits	320	5.00 (0.57)	0.651	0.623***	0.637***			
4. Rooms division	323	5.18 (0.42)	0.548	0.612***	0.663***	0.618***		
5. Introduction to business tools	316	4.62 (0.98)	–	0.420***	0.335***	0.385***	0.400***	
6. Introduction to hospitality management	326	4.78 (0.47)	0.481	0.466***	0.471***	0.513***	0.520***	0.491***

N = 330. Grades range from 1 (low) to 6 (high). Ns vary because modules were only graded if a student completed all mandatory courses within each module.
[1]Course grades (*cf.* Table 1) were used to compute Spearman-Brown Coefficients for each module. In *Introduction to hospitality management*, the grade on *French* was excluded because otherwise no valid cases were identified (no student completed all six available courses); if taken, it contributed to the module grade as per the hospitality school's regulations. No coefficient was calculated for *Introduction to business tools* because the module comprised only one course in the first semester.
***$p < 0.001$.

TABLE 3 Fluid ability, personality, and emotional abilities: descriptive statistics, internal consistencies, and correlations.

Measure	*M* (*SD*)	Reliability[1]	Correlations								
			1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Fluid abilities	35.45 (8.03)	0.847									
2. Extraversion	4.49 (1.30)	0.640	0.077								
3. Agreeableness	4.58 (1.23)	0.224	−0.030	0.251***							
4. Conscientiousness	5.05 (1.57)	0.727	−0.048	0.317***	0.485***						
5. Emotional Stability	3.96 (1.39)	0.501	−0.011	0.106	0.075	0.090					
6. Openness	5.17 (1.42)	0.690	−0.066	0.327***	0.510***	0.596***	0.089				
7. Emotion recognition	0.582 (0.152)	0.740	0.214***	0.067	0.089	0.091	−0.001	0.125*			
8. Emotion understanding	0.658 (0.173)	0.721	0.310***	0.025	0.060	0.057	−0.108	0.001	0.387***		
9. Emotion regulation	0.587 (0.097)	0.485	0.073	0.126*	0.006	0.055	−0.008	0.015	0.046	0.102	
10. Emotion management	0.447 (0.163)	0.607	0.379***	0.032	0.149**	0.077	−0.026	0.062	0.191***	0.339***	0.236***

N = 330. [1]Reliability measures: CFT (fluid ability) and GECo (emotional abilities): McDonald's ω; TIPI (personality): Spearman-Brown Coefficient.
1: CFT sum score ranges from 0 to 56; 2–6: TIPI mean scores range from 1 to 7; 7– 10: GECo mean scores range from 0 to 1.
*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

that the regulation subtest taps into an individual's behavior (selecting their typical response) rather than their ability (knowing what the best response would be; Völker, 2020; Simonet et al., 2021). Emotion recognition, emotion understanding, and emotion management (but not emotion regulation) were also significantly associated with fluid ability (respectively, $r = 0.21$, $r = 0.31$, $r = 0.38$, all $ps < 0.001$). Additionally, a few weak relationships between emotional abilities and personality were found. A better emotion recognition ability was associated with more openness ($r = 0.13$, $p = 0.023$); better emotion regulation was associated with extraversion ($r = 0.13$, $p = 0.022$); and higher emotion management ability was moderately associated with agreeableness ($r = 0.15$, $p = 0.007$). Fluid ability did not correlate with personality. All personality dimensions were strongly interrelated except for emotional stability, which did not correlate with any other personality dimension. Therefore, our results largely reflect previous research that proposes independence between ability and personality, with emotional abilities partly overlapping with the cognitive ability space (Schlegel and Mortillaro, 2019; MacCann et al., 2020).

No correlations with age were found. Gender did not impact the scores on either fluid or emotional abilities. On extraversion, however, males scored higher ($M = 4.71$, $SE = 0.121$) than females ($M = 4.38$, $SE = 0.088$), $F(1, 328) = 4.77$, $p = 0.030$, $\eta^2 = 0.014$; whereas on openness, females scored higher ($M = 5.29$, $SE = 0.089$) than males ($M = 4.94$, $SE = 0.149$), $F(1, 328) = 4.66$, $p = 0.032$, $\eta^2 = 0.014$. We found differences between Swiss and non-Swiss participants: Swiss students performed better on the emotion recognition subtest ($M = 0.618$, $SE = 0.012$; compared to $M = 0.557$, $SE = 0.011$), $F(1, 328) = 12.91$, $p < 0.001$, $\eta^2 = 0.038$. Swiss students were also less open ($M = 4.84$, $SE = 0.136$; compared to $M = 5.41$, $SE = 0.089$), $F(1, 328) = 13.50$, $p < 0.001$, $\eta^2 = 0.040$; less agreeable ($M = 4.39$, $SE = 0.115$; compared to $M = 4.72$, $SE = 0.082$), $F(1, 328) = 5.63$, $p = 0.018$, $\eta^2 = 0.017$; and less conscientious than international students ($M = 4.77$, $SE = 0.149$; compared to $M = 5.25$, $SE = 0.101$), $F(1, 328) = 7.81$, $p = 0.006$, $\eta^2 = 0.023$.

Regression analyses

We performed multiple regression analyses to test the contributions of fluid ability, personality, and emotional abilities to the six module grades. Because of the relationships between grades and age, gender, and nationalities, we included these demographic variables as covariates in the first step. The second step introduced fluid ability and personality dimensions; the final step introduced emotional abilities (Table 4).

Step 3 shows that the predictors explained significant portions of variance in five of the six module grades, ranging from 12.7% (*Wine & Spirits*) to 17.1% (*Introduction to business tools*). Specifically, the ability to manage emotions contributed significantly to four grades (*Wine & Spirits*, *Food & Beverage workshops I* and *II*, and *Rooms division*). Emotion regulation explained variance in *Wine & Spirits*, whereas Emotion understanding explained variance in *Rooms division*. Age explained significant portions of variance in three grades (*Food & Beverage workshops I* and *II*, *Rooms division*). Fluid ability contributed significantly to two grades (*Introduction to business tools*, *Rooms division*). Finally, openness predicted two grades (*Food & Beverage workshops I*, *Introduction to business tools*), and conscientiousness one grade (*Rooms division*). Overall, emotional abilities were significant predictors to four grades, age and personality each to three grades, and fluid ability to two grades.

To test whether emotional abilities would explain more variance in modules that involve practical rather than theoretical course activities, we computed the average grade of majorly theoretical modules (*Introduction to business tools*, *Introduction to hospitality management*; Spearman-Brown coefficient = 0.658) and practical courses (*Food & Beverage workshops I* and *II*, *Wine & Spirits*, *Rooms division*; Spearman-Brown coefficient = 0.882). The regression model remained the same as employed for the single module grades.

The predictors explained about 11% of variance in the theoretical courses, $R^2 = 0.109$, $F(13, 313) = 2.96$, $p < 0.001$. Only fluid ability made a significant contribution ($B = 0.022$, $SE = 0.005$, $p < 0.001$). In contrast, the same model explained 17% variance in the practical courses, $R^2 = 0.174$, $F(13, 315) = 5.10$, $p < 0.001$. The significant predictors were age ($B = 0.051$, $SE = 0.016$, $p = 0.001$), emotion management ($B = 0.470$, $SE = 0.147$, $p = 0.002$) and, approaching significance, conscientiousness ($B = 0.034$, $SE = 0.017$, $p = 0.050$). Therefore, fluid ability significantly predicted module grades that predominately involved theoretical coursework, yet in modules that involved practical coursework, the most important predictors were age and emotion management.

Discussion

We aimed to examine the contributions of emotional abilities beyond fluid reasoning and personality to the academic performance of hospitality students during their first semester of the bachelor program. Using regression analyses, we found that emotional abilities – in particular, emotion management – contributed to the grades of modules that predominately involved practical activities. In contrast, fluid ability contributed to modules teaching theoretical subject material through less interactive didactic methods. Directly comparing average grades of theoretical to practical modules, the difference in the variance explained was remarkable (11% vs. 17%). On top of that, we observed small contributions of personality, similar to the results of Wilson-Wünsch et al. (2016) and Verbree et al. (2021): lower openness and higher conscientiousness benefitted specific grades. We discuss and interpret the findings below.

Practical modules

The ability model of EI covers different emotional abilities (Mayer et al., 2016). We found that these abilities played differing roles in academic performance across hospitality modules. In the majorly practical courses of *Food & Beverages workshops I* and *II, Wine & Spirits*, and *Rooms division*, the ability to manage other people's emotions, measured by adaptive emotional conflict management strategies, contributed significantly to the final grades. The learning outcomes in these courses are adapted from industry-based skills and management competencies. They focus on skilling the students for hospitality-related management positions and developing their knowledge of field-related expertise (such as principles of sparkling wine or the main steps of winemaking). Moreover, the evaluation structure included group work. Deploying emotion management and regulation competencies are instrumental for teamwork collaboration. As MacCann et al. (2020) and Wilson-Wünsch et al. (2016) suggested, competent students successfully influence the emotions of others, which helps them build dependable bonds with classmates and develop supportive relationships with teachers (*Food & Beverages workshops I* and *II, Wine & Spirits*). Emotion management may also give the students an advantage in excelling in guest-oriented behavior (*Rooms division*). We should note that the mean score on the emotion management subtest ($M = 0.45$) was similar or lower compared to three samples of undergraduate psychology students in Schlegel and Mortillaro (2019). Considering the specific subject of the students who participated in this study and the importance of EI for a successful career in hospitality, it seems essential for students and young professionals to invest further in training this competence.

In addition to emotion management, understanding emotions was relevant in the module *Rooms division*. This module focused on teaching front-office skills and housekeeping. The courses rely on role-play as a learning method and contain lessons on conducting check-ins, talking to guests, and providing operational services. For such tasks and in the context of role plays, comprehending the causes and consequences of emotions is essential as it defines the success of the service delivery (Koc and Boz, 2019). Since front-office management and housekeeping involve following organizational guidelines, behavioral scripts, knowledge about how to conduct daily business, and the need for versatile execution, it was not surprising that fluid ability and conscientiousness emerged as additional predictors. A higher cognitive intelligence facilitates the acquisition of knowledge (Blair, 2006), and conscientious students may be more committed to completing tasks adequately and employ deeper, more strategic approaches to learning (Duff et al., 2004; Poropat, 2009; Wilson-Wünsch et al., 2016; Verbree et al., 2021). A learning-by-doing experience may enhance this relationship. Emotion management, complemented by emotion understanding, fluid ability, and conscientiousness, appears to make for a good set of emotional and technical competencies needed to provide services to guests. Our results might indicate that such learning settings (i.e., role-plays, group work, learning by practice) favor the leverage of emotional intelligence in learning new skills and knowledge.

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TABLE 4 Hierarchical regression of demographics, fluid ability, personality, and emotional abilities onto module grades.

Measure	Food & Beverages I			Food & Beverages II			Wine & Spirits			Rooms division		
	B	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*
Step 1												
Constant	3.98	0.306	***	3.62	0.371	***	4.02	0.454	***	4.19	0.333	***
Age	0.044	0.016	0.006**	0.064	0.019	0.001**	0.049	0.024	0.041*	0.051	0.017	0.004**
Gender	−0.058	0.045	0.207	−0.119	0.055	0.032*	−0.109	0.067	0.103	−0.072	0.050	0.146
Nationality	0.077	0.047	0.107	0.049	0.056	0.385	0.146	0.068	0.032*	0.035	0.051	0.493
R^2 (ΔR^2)	0.053 (0.053)			0.057 (0.057)			0.046 (0.046)			0.039 (0.039)		
ΔF		5.48**		6.16***			5.08**			4.32**		
Step 2												
Constant	3.67	0.332	***	3.25	0.403	***	3.67	0.498	***	3.75	0.355	***
Age	0.042	0.016	0.008**	0.063	0.019	0.001**	0.049	0.024	0.040*	0.049	0.017	0.004**
Gender	−0.071	0.046	0.121	−0.138	0.056	0.013*	−0.125	0.068	0.065	−0.080	0.049	0.104
Nationality	0.075	0.047	0.114	0.070	0.057	0.219	0.139	0.069	0.044*	0.042	0.050	0.404
Fluid ability	0.009	0.003	0.001**	0.005	0.003	0.094	0.011	0.004	0.007**	0.013	0.003	***
Extraversion	0.015	0.018	0.394	0.040	0.022	0.068	−0.013	0.026	0.607	−0.002	0.019	0.914
Agreeableness	0.019	0.021	0.354	−0.012	0.025	0.644	0.020	0.030	0.510	0.011	0.022	0.613
Conscientiousness	0.027	0.017	0.129	0.042	0.021	0.048*	0.036	0.025	0.162	0.042	0.018	0.025*
Emotional Stability	−0.008	0.015	0.587	−0.012	0.019	0.527	0.010	0.023	0.653	−0.016	0.016	0.317
Openness	−0.043	0.020	0.038*	−0.018	0.025	0.464	−0.051	0.029	0.086	−0.036	0.021	0.091
R^2 (ΔR^2)	0.110 (0.057)			0.097 (0.040)			0.081 (0.035)			0.122 (0.083)		
ΔF		3.05**		2.20*			1.95			4.95***		
Step 3												
Constant	3.74	0.349	***	3.32	0.421	***	3.90	0.516	***	3.79	0.371	***
Age	0.039	0.016	0.012*	0.061	0.019	0.002**	0.045	0.023	0.054	0.047	0.017	0.005**
Gender	−0.047	0.046	0.309	−0.108	0.056	0.052	−0.085	0.067	0.207	−0.069	0.049	0.159
Nationality	0.057	0.048	0.234	0.045	0.057	0.435	0.113	0.070	0.106	0.041	0.051	0.426
Fluid ability	0.005	0.003	0.090	0.000	0.004	0.957	0.004	0.004	0.403	0.009	0.003	0.003**
Extraversion	0.019	0.018	0.303	0.043	0.022	0.050	−0.006	0.026	0.820	0.002	0.019	0.907
Agreeableness	0.010	0.021	0.648	−0.026	0.025	0.291	0.002	0.030	0.940	0.001	0.022	0.952
Conscientiousness	0.025	0.017	0.151	0.040	0.021	0.058	0.032	0.025	0.196	0.039	0.018	0.036*
Emotional Stability	−0.008	0.015	0.584	−0.010	0.019	0.580	0.012	0.022	0.579	−0.011	0.016	0.481
Openness	−0.046	0.020	0.024*	−0.020	0.025	0.422	−0.054	0.029	0.065	−0.034	0.021	0.111
Emotion recognition	0.300	0.153	0.051	0.319	0.186	0.088	0.279	0.227	0.218	−0.064	0.164	0.697
Emotion understanding	−0.043	0.139	0.760	0.067	0.168	0.690	0.171	0.206	0.407	0.306	0.147	0.039*
Emotion regulation	−0.243	0.226	0.283	−0.355	0.267	0.185	−0.700	0.321	0.030*	−0.267	0.236	0.258
Emotion management	0.385	0.150	0.011*	0.481	0.181	0.008**	0.636	0.218	0.004**	0.317	0.157	0.045*
R^2 (ΔR^2)	0.144 (0.035)			0.135 (0.038)			0.127 (0.046)			0.153 (0.039)		
ΔF	2.90*			3.24*			4.03**			2.80*		

(Continued)

TABLE 4 (Continued)

Measure	Business tools			Hospitality management		
	B	*SE*	*p*	*B*	*SE*	*p*
Step 1						
Constant	4.31	0.793	***	4.21	0.376	***
Age	0.012	0.041	0.771	0.028	0.020	0.154
Gender	0.237	0.117	0.044*	−0.003	0.055	0.950
Nationality	−0.022	0.120	0.853	0.036	0.057	0.520
R^2 (ΔR^2)	0.014 (0.014)			0.011 (0.011)		
ΔF	1.48			1.23		
Step 2						
Constant	3.23	0.824	***	3.73	0.415	***
Age	−0.005	0.039	0.909	0.027	0.020	0.162
Gender	0.178	0.113	0.116	−0.013	0.056	0.820
Nationality	−0.021	0.116	0.858	0.056	0.057	0.332
Fluid ability	0.040	0.007	***	0.007	0.003	0.034*
Extraversion	0.045	0.044	0.310	0.023	0.022	0.283
Agreeableness	0.054	0.053	0.308	0.015	0.025	0.559
Conscientiousness	0.031	0.044	0.470	0.027	0.021	0.200
Emotional Stability	−0.003	0.038	0.929	0.001	0.019	0.955
Openness	−0.113	0.049	0.023*	−0.012	0.025	0.628
R^2 (ΔR^2)	0.138 (0.124)			0.043 (0.031)		
ΔF	7.31***			1.72		
Step 3						
Constant	3.97	0.861	***	3.72	0.439	***
Age	0.001	0.039	0.987	0.025	0.020	0.206
Gender	0.177	0.113	0.118	−0.004	0.057	0.943
Nationality	0.033	0.117	0.776	0.052	0.059	0.375
Fluid ability	0.048	0.008	***	0.004	0.004	0.222
Extraversion	0.053	0.044	0.232	0.024	0.022	0.269
Agreeableness	0.059	0.053	0.262	0.009	0.026	0.718
Conscientiousness	0.044	0.043	0.307	0.025	0.021	0.239
Emotional Stability	−0.014	0.038	0.716	0.002	0.019	0.902
Openness	−0.109	0.049	0.028*	−0.012	0.025	0.633
Emotion recognition	−0.698	0.387	0.072	0.038	0.192	0.844
Emotion understanding	−0.627	0.344	0.069	0.045	0.172	0.793
Emotion regulation	−0.753	0.545	0.168	−0.002	0.274	0.993
Emotion management	0.008	0.373	0.984	0.245	0.187	0.190
R^2 (ΔR^2)	0.171 (0.033)			0.050 (0.007)		
ΔF	3.03*			0.577		

$N = 330$.

Regression method: Enter. Step 1: Age, Gender (0 female, 1 male), Nationality (0 international, 1 Swiss); Step 2: Fluid ability, personality; Step 3: Emotional abilities.

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

While emotion management deals with the emotions of others, the ability to regulate emotions depicts how individuals influence their own emotions. This ability was relevant for the grade in *Wine & Spirits*, but in a somehow surprising direction: We found that a lower score on emotion regulation predicts a better grade. Alcoholic beverages can be used as a non-adaptive coping strategy, and indeed, the use of alcohol has been related to difficulties in emotion regulation (e.g., Dvorak et al., 2014). Though speculative, this may indicate that students with lower emotion regulation ability may be more open to engaging with

the subject matter, which ultimately helps them obtain better grades in this module.

The modules *Food & Beverage workshops I* and *II* focus in detail on cuisine and kitchen operations, using didactic workshop formats that team up students in gastronomic environments. The evaluation structure includes theory-based dimensions assessing the knowledge related to the practice and foundations of the jobs (e.g., cooking methods, kitchen management principles, etc.) but also behavior and attitude components (e.g., punctuality, contribution to the team, etc.). Again, emotion management predicted better grades, likely reflecting the students' capacity to manage peers in fast-paced and stressful teamwork situations. The learning purpose of these workshops is for students to experience being part of a kitchen brigade and participate in meal preparations and services at sales points. Therefore, the primary skills that the courses aim at developing are those of completing a task in a coordinated fashion for a specific deliverable under often stressful service delivery settings. Interestingly, a lower openness seemed important in *Food & Beverages workshops I*: When preparing dishes and creating new plates, too much creativity may be a pitfall, whereas sticking to the conventions may result in better grades.

Summed up, emotional abilities and personality were predictive of the final grades in modules presenting a professional environment concretely (involving medium to high stake interactions with peers, teachers, and guests). Yet another factor emerged: Age predicted better grades in *Food & Beverages workshops I*, *II,* and *Rooms division*. We can speculate that students who are a bit more mature tend to be more confident (Pearce, 2017) and use more efficient learning strategies (Wilson-Wünsch et al., 2016) that may be particularly beneficial in the more practical courses among these modules (age approached significance in *Wine & Spirits*). We further presume that age may also convey the accumulation of experience not as a student in hospitality but as a guest: In their twenties, young adults gain meaningful experiences traveling and dining out. These might lead them to use their private experiences to develop their professional skills.

Theoretical modules

With a decrease in practical course activities, we observed a decline in the importance of emotional abilities. Instead, the theoretical aspects usually taught in more in-class settings, such as lectures and classroom exercises, emphasized a more substantial role of cognitive ability. Fluid ability includes the capacity to reason, infer relationships between objects, and is related to acquiring knowledge. This ability seems essential to grasp the abstract nature of quantitative data in business administration (*Introduction to business tools* which focuses on math and computing knowledge) and acquire behavioral scripts and guidelines (*Rooms division*). It seems important to note that in the module that involves interaction with guests (*Rooms division*), fluid ability and emotion management predicted the grades in unison. In contrast, in *Introduction to business tools*, fluid ability took the spotlight to explain this self-study module, followed by a lower openness that may help stay focused on going over the abstract material of the course and succeed in theory-focused exams (Verbree et al., 2021).

We could identify significant predictors for five of six modules. No significant predictors could be found for the *Introduction to hospitality management* grade. One reason might be that none of the variables considered were systematically relevant to performance in the courses in this module. However, this seems in contrast with our general findings. Instead, we suspect the reasons are statistical: The module grade had low reliability, which makes inferential analyses less trustworthy. The fact that this module includes language courses alongside topics in hospitality likely added noise to the data. In fact, removing the course *Introduction to business English* would have improved the reliability within this module to 0.613. An approach to disentangle potential effects could be to separately analyze course grades that differ substantially in the topic (e.g., management in restauration vs. management in the front office), in content (procedural knowledge vs. soft skills), and in didactic methodology (frontal lectures vs. interactive classes) in future studies.

Limitations and future directions

Our study faces several limitations. An important one addresses low reliabilities on some module grades and psychometric measures. One reason may be heterogeneity across course grades, especially in *Introduction to hospitality management*. As discussed above, this may have been caused by varied contents conglomerated into one grade and the broad range of didactic methods. Additionally, some modules include teacher ratings of students' transferable skills (e.g., teamwork), which may have somewhat inflated the associations we observed with emotional abilities. Future studies should ideally keep a more detailed record of each course's methods and grading procedures. In particular, avenues for future research could explore the effect of assessment and didactic methods on the relationship between emotional competencies and academic performance. Such findings could be valuable for both the advancement of knowledge and practice, especially in courses that may demand more effort (tapping into conscientiousness), involve more difficult subject material (tapping into cognitive abilities), or rely heavily on human interaction (tapping into emotional abilities). Exploring the effect of the grading procedure and difficulty on the results could strengthen our understanding of the role of EI in learning and support higher education leadership in developing curricula that improve the learner's readiness for professional challenges. Higher education is being challenged for its relevance in preparing its graduates. Therefore, designing innovative curricula that address social and professional needs, including training students' EI, is crucial to developing a unique value proposition for higher education institutes.

Part of our sample consisted of international students whose first language was neither English nor French. The fact that some reliabilities are lower than those reported in other publications (Gosling et al., 2003; Schlegel and Mortillaro, 2019) might be ascribed to language barriers. Yet this could also be the case because the GECo measures emotional competencies using general workplace situations not explicitly related to the hospitality context, thus presenting the students with potentially unfamiliar work scenarios. Here, researchers may find slightly different results if they use a measure for emotional competencies with situations adapted to the context of hospitality.

Unfortunately, to our knowledge, such a measure has yet to be made available.

Our findings may be dependent on the curriculum of the EHL. Further research should investigate whether the results hold across other institutions that educate in hospitality management. In this line, it may be interesting also to assess learning styles (Duff et al., 2004; Wilson-Wünsch et al., 2016), as well as relationship qualities with peers and teachers to shed more light onto the mechanisms through which emotional abilities affect the students' grades (MacCann et al., 2020). Our results seem promising to elucidate that emotional competencies contribute primarily *via* the interactive parts of the curriculum, and fluid ability primarily *via* tasks that involve processing and reasoning. Other aspects of cognitive intelligence, such as crystallized abilities as an estimate of students' wealth of semantic, acquired knowledge, can also be interesting to investigate to add further detail to this picture.

The students' motivation, goals and stress management may impact their attitudes toward learning and thus moderate our findings (Behnke, 2012). Similarly, controlling for tendencies to avoid social interactions on the job seems important (Koc, 2019). Finally, we must also consider that school is a different environment than an actual hospitality business. Wilson-Wünsch et al. (2016) point out that a great deal of hospitality workers' expertise (especially their cognitive performance) is honed in the field only after they leave school. How hospitality students' cognitive and emotional abilities benefit not just grades but will also continue shape in the later workplace can be investigated with longitudinal studies. Such studies would add a theoretical grounding to the professional training methods and tools available to develop the workforce. Given the meta-analytic results provided by Miao and colleagues on how EI affects service quality (Miao et al., 2019) and job performance in general (Miao et al., 2021), we expect that the relationships are promising and deserve further attention.

Conclusion

Our study demonstrated that emotional abilities, measured *via* a performance-based test instead of self-report, predicted hospitality grades beyond fluid ability and personality under the condition that courses involve practical work. These results provide valuable evidence that EI, when measured as an ability, explains unique and essential aspects of how students engage with a higher education environment that is replete with human interaction. Hospitality students draw from their emotional and cognitive (fluid) abilities to master the complex and diverse education that prepares them for careers in hotels, restaurants, and service industries. On the one hand, their abilities to manage, understand, and regulate emotions play important roles in interactive courses. On the other hand, modules that emphasize more abstract or theoretical material benefit from fluid abilities. Finally, for specific modules, students may have an easier time staying focused on following instructions, learning conventions, and developing skills if they are more conscientious and focused on current practices than on generating novel ideas.

The complexity of job demands in hospitality calls for an equally complex set of skills not limited to purely cognitive abilities but interpersonal competencies as well (Dominique-Ferreira et al., 2022). Our evidence suggests that while some aspects of personality seem important, researchers and educators should focus more on the underlying abilities necessary for acquiring knowledge and work experiences. Past studies have shown that emotional abilities can be trained (Hodzic et al., 2018), and hospitality professionals continue to express interest in fostering their staff's emotional competencies (Wolfe and Kim, 2013; Wolfe et al., 2014). We thus reaffirm previous' authors' statements that hospitality education should implement EI courses and address emotional aspects in their coursework, to help students attain better professional achievement and social life in educational settings (Scott-Halsell et al., 2008; Wolfe, 2017).

Data availability statement

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

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

Author contributions

JV: data curation and writing – original draft. IB: resources, supervision, project administration, and writing – review and editing. MM: conceptualization, methodology, project administration, and writing – review and editing. All authors contributed to the article and approved the submitted version.

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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.

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More than just emotional intelligence online: introducing "digital emotional intelligence"

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The ubiquitous nature of emotional intelligence, as a central theme in every aspect of our lives—be it at work, school, or home—coupled with the growing prevalence of digital interactions, makes it fundamental to develop our understanding of emotional intelligence in a digital world. However, the digital world represents more than just a contextual factor to consider, as interactions in digital environments require digital competence. The objective of this paper is to conceptualize "digital emotional intelligence" as the integration of both emotional intelligence and digital competence. The model we propose posits that trait emotional intelligence predicts attitudes toward digital competence, while digital ability emotional intelligence is predicted by digital competence skills and digital competence knowledge. Using a self-reported questionnaire on 503 respondents, a structural equation model highlights a positive relationship between trait emotional intelligence and attitudes toward digital competence.

KEYWORDS

emotional intelligence, digital competence, digital skills, digital emotional intelligence, ability emotional intelligence, trait emotional intelligence

1. Introduction

Emotional intelligence (EI) plays a central role in our lives and is related to multiple positive outcomes. Since its coining by Salovey and Mayer (1990) and its popularization by Goleman (1995), EI has gained widespread interest in academic circles, be it in education, organizations, or society in general. In education research, results have shown the importance of EI in academic contexts (Garner, 2010). In organization studies, research has demonstrated its impact on job satisfaction (Miao et al., 2017a) and organizational citizenship behavior (Miao et al., 2017b). EI has also been found to have a negative influence on burnout (Szczygiel and Mikolajczak, 2018) and counterproductive work behavior (Miao et al., 2017b).

However, the current understanding of EI does not account for the digital context in which we all interact, work, and live today. One notable exception comes from scholars in the emotion regulation literature who have called for research on "digital emotion regulation" (Wadley et al., 2020; Smith et al., 2022). Wadley and colleagues define it as a "process in which people evaluate their emotions in relation to their current goals and decide whether to modify them and, if so, select which regulation strategy to use" (Wadley et al., 2020; p. 413) and investigate (1) how digital technology may be used to regulate emotions, and (2) how digital technologies may impact people's emotions. This emphasizes the relevance of the digital world and its importance in shaping the way we experience emotions.

Over the last 20 years, digital competence (DC) (also referred to as digital literacy or digital skills) has gained interest from scholars and policymakers as a multifaceted competence that needs to be developed in learners (Zhao et al., 2021), workers (Oberländer et al., 2020), and citizens (Vuorikari et al., 2022). Some aspects of DC, such as technical skills, represent strict entry barriers to the digital world, while others, such as digital communication skills, drastically shape our interactions and emotional experiences online (Sánchez-Caballé et al., 2020). Thus, it seems very difficult to fully experience emotions in the digital world without DC. Conversely, EI can have a strong impact on DC, especially in terms of adopting appropriate behaviors online and addressing ethical issues.

In that respect, the relationship between DC and EI might be reciprocal. Our purpose is thus to question the integration of DC and EI in a digital environment. To achieve this, this paper reviews literature on EI and DC to map out the variety of approaches to both concepts and their implications when it comes to modeling the relationship between them. Specifically, we discuss the specificities of both trait and ability approaches to EI and their relationship to DC. We also present the various frameworks of DC and their similarities and differences as well as their overall purpose, to discuss what DC ultimately consists of. Drawing on the literature review, we develop a conceptual model for "digital emotional intelligence" (dEI), comprising two key conceptual linkages between trait emotional intelligence (TEI) and DC, and between DC and ability emotional intelligence (AEI). More specifically, our conceptual model of dEI posits that TEI will predict DC-Attitudes, while digital AEI (dAEI) is predicted by DC-Skills and DC-Knowledge. Based on these propositions, we formulate a hypothesis centered on the relationship between TEI and DC-Attitudes that we empirically test.

1.1. Emotional intelligence

EI was introduced by Salovey and Mayer (1990; p. 189) as "the subset of social intelligence that involves the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions." Since this seminal work, many conceptualizations and definitions have emerged around it. In the following, we will focus on TEI and AEI.

1.2. Trait emotional intelligence

One type of model describes EI as a dispositional trait (Vesely Maillefer et al., 2018). This approach grounds EI in a personality perspective and differential psychology (Petrides et al., 2016). In this conceptualization, TEI refers to individuals' emotional dispositions and focuses on how people perceive their emotional world (Petrides et al., 2016). TEI is defined as "a constellation of emotional self-perceptions" (Petrides, 2010; p. 137) such as adaptability, empathy, emotion expression and perception and self-esteem, among others. TEI can thus be assessed using self-reported questionnaires and has also been called "trait emotional self-efficacy" (Petrides et al., 2016; p. 339).

1.3. Ability emotional intelligence

A second type of model defines EI as an ability. AEI is "the ability to reason validly with emotions and with emotion related information, and to use emotions to enhance thought" (Mayer et al., 2016; p. 296). Based on this definition, AEI is usually measured through performance in tasks (Olderbak et al., 2019).

The most prominent model focusing on AEI is the model of Salovey and Mayer (Salovey and Mayer, 1990; Mayer and Salovey, 1997). Their model suggests that AEI comprises four factors: emotion perception, facilitation of thought using emotions, emotion understanding, and emotion management. Recent studies have suggested that a model containing three factors (removing the "using emotions" factor) presents a better empirical fit (Vesely Maillefer et al., 2018). Building on that, we will rely on this three-factor model in the rest of the paper.

Emotion perception refers to one's capacity to identify emotions accurately. This factor may be oriented toward oneself (i.e., the ability to pay attention to one's own physical and psychological state regarding emotions) or toward others (i.e., the tendency to be sensitive to others' emotions)—(Mayer et al., 1999). This factor also refers to the capacity to identify emotional content in its environment, and notably to assess if it is accurate or not (Mayer et al., 2016). Understanding emotions—the second factor of the model—refers to the ability to understand that emotions can be connected to each other and that they can change across situations and time (Rivers et al., 2007). This also refers to knowing which situations can lead to certain emotions (Mayer et al., 2016). The third factor of the model (managing emotions) refers to the ability of people to regulate their emotions as well as others' emotions. This factor thus taps into to the capacity to manage emotions to achieve a desired outcome, to assess different strategies that can be used to control the emotion that is being felt and to choose to engage or disengage with the emotion felt, depending on one's need.

1.4. Digital competence

To be active in a digital context, digital competence (DC) is required. DC has been shown to be not only a right but also a requirement of citizens, as it is necessary to be functional now (Ferrari, 2012). Research has revealed a strong interest in the study of DC in (tertiary) educational settings (Zhao et al., 2021; Audrin and Audrin, 2022). Zhao et al. (2021) highlight that different theoretical frameworks regarding digital competence co-exist. Audrin and Audrin (2022) further reveal that the field suffers from a lack of clarity regarding the terminology (i.e., digital literacy, digital skills, digital competence, 21st century skills, …). Despite this lack of agreement, literature agrees that DC is not only constituted of technological skills, but that it encompasses multiple literacies (Sánchez-Caballé et al., 2020). Moreover, as highlighted by Sillat et al. (2021), digital competence does not only refer to skills, but it refers to a wider sense of competence, as it comprises knowledge, skills and attitudes.

Three DC frameworks have gained traction in the literature over the last few years, coming from 91) the UK Department for Education, (2) the European Commission's science and knowledge

service, and (3) van Laar et al. (2018). These frameworks have different purposes and are aimed at different groups of actors. While the UK Department for Education's framework is intended for anyone who wants to improve their digital skills (Department for Education., 2019), the DigComp framework aims to "create an agreed vision of what is needed in terms of competence to overcome the challenges that arise from digitization in almost all aspects of modern lives" (Vuorikari et al., 2022; p. (4). In contrast, the framework developed by van Laar et al. (2018) aims at developing "a set of reliable measures that focus on the frequency of activities that working professionals perform to assess each core 21st-century digital skill" (van Laar et al., 2018; p. 2185).

While the frameworks differ in how they are structured and operationalized, several main dimensions appear as the core of DC: Information (using digital technology to search, filter, organize information and digital content), communication and collaboration (using digital technology to transmit and share information, but also to interact with others), critical thinking, problem-solving & decision-making (using digital technology to make informed judgments, assessing the information available online, and sorting through relevant data online), safety and legality (adopting security measures, but also behaving in a respectful way online), digital foundation skills (having the basic technical skills to use digital technologies). Making sense of these categories is helpful as it makes it possible to identify what DC is about. However, this only helps scrap the surface of DC as each of these dimensions entails a wide variety of sub-dimensions.

Another way to look at these frameworks is to focus on the components that constitute their sub-dimensions, namely knowledge, skills, and attitudes (Hämäläinen et al., 2021; Vuorikari et al., 2022), relying on the conception of competence as the integration of knowledge, skills and attitudes (Baartman and De Bruijn, 2011; Lizzio and Wilson, 2004; Seufert et al., 2021). Vuorikari et al. (2022) further develop this distinction in their framework. In their sense, knowledge is "the outcome of the assimilation of information through learning" (Vuorikari et al., 2022; p. 3). Knowledge thus bears a very informational dimension: in the context of DC, it is the knowledge that individuals have about the digital world, its tools, its rules, and how to behave online. In contrast, skills can be defined as "the ability to apply knowledge and use know-how to complete tasks and solve problems" (Vuorikari et al., 2022; p. 3). Skills thus refer to "doing or acting in practice, involving motor skills as well as cognitive skills" (Baartman and De Bruijn, 2011; p. 127). As such, they are embedded in practice: in the context of DC, it is the ability of individuals to carry out tasks in the digital world. Finally, attitudes is tied with individuals' beliefs (Hämäläinen et al., 2021), and can be defined as "an individual's predisposition to respond favorably or unfavorably to an object, person, or event" (Aslan and Zhu, 2017; p. 555). Attitudes can thus be considered as more of predispositions toward action: in the context of DC, it is the tendency that individuals will have to behave in a certain way in the digital world. Distinguishing between knowledge, skills, and attitudes helps understand the variety of dimensions of competence required to be digitally competent.

In summary, the literature on DC is still in the process of standardizing its definition and assessment. This overview shows that some dimensions emerge as important in DC, such as: information, communication and collaboration, critical thinking, problem-solving & decision-making, safety and legality, digital foundation skills. On top of these dimensions, a transversal approach to DC focuses on the variety of its components and identifies different sets of knowledge, skills, and attitudes within each dimension.

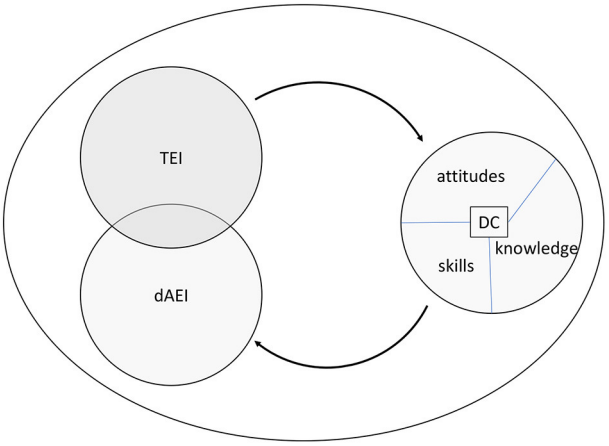

FIGURE 1
Proposed conceptual model of dEI.

2. An integrated model of digital emotional intelligence

The objective of this paper is to model the relationship between DC and EI in a digital environment, providing a conceptualization of "digital emotional intelligence" (dEI) that goes beyond solely "EI in a digital world" but rather as deeply integrated with DC. Based on our literature review of the concepts, considering both TEI and AEI as well as the diverse knowledge, skills, and attitudes that compose DC, we represent the conceptual model depicted in Figure 1. To build this model, we followed the steps recommended by Thatcher and Fisher (2022).

This conceptual model of dEI posits two relationships: (1) TEI and DC-Attitudes, (2) dAEI and DC-Knowledge and Skills. Note that we hereafter refer to digital AEI (dAEI) instead of simply AEI, as we formulate the proposition that DC-Knowledge and DC-Skills may allow and enhance a new form of AEI that is specific to the digital world. Our propositions are the following:

(1) TEI will predict DC-Attitudes
(2) DC-Knowledge will predict dAEI
(3) DC-Skills will predict dAEI.

In the following sections, we will justify, detail, and illustrate each of these relationships with examples. In the last part of the paper, we conduct an empirical test to investigate the proposed relationship between TEI and DC-Attitudes.

2.1. TEI and DC-attitudes

In our model of dEI, we formulate the proposition that TEI will predict DC-Attitudes. This assumption is based on the approach of TEI as a disposition toward action (Vesely Maillefer et al., 2018) which impacts attitudes (O'Connor et al., 2019). Studies using TEI have linked it with work attitudes, such as job satisfaction and organizational citizenship behavior (Miao et al., 2017a). As highlighted earlier, attitudes are conceptualized as "an individual's predisposition to respond favorably or unfavorably to an object, person, or event" (Aslan and Zhu, 2017; p. 555). In the context of DC, attitudes can be considered as predispositions toward action, i.e., the tendency that individuals will have to behave in a certain way in the digital world. Therefore, it makes sense to conceptualize TEI as an antecedent of individuals' DC-Attitudes. An analysis of the examples of attitudes presented in DigComp 2.2 (Vuorikari et al., 2022) allows to clearly identify the link with TEI. The dimensions of TEI—wellbeing, self-control, emotionality, and sociability—(Petrides et al., 2016) are apparent throughout the examples of key attitudes for DC. In the following, we are going to provide illustrations of some selected items from DC-Attitudes and how they display a specific form of TEI.

Several items of DC-Attitudes ("being inclined to focus on positive impacts and avoiding the negative impacts of digital media, such as overuse, addiction, and compulsive behavior"; "being open to explore alternative pathways to find solutions to produce digital content"; Vuorikari et al., 2022) can be tied with the wellbeing dimension of TEI. The wellbeing dimension of TEI comprises optimism, self-esteem beliefs and trait happiness (Petrides et al., 2016) can be identified in the selected items that present optimism (e.g., "focus on positive impacts") and self-esteem (e.g., "being open to find solutions") as part of DC attitudes.

Several items of DC-Attitudes ("intentionally avoiding distractions and aiming to avoid information overload when accessing and navigating information, data and content"; "being motivated to co-design and co-create new products and services using digital devices to create economic or social value for others"; Vuorikari et al., 2022) can be tied with the self-control dimension of TEI. The self-control dimension of TEI notably encompasses impulsiveness and stress management (Petrides et al., 2016) can be identified in the selected items that show an attitude toward impulse control (e.g., "intentionally avoiding distractions"), and stress management (e.g., "aiming to avoid information overload").

Several items of DC-Attitudes ("being inclined to help others to improve their digital content"; "willing to adapt an appropriate communication strategy depending on the situation and digital tool: verbal strategies, non-verbal strategies, visuals strategies or mixed strategies"; Vuorikari et al., 2022) can be tied with the emotionality dimension of TEI. The emotionality dimension of TEI refers to emotional expression, empathy, emotion perception and relationships' quality (Petrides et al., 2016) and can be identified in the selected items that show an attitude toward emotion perception and expression (e.g., "willing to adapt appropriate communication strategy") and relationships (e.g., "being inclined to help others…").

Several items of DC-Attitudes ("being concerned that much online information and content may not be accessible to people with a disability, for example to users who rely on screen reader technologies to read aloud the content of a web page"; "considering ethics as one of the core pillars when developing or deploying AI systems"; "encouraging everyone to express their own opinions constructively when collaborating in digital environments, willing to help others to improve their digital competencies, building on their strengths and mitigating their weaknesses"; Vuorikari et al., 2022) can be tied with the sociability dimension of TEI. The sociability dimension of TEI notably focuses on assertiveness and awareness (Petrides et al., 2016) and can be identified in the selected items that show an attitude toward others (e.g., "willing to help others," "encouraging everyone to express their own opinions") in the digital context. These examples provide an illustration of the way in which the dimensions of TEI could be reflected in DC-Attitudes. Altogether, this exercise shows how predispositions related to emotional intelligence can influence and shape DC-Attitudes.

2.2. dAEI and DC-knowledge and-skills

In our model of dEI, we formulate the proposition that dAEI (digital-AEI) will be predicted by DC-Knowledge and DC-Skills. This assumption is based on the approach of AEI that conceptualizes it as an ability (Mayer et al., 2016) that can be developed (Zeidner et al., 2002). Literature further highlights that training may be particularly efficient when they include instructions (designed to enhance *knowledge*) and practice with feedback (designed to enhance *skills*) (Blanch-Hartigan et al., 2016). The same reasoning can be applied to the digital context, in which DC-Knowledge and DC-Skills should participate in improving individuals' dAEI. Knowledge is mostly informational (Baartman and De Bruijn, 2011) and, in the context of DC, it refers to what individuals know about the digital world, its tools, its rules, and how to behave online. Skills are embedded in practice (Baartman and De Bruijn, 2011) and, in the context of DC, it is the ability of individuals to carry out tasks in the digital world. In our model, we suggest that both knowledge of the digital world and skills to carry out tasks in the digital world are likely to impact the ability of individuals to reason validly with emotions and emotions-related information in a digital context (dAEI). Thus, we conceptualize DC-Knowledge and DC-Skills as antecedents of dAEI. An illustration of examples of knowledge and skills presented in DigComp 2.2 (Vuorikari et al., 2022) allows to identify the link with AEI very clearly. In the following, we are going to provide illustrations of some selected items of (1) DC-Knowledge and (2) DC-Skills taken from Vuorikari et al. (2022) and discuss how these can impact dAEI. The following examples only represent a selection of DC-Knowledge and DC-Skills that impact dAEI and have been chosen based on their relevance. Many other examples could have been used. We have considered the three dimensions of AEI (i.e., the perception of emotions, understanding of emotion and management of emotions) and have also added a fourth transversal dimension with examples of theoretical knowledge that represents a prerequisite to dAEI.

Some selected items of DC-knowledge (i.e., "understanding the difference between disinformation and misinformation"; "being aware of the meaning of non-verbal messages used in digital environments and knowing that their use can culturally differ between countries and communities"; Vuorikari et al., 2022) illustrate well how DC-Knowledge can have an impact on the perception of emotions. Knowing the meaning of non-verbal messages used in digital environments, and knowing the difference between disinformation and misinformation can consequently improve people's ability to perceive emotions online in several ways: by enabling them to better recognize the emotions of others through non-verbal cues, and by allowing them to better assess the intentions or motivations behind the information that they are receiving.

Some selected items of DC-knowledge (i.e., "knowing that AI systems can be used to automatically create digital using existing digital content as its source"; "knowing signs of digital addictions and that digital addiction can cause psychological and physical harm"; Vuorikari et al., 2022) illustrate well how DC-Knowledge can have an impact on the understanding of emotions. Knowing that AI systems can be used to automatically create digital content which may be difficult to distinguish from human creations can help people to better understand the potential emotional impacts of interacting with AI systems. It can consequently improve their understanding of their own emotions and enhance their sensitivity toward potential emotional impacts of these interactions. Knowing signs of digital addictions (e.g., loss of control, withdrawal symptoms, dysfunctional mood regulation) and their consequences can also improve people's ability to understand their own emotions when using (too much of) digital technologies. This can also be true regarding others: such knowledge may help one to be more aware of the emotions of others who may be experiencing digital addiction and in turn improve their understanding of emotions.

Several items of DC-knowledge may be relevant to explain management of emotions (i.e., "being aware that search engines, social media and content platforms often use AI algorithms to generate responses that are adapted to the individual user"; "being aware that adapting one's behavior in digital environments depends on one's relationship with other participants and the purpose in which the communication takes place"; Vuorikari et al., 2022). Knowing that search engines often use AI algorithms to generate responses adapted to the user can help them be more aware of the potential emotional impacts of interacting with these platforms and can consequently improve people's management of emotions. Knowing that one's behavior in digital environments should depend (1) on one's relationship with others and (2) on the specificities of said digital environments can help people better understand the ways in which emotions can be effectively managed in different social and professional contexts online and can consequently improve people's management of emotions.

Finally, some selected items of DC-knowledge may be considered as prerequisites to dAEI (i.e., "knowing the main functions of the most common digital devices; knowing some reasons why a digital device may fail to connect online"; "being aware that difficulties experienced while interacting with digital technologies may be due to technical issues, lack of confidence, one's own competence gap or inadequate choice of digital tool to solve the problem in question"; Vuorikari et al., 2022). Indeed, without such knowledge, there is no access to the digital world in the first place. Knowing the main functions of the most common digital devices and knowing some reasons why a digital device may fail to connect online is a prerequisite to dAEI as a minimum level of knowledge is needed to interact with digital technologies. Without this knowledge, it may be difficult or impossible for people to access and use digital technologies, and as such to develop dAEI. Knowing that difficulties experienced while interacting with digital technologies may be due to technical issues, lack of confidence or competence is also a prerequisite to dAEI as such knowledge is essential for being able to effectively troubleshoot and overcome challenges that may arise when using digital technologies. Without this understanding, people may be less able to access and use digital technologies, which can limit their participation in the digital world.

These examples provide an illustration of the way in which DC-Knowledge can play a role in enhancing and improving the different dimensions of dAEI. Altogether, this exercise shows how DC-Knowledge can help develop dAEI.

Some selected items of DC-Skills (i.e., "knowing how to analyze and critically evaluate search results and social media activity streams, to identify their origins, to distinguish fact-reporting from opinion, and to determine whether outputs are truthful or have other limitations"; "knowing how and when to use machine translation solutions and simultaneous interpretation apps to get a rough understanding of a document or conversation, but also knowing that when the content requires an accurate translation a more precise translation may be needed"; Vuorikari et al., 2022) illustrate well how DC-Skills can have an impact on the perception of emotions. Having the skills to analyze and critically evaluate search results and social media activity streams can help people to better understand the context and perspective behind different types of online information and content and can consequently improve people's perception of their own emotions as well as the perceptions of others' emotions. Knowing how and when to use machine translation solutions to get an understanding of a document or conversation can help people better understand the emotional content of such content and can consequently improve people's perception of emotions.

Our model further posits that DC-Skills may predict understanding of emotions. We believe this is particularly true for the following items (i.e., "knowing how to curate content on content sharing platforms so as to add value for oneself and others"; "knowing how to recognize embedded user experience techniques designed to manipulate and/or to weaken one's ability to be in control of decisions"; Vuorikari et al., 2022). Being able to curate content on content sharing platforms can allow people to better understand the interests and perspectives of the people they are interacting with and consequently improve their understanding of others' emotions. Being able to recognize embedded user experience techniques can allow people to better understand the motivations and intentions behind certain online interactions or behaviors and can consequently improve their understanding of others' emotions.

Some selected items of DC-Skills (i.e., "knowing how to adopt information and communication practices in order to

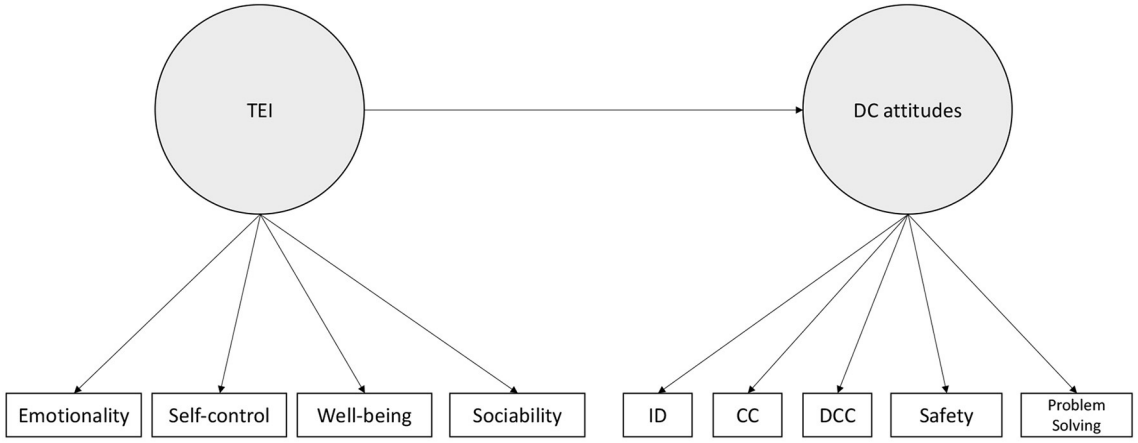

FIGURE 2
Hypothesized link between TEI and DC-attitudes. ID, Information and Data Literacy; CC, Communication and Collaboration; DCC, Digital Content Creation.

build a positive online identity"; "being able to apply and follow protection strategies to fight online victimization"; Vuorikari et al., 2022) illustrate well how DC-Skills can have an impact on the management of emotions. Being able to adopt information and communication practices that build a positive online identity can allow people to present themselves in a way that reflects the emotions they want to display and can consequently improve the way they manage their own emotions. Being able to apply and follow protection strategies to fight online victimization can allow people to take control of their online interactions and protect themselves from harmful or negative experiences and can consequently improve the way they manage their emotions. Both skills can also help people show consideration for the wellbeing and safety of those they are interacting with online and thus improve the way they manage the emotions of others.

Finally, some selected items of DC-Skills (i.e., "knowing how to identify and solve a camera and/or a microphone issue when in an online meeting"; "taking a step-by-step approach to identify the root of a technical problem and exploring various solutions when facing a technical malfunction"; Vuorikari et al., 2022) illustrate well how DC-Skills can have a broader impact on dAEI and can be considered as prerequisites to dAEI in that, without them, there is no access to the digital world in the first place. The skills listed in the examples are essential for accessing the digital world and show the importance of developing DC-Skills through training. Being able to identify and solve problems with cameras and microphones, for example, is important for participating in online meetings and communication. Having the skills to take a step-by-step approach to problem-solving and explore various solutions can help individuals effectively troubleshoot technical issues. Being able to find solutions on the internet is also a valuable skill, as it allows individuals to access a wealth of information and resources that can help them resolve technical problems and access the digital world.

These examples provide an illustration of the way in which DC-Skills can play a role in enhancing and improving the different dimensions of dAEI. Altogether, this exercise shows how DC-Knowledge can help develop dAEI. In the following section we empirically test one of the conceptual links developed above, more specifically, how DC-Attitudes are predicted by TEI.

3. Empirical premises of digital emotional intelligence

3.1. Materials and methods

3.1.1. Participants and procedure

Participants were recruited on Mturk and completed the questionnaires on Qualtrics. We required participants to (1) have a HIT (human intelligence task) approval rate of more than 95%, (2) be located US and (3) be currently employed. Among the whole sample, 40.9% of the participants were male and most of the participants between 25 and 45 years old (63.5%). Participants were first asked to provide their consent to participate in the study. Then, they reported information regarding their age, gender, employment status and flexible work possibilities. Participants were then presented with DigComp (Clifford et al., 2020) and TeiqueSF scales (Petrides and Furnham, 2001). Within each scale, we included five validity items randomly presented to control for participants' concentration during the survey. After removing participants who did not correctly answer validity items, our final sample consisted of 503 participants.

3.1.2. Measures

Digital competence was measured using the DigComp framework (Clifford et al., 2020). This framework was selected for its global relevance, as opposed to van Laar et al. (2018) instrument that focuses on a specific category of professionals. Participants were asked to answer on a scale from 1 ("Strongly disagree") to 5 ("Strongly agree") to assess their perceived competence regarding

digital competence. The questionnaire consists of 82 items measuring DC-Attitudes as well as DC-Knowledge and DC-Skills across the 5 subscales of DC (information, communication and collaboration, problem solving, safety, digital content creation). In this paper, we focus on the items measuring attitudes (21 items, alpha = 0.85). We thus had items measuring attitudes toward information (e.g., "I critically check if the information I find online is reliable"), communication and collaboration (e.g., "I am open toward sharing digital content that I think might be interesting and useful to others"), problem solving (e.g., "I am interested in understanding how a task can be broken down into steps so that it can be automated, for example in software or by a robot"), safety (e.g., "I am careful about checking the privacy policies of the digital services that I use"), and digital content creation (e.g., "I am interested in understanding how a task can be broken down into steps so that it can be automated, for example in software or by a robot"). We further aggregated the items for each subscale.

EI was measured using the TeiqueSF (Petrides and Furnham, 2001). This questionnaire distinguishes between four dimensions of EI: Emotionality (6 items such as "Expressing my emotions with words is not a problem for me" alpha = 0.84), Self-Control (6 items such as "I usually find it difficult to regulate my emotions"—reversed item I'm usually able to find ways to control my emotions when I want to", alpha = 0.74), Wellbeing (6 items such as "I feel that I have a number of good qualities", alpha = 0.62) and Sociability (6 items such as "I can deal effectively with people", alpha = 0.74). The hypothesized model is depicted in Figure 2 below.

3.1.3. Statistical analyses

Analyses were performed in R using *lavaan* (Rosseel et al., 2020). We first performed a two-factor confirmatory factor analysis (CFA) to test the existence of the two factors hypothesized in Figure 2 as well as their correlation (as in Sergi et al., 2007). In this model, we introduced TEI dimensions (emotionality, self-control, wellbeing and sociability) as well as the DC-Attitudes (information, communication and collaboration, problem solving, safety and digital content creation). We then performed a structural equation model (SEM) in which we introduced the same factors as in the CFA but we tested here the regression coefficient between TEI and DC-Attitudes. To assess the fit of the model, we used the comparative fit index (CFI), the standardized root square mean residual (SRMR), the root mean square error of approximation (RMSEA) and the Tucker-Lewis Index (TLI). We expected a good model to have a CFI above.95, an SRMR below.08, an RMSEA below.08 and a TLI above 0.90 (or above 0.95 to provide a good fit).

3.2. Results

We first report correlation matrix between the subdimensions of DC-Attitudes and with the dimensions of EI (i.e., wellbeing, sociability, emotionality, and self-control—see Table 1). Results highlight that all subdimensions of DC-Attitudes are positively related to each other (r = [0.416; 0.708]). This is also true for the dimension of EI (r = [0.609; 0.717]). Interestingly, the wellbeing

TABLE 1 Correlation coefficients between DC-Attitudes and TEI sub-dimensions.

	Information and data literacy		Collaboration and communication		Digital content creation		Safety		Problem solving		Well-being		Sociability		Emotionality		Self-control	
Information and data literacy	—																	
Communication and collaboration	0.467	***	—															
Digital content creation	0.416	***	0.652	***	—													
Safety	0.439	***	0.553	***	0.586	***	—											
Problem solving	0.512	***	0.645	***	0.708	***	0.627	***	—									
Wellbeing	0.288	***	0.227	***	0.324	***	0.353	***	0.390	***	—							
Sociability	0.162	***	0.086		0.224	***	0.193	***	0.241	***	0.649	***	—					
Emotionality	0.163	***	−0.072		0.077		0.095	*	0.113	*	0.622	***	0.613	***	—			
Self-control	0.168	***	−0.023		0.090	*	0.143	**	0.124	**	0.639	***	0.609	***	0.717	***	—	

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

dimension of EI is significantly and positively related to DC-attitudes (r = [0.288; 0.390]). Sociability is also related to most dimensions of DC-Attitudes (r = [0.162; 0.241]), except for the communication and collaboration attitudes ($r = 0.086$, $p = 0.053$). This is also true for the self-control dimensions, which is positively correlated with the DC-Attitudes (r = [0.09; 0.168], except for the communication and collaboration ($r = -0.72$, $p = 0.613$). Finally, emotionality is positively correlated with DC-Attitudes related to identification (r =.163, $p < 0.001$), safety ($r = 0.095$, $p = 0.033$), and problem-solving ($r = 0.113$, $p = 0.011$).

In the following, we report the results from the CFA model presented in Figure 2. Factors loadings are reported in Table 2 below. These results highlight that (1) all the hypothesized dimension load on their respective factors and (2) that TEI and DC-Attitudes are positively correlated (b = 0.26, 95%CI = [0.15; 0.32], z = 4.16, $p < 0.001$).

Below, we report the results from the SEM model, which is presented in Figure 3. Except for the RMSEA indices, the model provided an acceptable fit (RMSEA = 0.096, SRMR = 0.075, CFI = 0.954, TLI = 0.929). Factor loadings are reported in the Appendix. The results further highlight that trait EI significantly and positively predict DC-Attitudes (b = 0.339, 95%CI = [0.320; 0.340], z = 5.61, $p < 0.001$), suggesting that the higher trait EI, the more positive DC-Attitudes.

4. Discussion

The purpose of this work was to introduce the concept of "digital emotional intelligence" and propose it as a conceptual integration between EI and DC, emphasizing that it goes beyond solely EI in the digital context. Our conceptual model considers the two most prominent perspectives on EI (i.e., TEI and AEI). In terms of DC, we chose not to emphasize the different dimensions of DC (i.e., communication, digital content creation, safety or ethical issues) but instead focused on the transversal aspects of knowledge, skills and attitudes. Therefore, our model conceptualizes how EI and DC might impact each other to create dEI. We also conducted primary empirical testing of the relationship between EI and DC by focusing on how TEI can predict DC-Attitudes.

This work offers theoretical contributions to research on EI. Firstly, we build on the integrative conceptualization of EI, which combines both AEI and TEI (e.g., Mikolajczak, 2009). We believe that such a conceptualization provides a unifying view of EI. Although the term "digital emotional intelligence" already appears in the literature, the definitions used rather tend to rely on the sole ability model (Na-Nan et al., 2019). In this paper, we adopt a more global and unified view of dEI.

By conceptualizing dEI, we suggest that it is distinct from "traditional" EI and thus requires specific attention and measures. However, further testing is needed to ensure that "traditional" EI is indeed distinct from dEI. Additionally, the relationship between dEI and outcomes related to the digital world (in a professional or learning context) needs further investigation considering the new model of dEI. Lastly, we propose that the relationships between EI and DC are reciprocal, thereby contributing to research on EI by distinguishing between TEI as an antecedent and dAEI as an outcome of DC.

This paper offers a premise of empirical testing of the link between TEI and DC-Attitudes in DigComp. The primary results indicate a significant relationship between the two constructs, suggesting that TEI positively predicts DC-Attitudes. The relationship between DC-Knowledge and -Skills and dAEI requires further construct development and testing, as dAEI is proposed to be distinct from AEI.

This work makes a significant theoretical contribution to research on DC by highlighting its relationship with EI and emphasizing its relevance for dEI. Although there are some mentions of dEI in the literature (Oluwatofunmi and Amietsenwu, 2019; Sarnok et al., 2021), the embeddedness of the construct in a global digital competence framework has rarely been theoretically discussed. Traditional DC frameworks often do not explicitly consider emotions and EI. As shown previously, DigComp (Vuorikari et al., 2022) makes use of several examples that can be tied with a form of EI, but the link is not explicitly made. By elucidating this relationship, it becomes possible to investigate it and question how to study DC and EI jointly. More specifically, by suggesting distinct types of relationships between different forms of EI and different dimensions of DC, eventually with different frameworks, this paper offers a more comprehensive reflection on the various components of DC and their development and assessment.

This research also offers several practical implications. Almost 30 years ago, Goleman raised awareness of the importance of EI in the workplace (Goleman, 1995). In the intervening years, the world has undergone significant changes with the rise of mobile technologies, social media, and digital communication transforming the way we work, learn, and interact with others. As a result, it is crucial to update our understanding of EI to account for the specificities of the digital world and the knowledge and skills required to be "digitally emotionally intelligent." This conceptual paper offers a renewed perspective on EI that aligns with contemporary notions of dEI.

This updated conceptualization has implications for policymakers, organizations, managers, and employees. Policymakers can integrate dEI more systematically into their frameworks and lead initiatives on DC that systematically account for dEI. Organizations can use this conceptualization to develop corporate training and policies that foster the development of dEI among their workforce. In particular, for remote work and virtual teams, raising awareness about the importance of dEI across the workforce is essential. Organizations can also consider dEI as a selection criterion for their workforce, especially for managerial positions. The conceptualization also highlights the importance of basic DC without which individuals cannot develop any form of dEI. It is therefore critical to foster the development of DC with adequate training initiatives at different levels (educational level, organizational level, etc.) to make sure that people are indeed able to develop dEI. The current conceptualization provides a spark of interest, but measurement instruments need to be developed to help institutions in their use of dEI. Organizations could thus improve their selection practices

TABLE 2 Factor loadings for the two factors CFA linking DC-Attitudes and TEI.

Factor loadings	Estimate	Standard Error	z-value	*p*-value	95% ci (lower)	95% ci (upper)	Standardized estimate
DC-attitudes							
Information and digital literacy	1.00	0.00			1.00	1.00	0.58
Communication and collaboration	0.97	0.09	11.4	0	0.80	1.14	0.77
Digital content creation	1.12	0.10	11.4	0	0.93	1.32	0.82
Safety	1.02	0.08	12.5	0	0.86	1.18	0.73
Problem solving	1.11	0.09	13.0	0	0.94	1.27	0.86
Emotionality	1.00	0.00			1.00	1.00	0.82
Wellbeing	0.87	0.05	18.3	0	0.78	0.96	0.80
Sociability	0.76	0.05	15.2	0	0.66	0.86	0.77
Self-control	0.84	0.05	17.7	0	0.75	0.94	0.82
Correlation							
DC-attitudes and TEI	0.11	0.03	4.2	0	0.06	0.16	0.26

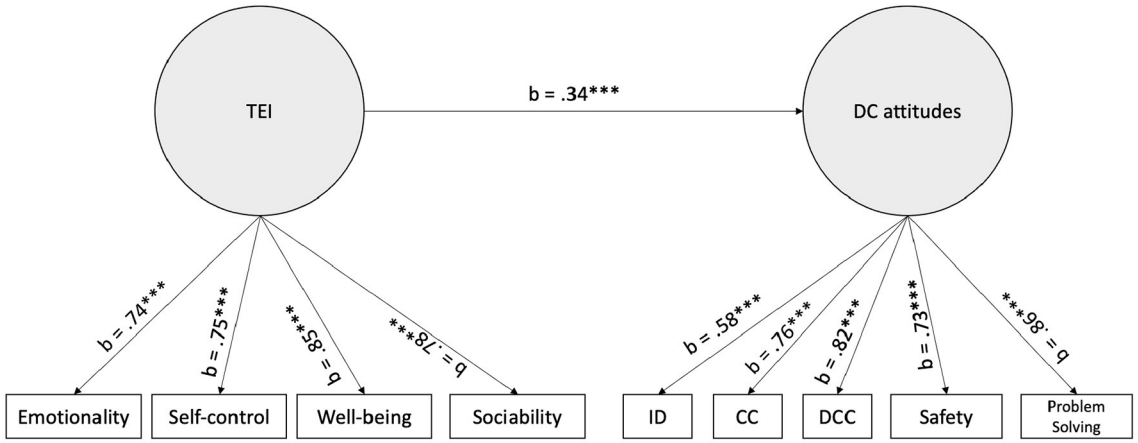

FIGURE 3
Tested links (standardized estimate) between TEI and DC-Attitudes. ID, Information and Data Literacy; CC, Communication and Collaboration; DCC, Digital Content Creation.

(for example to select remote workers who will require dEI in their day-to-day digital interactions at work). Measuring dEI would also be beneficial to organizations and training institutions in respect to digital learning as it would help them identify potential issues in their learners. This conceptualization can also help managers, employees, educators, and learners better understand the challenges they face in their work or learning environments Altogether, raising awareness of the concept of dEI makes it possible to consider DC and EI jointly into various programs and trainings to build a more digitally emotionally intelligent workforce and society.

This research offers several opportunities for future studies. Our model provides conceptual paths between TEI and DC-Attitudes and DC-Knowledge and DC-Skills and dAEI. Future studies are needed to (1) operationalize these concepts—specifically dAEI—and (2) test the relationships proposed in our model. By conceptualizing this new construct of dEI, this research also suggests that its relationship with various outcomes (organizational ones as well as learning ones) needs to be reassessed. For example, the relationship between collaborative behaviors, organizational citizenship behavior and dEI could be measured to account for specific digital learning setups and virtual teams. Another interesting line of research consists in the integration of a relatively new component of EI, namely emotion information processing (EIP; Fiori and Vesely-Maillefer, 2018). EIP refers to how people pay attention to, encode, retain, and retrieve information related to emotion (Vesely Maillefer et al., 2018). The specific articulation between EIP and dEI, and notably how EIP may or not be

important in a digital context, and how it interacts with DC calls for future studies.

5. Conclusion

EI has been shown to be crucial in educational and organizational contexts as well as in everyday life. As more of our life takes place online, this paper proposes to formally coin "digital emotional intelligence" as an integration between EI and DC. The framework builds on both trait EI and ability EI and associates them with the knowledge, skills, and attitudes of DC. The paper also provides empirical premises on the relationship between TEI and DC-Attitudes, suggesting that TEI positively predicts DC-Attitudes, and highlights the importance of further investigating the relationship between EI and DC, especially regarding dAEI and DC-Knowledge and Skills. The framework proposed in this study provides a foundation for future research on dEI and its impact on work, learning, and everyday life. By pointing out the specificities of the digital context and the importance of DC in dEI, this paper develops the concept of dEI as more than just "emotional intelligence online."

Data availability statement

The raw data supporting the conclusions of this article will be made available by the author upon request.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

Author contributions

CA: study conception, data analysis, and manuscript writing. BA: study conception, data acquisition, and manuscript writing. All authors contributed to the article and approved the submitted version.

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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.

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Appendix

Factor loadings for the SEM liking DC-attitudes and TEI.

Factor loadings	Estimate	Standard Error	z-value	*p*-value	95% ci (lower)	95% ci (upper)	Standardized estimate
DC-attitudes							
Information and digital literacy	1.00	0.00			1.00	1.00	0.58
Communication and collaboration	0.97	0.08	11.4	0	0.80	1.13	0.77
Digital content creation	1.12	0.10	11.3	0	0.93	1.31	0.82
Safety	1.02	0.08	12.5	0	0.86	1.18	0.73
Problem solving	1.11	0.09	12.9	0	0.94	1.28	0.86
TEI							
Emotionality	1.00	0.00			1.00	1.00	0.74
Wellbeing	1.02	0.08	13.0	0	0.87	1.18	0.85
Sociability	0.86	0.07	12.8	0	0.73	0.99	0.79
Self-control	0.85	0.05	16.8	0	0.75	0.95	0.75
Residual covariance							
Wellbeing and self-control	0.14	0.05	3.0	0	0.05	0.23	0.37

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A bibliometric analysis and literature review on emotional skills

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The content, management, and implementation of social skills have been developed since the end of the 20th century as a model of capabilities. Thus, as human beings develop and train their basic cognitive and perceptual–motor functions, they increase their ability to solve and cope with difficulties. This article aims to present a bibliometric and systematic review of social skills, using query sources in databases such as Web of Science (WoS) and Scopus between the years 2000 and 2022, with platforms such as Bibliometrix and Gephi. This search yielded a total of 233 records in WoS and 250 records in Scopus that were merged and, after eliminating 143 duplicate data, were consolidated into 340 records that enclose the academic production of 20years. Through scientific mapping, the main authors, journals, and countries in this field were determined; similarly, the most relevant studies were classified into three categories, namely, classic, structural, and perspectives, which were represented by means of the metaphor of the tree of science. In addition, a program for further studies was planned, such as in-depth qualitative research measuring observationally and directly taking into account emotional expressiveness, emotional understanding, emotion regulation, and behavior, and the impact of social skills training on social problem-solving. Finally, another important aspect to mention is that this research work is useful for the scientific academic community in many areas of knowledge such as psychology, education, and managers of educational institutions.

KEYWORDS

Well-being, mental health, personality, bibliometric analysis, bibliometrix

1. Introduction

Globally, the coronavirus disease 2019 (COVID-19) pandemic has influenced emotions (Mangiavacchi et al., 2021) affecting people's quality of life because of blockages, lockdowns, physical distancing, restriction of social interactions, deprivation of traditional learning methods, and situations that have caused stress, anxiety, and mental health concerns (Salmela-Aro et al., 2021), that is, it is increasingly difficult to ignore emotional situations that affect mental health in human beings (Lane and Smith, 2021).

In this sense, psychosocial problems have become one of the concerns of daily life, especially for those people who perform activities of direct contact and care, mainly in the educational

field (Schoeps et al., 2019). As it has been observed, educational requirements demand productivity, warmth, attention, quality, and even conflict resolution, the latter having the capacity to solve unexpected situations (Peláez-Fernández et al., 2021). To this end, the scientific literature recognizes emotional skills (ES) as a fundamental axis for managing emotions, feelings, assertiveness, empowerment, and solving difficult situations (Aly et al., 2021). This is how managing social skills is closely related to the emotional ability that human beings show for the development of emotions (Estrada et al., 2016).

In this regard, some reviews were found that relate, for example, a meta-analysis exploring psychoeducation and the component training of cognitive emotional skills development in children and adolescents (De Mooij et al., 2020); a literature review that proposes the development of tools and training based on simulation and measure design for decision-making (Stalnikowicz and Brezis, 2020); a review that proves the benefits of video game training on cognitive and emotional skills in relation to healthy young adults (Pallavicini et al., 2018); another meta-analysis that explores the key individual and environmental factors, related to identity and social–emotional skills (SS) such as continuous reciprocal interactions between the self and peer environment, emotion regulation, and social skills for general wellbeing and adequate positive mental health (Mitic et al., 2021); and finally, a systematic review that proposes organizing relevant concepts of alexithymia or the inability to identify one's emotions and consequently, an inability to express what clients are feeling to help therapists to get a clear idea of how clients function and why they transmit feelings the way they do (Nunes da Silva, 2021).

On the other hand, emotional competencies are conceived from childhood, forging a result of free and own learning strategies, which are permanent and teach the subject to create emotional stability, self-esteem confidence in their capabilities, good decision-making, and skills to relate with others; in short, strategies to be a happy individual in society (Gallego-Tavera et al., 2021), which allows its applicability to be used in different contexts of human being's performance forming ideal welfare through the balance of emotional, mental, and social factors. Thus, educational institutions are positioned as the entities with the greatest advancement of emotional skills and where the factors and constituent elements of emotional intelligence should be applied the most (Cohen and Syme, 2013). Without leaving aside, the family constitutes a fundamental part of support to the institutions since the family favors with the communication and development of school activities (Pérez-Fuentes et al., 2019).

The strengthening of these competencies is a great challenge for society, especially in relation to the adaptation and performance of the subjects in each of their environments. Thus, it is necessary to strengthen skills focused on self-regulation and control of emotions. The above is a strategy that contributes to minimizing the emotional burden faced by the subjects nowadays as a result of relevant aspects such as inequalities, inequities, and even more the aftermath generated by the Pandemic. In view of the aforementioned, situations evidenced in intolerance to frustration and limited capacities to provide solutions to the problems presented are highlighted, evidencing deficiencies in the appropriation of psychological resources, especially those related to emotional skills (Martinez et al., 2023).

In relation to the above, in the 1990s, UNESCO presented a report on education for all, focusing on the need for lifelong learning, based on the integral development of subjects and the improvement of their quality of life, informed decision-making, and centered on education for all. At the same time, the World Health Organization promotes an initiative called life skills, focusing on the consideration of social skills, empathy, management of emotions and feelings, stress and tension management, and prevention of psychosocial risks. Similarly, the Organization for Economic Cooperation and Development (OECD) from its lines of research emphasizes the study of social and emotional skills and how they can become predictors of success. In its report on Competencies for Social Progress, it states that the school population requires a balanced endowment of cognitive, social, and emotional skills to achieve positive life outcomes, and, therefore, the implementation of public policies aimed at this purpose is essential (Organization for Economic Co-operation and Development (OECD), 2015). Currently, from the World Education Summit, a reference is made to determine elements, such as solidarity and cooperation, to contribute to collective work and empathy.

The subject of interest is visible in various areas of human interaction, such as in the school environment, a predictor of success is academic performance, which over time has been related to intellectuality, but the presence of skills that promote the capacity for self-regulation, as well as decision-making and problem-solving, and aspects that contribute to psychological well-being and healthy lifestyles, should not be overlooked. In addition, these types of positive experiences contribute to the wellbeing of teachers and students, generating favorable school spaces (Gordón et al., 2019). Without leaving aside, the family environment, considered a protective environment, can provide individuals with the necessary tools to face different situations.

On the other hand, from the professional point of view, psychosocial conflicts should be the object of interest, especially those that promote interaction and direct contact with different population groups. It should be noted that in this context, the occurrence of stressful events is a recurrence that invites the generation of coping techniques and control of emotions (Laudadío and Mazzitelli, 2019).

In the interpersonal sphere, emotional skills are evident, due to the great significance of empathy, and the ability to understand other emotional states, as well as the ability to cope with various situations. In addition, this is considered a predictor of job success (Galindo, 2018).

Studying the development of emotional skills is of great interest due to the implications present in the daily life of the subjects, especially in the school population, since it contributes to the regulation, control, and recognition of these skills (Merchán-Clavellino et al., 2019). It should be noted that emotional skills become predictors of functioning, so those who are considered emotionally intelligent have strengthened the ability to perceive, understand, and manage emotions.

Other relevant aspects as mentioned by Lucero (2015) are the research contributions, from a cognitive perspective where it has been possible to relate the existing relationships between failure and success from various factors such as social perception, cognitive styles used to respond to the various problems, and the coping of each situation at different stages of the life cycle. Another significant aspect is the integration of emotional variables associated with protective factors related to mental health and vulnerability, as well as the effects on it. In relation to the above, it is established that positive emotions have the possibility of identifying negative effects resulting from poverty experiences, acting as protective factors (Seligman Campayo Muñoz and Cabedo Mas, 2017).

Therefore, emotional competencies can be understood as the set of skills possessed by human beings to understand, comprehend, develop, accept, and adapt individually and socially in society, achieving understanding with their peers.

In this order of ideas, the main objective of this article is to develop a bibliometric and systematic review of SE, to answer the following research questions: Which authors, countries, and journals lead the literature on emotional skills, and which are the most-cited authors? What are the main research papers, the main areas, and what perspectives or trends exist in the literature on this field of study? This is necessary to achieve an approach that shows the importance and benefits in the social context of the implementation and continuous training of social skills in human beings in terms of mental health and preservation of life, which are supported by a chronological vision that shows the variables presented by research professionals, universities, and other entities.

This article is organized as follows: The first part presents the introduction of the study, including a contextualization of the problem, the importance of the topic, and literature review on emotional skills, the main objective, and the research questions. The second part shows, in detail, the methodology developed in two phases: a scientific mapping of the area through a bibliometric analysis and, the second phase, a network analysis to identify the most relevant papers on social skills and to determine the main groups on which current research is focused. The third part presents the results with their respective discussion. Finally, the conclusion and recommendations for future research are presented.

2. Materials and methods

This review is developed in two phases—the first with a scientific mapping of the area through a bibliometric analysis of the scientific production registered in Scopus and WoS in a time range between 2000 and 2022; this is due to the great relevance of this tool in current bibliometric studies that are allowing the recognition and development of trends in thematic areas and their basic structures (Bonilla-Chaves and Palos-Sánchez, 2023). Similarly, other recent research has used bibliometric analysis by means of the Bibliometrix application to perform exhaustive and comprehensive analyses of the scientific mapping of a specific topic (Lizano-Mora et al., 2021; Palos-Sanchez et al., 2022). However, for the present research, as selection criteria for the articles, a search was conducted in English to obtain the largest number of documents in the WoS and Scopus databases from the year 2000 to the first quarter of the year 2022. As search criteria, the title, the scientific journals indexed in Scopus and WoS, and the search term "emotional skill" were taken into consideration. The second phase with a network analysis allows identifying the most relevant papers on social skills and determines the main clusters on which current research on the area is focused (Cristóvão et al., 2017; Rojas-Sánchez et al., 2022; Park and Jeon, 2023).

2.1. First phase: scientific mapping

To perform a production analysis and scientific mapping, the five bibliometric methods suggested by Zupic and Čater (2015) were used: citation analysis, word co-occurrence analysis, co-citation analysis, co-author analysis, and bibliographic coupling analysis. They were used jointly in WoS and Scopus since it allows a broader overview of the area of knowledge (Echchakoui, 2020). In order to clean the data, we filtered both in the Scopus database and in Web of Science, according to the search criteria, as shown in Supplementary Table 1. The results obtained were merged and duplicates removed, using the R estudio software, i.e. uniform articles found in the two databases were excluded. The search parameters are given in Supplementary Table 1.

These search criteria showed 233 records in WoS and 250 records in Scopus that were merged and, after eliminating 143 duplicate data, were consolidated into 340 records which enclose the academic production for 20 years (see Supplementary Figure 1). The estimated studies were published in specialized journals in the field of science area; an overlap of 14% was observed between these two databases, which demonstrates the relevance of using them together.

While reviewing in the search parameters the concept of "emotional skill" in different languages (French, English, German, and Spanish), it is intended to cover the largest number of records within these databases. As a result, it is identified that 77% of the publications in this area related to WoS and Scopus are in English, while 14% are in Spanish and 4% are in German (Supplementary Figure 2). This is because English is the dominant language in these databases; thus, these journals and authors attempt to perform their publications in English to increase their visibility (Vera et al., 2019). The tool used for the bibliometric analysis is Bibliometrix (Aria and Cuccurullo, 2017) since it is a free-use tool that allows working with different databases and multiple functionalities; it has also been used and validated by other studies (Acevedo et al., 2020; Duque et al., 2020, 2021c; Di Vaio et al., 2021; Queiroz and Fosso Wamba, 2021; Secinaro et al., 2021).

2.2. Second phase: network analysis

The research obtained in WoS and Scopus were grouped, and the duplicates were eliminated using the programming in the R Software. Their references were then extracted, and a citation network was structured using graph theory as a model, which is a tool that allows organizing information on the typology and characteristics of the network and all the studies that constitute it (Wallis, 2007; Yang et al., 2016).

Subsequently, three bibliometric indicators were calculated: the indegree indicator (number of times in digits that a study has been referenced by others; Wallis, 2007), the outdegree indicator (number of times in digits that a particular group cites others or the number of connections of each study; Wallis, 2007), and the betweenness indicator (degree of intermediation and centrality of each element within the network; Freeman, 1977). The latter is presented when the document is referenced and reference to the others (Zhang and Luo, 2017).

The result shows the knowledge structure in this area, organized by all the research obtained from the databases and their appropriable references, which allows work from various sources to be involved, not only those that are part of WoS and Scopus but also from other databases and scientific publications. This network analysis, also known as co-citation mapping, helps visualize the structure of an area of knowledge and also facilitates identifying its subareas or research tendencies (Gurzki and Woisetschläger, 2017; Zuschke, 2020). To

provide graphical visualization of the knowledge network of the emotional skills study area, the tool Gephi is used (Bastian et al., 2009).

The indegree, outdegree, and betweenness indicators were calculated for each record of the network, which allows classifying the works using the tree metaphor (Robledo et al., 2014; Valencia et al., 2020). Implementing this analogy, three categories arise as follows: the roots (high indegree), where classical documents and documents of theoretical hegemonic relevance within the field of study are identified, especially publications that are cited but do not cite others (Wallis, 2007); consecutively, in the trunk (high betweenness), those documents that cite but at the same time are cited by others are found (Zhang and Luo, 2017). In this topic, structural works are grouped that link the theoretical foundation of the classics with current research; and finally, the leaves (high outdegree), where most of the recent studies are found and others are cited (Wallis, 2007); these publications show the current framework guidelines for research in the area that are established as emerging research fronts. This methodological process has been used and validated in previous studies (Clavijo-Tapia et al., 2021; Ramos et al., 2021; Torres et al., 2021; Trejos-Salazar et al., 2021; Duque et al., 2021a,b; Rubaceti et al., 2022).

3. Results

3.1. Bibliometric analysis development

A bibliometric analysis of the scientific production recorded in WoS and Scopus was performed. Supplementary Figure 3 shows the number of publications between 2000 and 2022. In total, 340 records related to ES were identified. A growing trend in the number of records was visualized, showing an annual growth rate of 15%. Furthermore, it was visualized that more than half of the publications were made in the last 5 years. These data show an increase in the interest of the scientific community in the subject during the last decade.

Supplementary Table 2 shows the ten countries that provide the largest number of publications. The United States is identified as the country that leads the list with 16.1% of the total number of publications, followed by Spain with 11.1%, and the United Kingdom with 4.7%. In general terms, of the 10 countries with the largest publications, seven are European and contribute 47.7% to the field of study, representing the importance of this continent in the study, benefits, contributions, and search for integral wellbeing of social skills. The American continent represented by the United States and Mexico represents 18% and Oceania with a unit represented 3.5% of publications.

Supplementary Table 3 shows the ten authors with the highest number of publications, the number of citations, and their corresponding index *h*. Filip K. Fruyt ranked first from the Universiteit Gent, Ghent (Belgium); however, the author with the highest number of citations is Oliver P. John who, in turn, is the author with the highest index *h*.

Supplementary Table 4 lists the scientific journals with the largest number of associated articles. In addition, the index h and the quartile in which they are found are presented. Only one of the journals is in Q1, four are in Q2, and three do not record quartiles. The journal with the most publications contributing to the subject of study is the Frontiers of Switzerland with a total of eight records, as well as Index *h* and the highest SJR.

Supplementary Figure 4 shows the four main components that make up the bibliographic analysis. In the first square is the author co-citation network, which made it possible to identify the most prominent authors in terms of citation count; in this study, Joseph A. Durlak, John D. Mayer, and Peter Salovey are the most referenced. The second square shows the network of authors' collaboration and shows the joint work of the authors who had already been mentioned above, such as Filip K. Fruyt, John Oliver, Ricardo Primi, Daniel Santos, and their close literary link. The collaboration network between countries reaffirms the leading role of the United States, Belgium, and Brazil. Finally, the term co-occurrence network is given, where two large groups of compound words are found: the first (in red) by words such as emotions, human beings, children, and adults, and the second (in blue) illustrating variables such as adolescents, emotional intelligence, empathy, and skills, the latter being constant in both groups.

3.2. Network analysis

Through this analysis, it was possible to identify the most important documents in the area. Documents with the highest indicators were chosen for review and were organized using the science tree metaphor—five classics (roots), five structural (trunk), and 10 leaves (leaves). To establish the subareas or common areas of research, the clustering algorithm proposed by Blondel et al. (2008) was used. In this way, three main groups were identified that can be represented in the leaves (Supplementary Figure 4).

3.2.1. Root (classics)

The hegemonic publications (tree roots) that make up this literature review are considered research that supports the study subject. These documents generally raise the importance and assessment of competencies in ES for children, youth, and parents.

One of the most referenced documents, considered a seminal work in the area, is "emotional intelligence" by Salovey and Mayer (1990), who determined that mental processes and individual differences are related to emotions, and their use and regulation in an adaptive way. Subsequently, Goodman (1997) offers a brief evaluation of behavior, strengths, and difficulties through the qualities and difficulties questionnaire (SDQ) for children and youth and Rutter's questionnaires for parents, which allow evaluating and showing a simple report of emotional and behavioral difficulties, problems with peers, hyperactivity, and prosocial behaviors.

Furthermore, Durlak et al. (2011) explored the effects of social–emotional learning (SEL) programming on social and emotional skills, attitudes toward self, positive social behavior, behavioral problems, emotional distress, and academic performance in different schools in the United States. Similarly, years later, Taylor et al. (2017) promoted personal strengths in young people, social competencies, positive identity, and commitment to learning, classifying the results into seven categories that evaluated positive social and emotional assets (SS and ES and attitudes toward oneself, others, and school) and wellbeing indicators—positive (positive social behaviors and academic performance) and negative (behavior problems, emotional distress, and substance use).

Finally, Cetina et al. (2011) highlight that parents who take into consideration the dimensions of emotional warmth and train themselves in ES promote self-regulation in children, greater self-esteem, and a greater adjustment in psychological maturity.

3.2.2. Trunk (structural)

This section identifies the publications indicating the research that links what is shown by the authors and the documents of classical foundation with the most recent authors and approaches on ES, being a category that shows the models and orientations consolidating the scientific study in this field.

Delhaye et al. (2013) described attachment and self-report measures in SS considering emotional intelligence (EI), empathy, and resilience. Moreover, Björklund et al. (2014) showed that models based on SEL allowed enhancing children's social interaction skills and emotion management to contribute to promoting mental health. Similarly, Appelqvist et al. (2016) implemented and evaluated a method to improve SS and prevent psychosocial problems in children between 7 and 12 years, expressing that children with low social ES are at a greater risk of connecting with school and having good social relationships in the future.

Moving on with structural research, Schoeps et al. (2018) proposed that learning ES is a potential component to promote the quality of interpersonal relationships, wellbeing, and emotional education in adolescents. In this line, Abrahams et al. (2019) analyzed how the measurement of SS in young people can advance in terms of conceptualization and classification of skills, techniques, and evaluation methodologies to improve wellbeing and subsequent positive results in life.

3.2.3. Recent documents (leaves)

With the bibliometric review process, three main subareas (clusters) were established in this field of study which shows more recent lines of research. Each of them has been set out in the following section.

3.2.3.1. Cluster 1: emotional skills and education

This perspective reflects the connection and benefits that ES present as an essential complement in education (Supplementary Figure 5), identifying studies such as that of Denham (2006) who suggests deepening the social–emotional domain in multiple contexts. Moreover, French and Mantzicopoulos (2007) applied the structure of the pictorial scale of competence and social acceptance (PSPCSA) to evaluate skills related to cognitive competence, acceptance by the mother, and acceptance by peers, finding a significant decrease in perceptions of cognitive competence; however, they concluded that it is not recommended that professionals only use the PSPCSA to make decisions about children. There is always the need to carry out an exhaustive study to know the evolution of children's own beliefs. Similarly, Bierman et al. (2008) promoted the abilities of teachers to use research-based practices based on the development of SS through training workshops and tutorials with an intervention program.

Later, LeBuffe et al. (2013) assessed social and emotional competencies in children, using the Devereux set of assessments to measure protective factors related to resilience and believing that developing a child's protective factors will mitigate the impact of risk. Subsequently, with a similar study, Denham et al. (2014) evaluated social aspects, self-regulation, problem-solving, and social–emotional behavior through SEL programming and the components of social learning theory, suggesting that early assessment and control are possible, using these measurement instruments to maximize early school success. Furthermore, McCoy et al. (2016) analyzed the progress of cognitive and socio-emotional skills in the early stages of life, concluding that countries that are exposed to risk factors, such as infectious diseases, malnutrition, poverty, and low availability of educational and healthcare resources, affect the low development of cognitive and socio-emotional skills of the child population.

Carrying on with the strategy of science tree reading, this perspective is finalized showing the last advances of Bethell et al. (2017) with a field study on promoting resilience, enhancing upbringing, and the social and emotional roots in childhood development, such as healthy components, promoting health for a lifetime, concluding that there are sufficient scientific findings that endorse building programs and policies applied to child health services from which four general priorities arose. First, resilience and enriching relationships in child health services; second, to cultivate conditions for cross-sectional collaboration to stimulate action and to approach structural inequalities; third, to recover and promote safe, enriching relationships and absolute participation of people, families, and communities to heal trauma; and finally, boosting efforts for research, innovation, and implementation of child and family health. At the same time, Wolf et al. (2017), through the international development and early learning assessment (IDELA), managed to evaluate the socio-emotional and motor needs of the child population to offer an integral education. It is also argued by a study that socio-emotional adjustment and children's self-regulation is the key to the success and integral wellbeing of children (Vitiello et al., 2022).

3.2.3.2. Cluster 2: emotional skills and personality

This perspective focuses on the effect of ES on the development of personality (Supplementary Figure 6). The most relevant research is the one raised by Primi et al. (2018) in which they analyzed socio-emotional skills related to the personality dimensions of Goldberg. Following this logic in another study, several conceptualizations of ES were examined, showing a relation between EI and the personality dimensions to raise an integrating set of domains of socio-emotional skills (Abrahams et al., 2019).

Currently, other research was identified that shows that social and emotional learning is fundamental to help in the decision-making of those in charge of public policies, to favor teachers in daily practice, and allow children and adolescents to reach their potential (Suarez-Alvarez et al., 2020). Primi et al. (2021), by means of the computer assessment of social and emotional skills using the child and adolescent inventory system (SENNA), demonstrated in their results that knowledge and understanding of specific skills are a high priority for handling multiplicity in self-efficiency, stability, self-management, creativity, and innovation.

In this order of ideas, Cieciuch and Strus (2021) highlight in the current knowledge a comprehensive model of flexible core personality competencies determined by stable temperamental traits with a biological base that underlies many specific emotional skills. Finally, Bhaktha and Lechner (2021) presented a simulation study regarding the performance of test scores and plausible values, in regression with scales of personality or socio-emotional skills as a forecast for school performance results and professional success.

3.2.3.3. Cluster 3: emotional skills and autism

Under this perspective of ES and children with autistic spectrum disorder (ASD), in the first instance, Azevedo (2018) designed a digital game to promote the development of ES in children with ASD. The game considered rehearsed facial expressions of joy, sadness, fear, anger, and surprise in three different activities: impression, recognition, and narration. Sofronoff et al. (2017) examined an intervention in ES with the participation of parents of children with ASD, demonstrating significant improvements in children's social skills, parents' self-efficiency, children's behavior, and anxiety levels.

Similarly, from the empirical studies performed, it is evident that there is a relation between how experiences mediated by music when learning languages can develop students' interpersonal and collaborative skills to become active members of a more inclusive society (Cores-Bilbao et al., 2019). This situation leads Russo-Ponsaran et al. (2019) to demonstrate the usefulness, trustworthiness, and validity of the SEL web program concluding its usefulness and accessibility as a tool to measure complex profiles of socio-emotional skills in youth with ASD.

Finally, Hu and Lee (2020) evaluated the effects of cognitive-behavioral therapy in children with ASD with an ideal multiple training when it comes to acquiring and maintaining ES of acknowledging emotions in context, expression, seeking help, and regulation. Kastner et al. (2020) performed experimental research on educational programs in visual arts based on psychological theories and models of ES on how to teach, practice, and reflect skills or specific competencies to improve them through drawing portraits and focusing on instruction.

4. Discussion

The results of this research were presented through a generalized and quantitative analysis according to the search parameters on HE, with tables, graphs, and word clouds, emphasizing the main indicators of production and citation, continuing with an inductive type analysis that found three major groups in the cited articles, which are HE and education, HE and personality, and HE autism in children, youth, and adults.

At a general level, it is highlighted that the development and training of HE from childhood onward facilitate fundamental tools for conflict resolution, allowing them to interact peacefully and resiliently with others and achieve goals, is the result of favorable gains that allow human beings to acquire and strengthen many skills. HE training leads to open communication between individuals, allows for a better understanding of feelings, capacities and strengths, promotes them and enables people to develop confidence in themselves, in their abilities, to think assertively about problems, and to engage in conflict avoidance and resolution.

The above is consistent with Stalnikowicz and Brezis (2020), who suggest that skills such as empathy and listening are key challenges when communicating, affirming that emotional skills are required for the generation of trust and for the care of people's health. Likewise, a meta-analysis similar to the present study explored individual and environmental factors associated with socio-emotional skills such as ongoing reciprocal interactions between self and peer environment, emotion control, and social skills as items of great importance for overall wellbeing and good positive mental health (Mitic et al., 2021).

Here lies the added value of this literature review because it highlights that the use and training of HE in an ideal way are a must in human beings, it is a shared responsibility, offering a base of studies at a global level allows foreseeing that there is a general interest in contributing to humanity for a better social coexistence that allows preserving mental health because it is made up of a balance of skills and positive and negative emotions throughout the development of the life cycle.

Thus, the HE and education scenario is highlighted with studies that give strength to the findings of this review, there is some research in this line that states that curricular studies on emotional skills make direct comparisons difficult, but suggest the importance and effectiveness of emotional skills in training for others. Equivalent to this, Campayo Muñoz and Cabedo Mas (2017) show that the commitment to emotional skills has benefits for the development of certain aspects and positive implications for education. Therefore, an adequate understanding of the relationship between aggressive behaviors and the level of HE in people would help the design of prevention programs and could improve intervention policies in this area of knowledge (Sylva, 2019).

In this order of ideas, the programs and all the trends mentioned are comprised of a set of instructional activities with goals and objectives designed to generate changes in attitudes and behaviors toward the resolution of interpersonal conflicts. They are fundamental to put them into practice and essentially from the school environment to leave a mark and to be able to continue training as the individual interacts according to his social context. Programs that promote the development of emotional intelligence levels among the adolescent population report the benefits of these interventions to moderate behavior, as well as to reduce its emotional and social consequences (Vega et al., 2022).

Therefore, having emotional skills has nowadays become a requirement for the success of subjects in all scenarios of their actions and a large part of their life cycle. Hence, it is necessary to recognize and strengthen these skills. As a result of the above, training spaces are considered as large scenarios that require inviting to rethink the development of their practices oriented not only to the development of contents but also to the execution of actions that contribute to an adequate approach of the tools related to being emotionally intelligent, being imperative for the academy and research environments to value the skills of being for their respective promotion and intervention.

5. Conclusion

This research enabled us to analyze the scientific production of ES and identify emerging lines of research. Even though several literary reviews have been conducted in the study of ES, there was no research presenting a bibliometric analysis that could show the networks and structures of the work of the main authors in this area.

Moreover, it is highlighted that the results were shown using a tree structure analogy, to explicitly guide the evolution of this

knowledge area. The root's research was reflected as the platform and starting point of this content, the trunk's research provided the ES structure, and the leaves' research is considered as clusters or subareas of research with regard to the subject, thus demonstrating three main subject matters—ES and education, personality, and ES and autism.

It is important to highlight that the explorations of this study have been developed mainly in countries of developed economies. However, in zones like Latin America, the research that aims to study this inquiry is in the initial phase. Nevertheless, the structural documents are important because they provide and set the grounds to continue with the methodology, improve models and design, and remain in time as important sources that value the learning of individuals' ES.

ES has been necessary competency in the development and use of EI. Human beings that use this concept show greater advantages in generating positive responses and generate greater empathy to face problems and difficult situations. Because of the constant massive social problems that affect mental health, training is essential and we need to implement this in daily life to overcome obstacles, envision solutions, and make responsible decisions that provide tranquility and personal satisfaction.

This process allows us to perceive, as science provides us with more knowledge, the conceptualization of emotional education, personality development, and autism which will inevitably evolve in a more precise direction. The HE contributes to the development of emotional competence as a significant factor of effective and responsible citizenship, and its mastery favors a better adaptation to the context and tends to respond to life circumstances with greater chances of success.

Finally, in this study, important lines of research are observed, which are as follows:

- Qualitative research taking into consideration emotional expressiveness, understanding emotions, and regulating emotions and behavior.
- The impact of social skills training in solving social problems.
- Research on trends in the pedagogical training of social skills for professionals from different areas.
- Study of training assessment instruments in social and ES.
- Study of socio-emotional skills, personality traits, and constructions related to adopting structural equation models and plausible values.
- Impact of the development of pedagogical resources used by professionals and families in supporting children with ASD.

Although the purpose of this study was to develop a systematic bibliometric review of emotional skills, obtaining significant and useful results for the scientific and academic community, the search was focused on databases, such as WoS and Scopus, and was oriented at a general level on emotional skills. Therefore, for future bibliometric analyses, it is recommended to use more specialized databases and to limit the search or the number of research fields to certain areas of knowledge or disciplines to obtain more specialized results. In other words, for future work of this type, we suggest the inclusion of other thematic areas and the use of new search terms that allow the inclusion of other articles and a more detailed analysis of the metadata to investigate other current and future lines of research.

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

MM, DD, and MÁ contributed to the conception of the topic and bibliometric analysis, and wrote the first draft of the manuscript. MM, DD, IM, and JN-O wrote sections of the manuscript. JH-L, VB, JN-O, IM, and LC-T reviewed and edited the manuscript. MÁ, JH-L, VB, and LC-T drafted and revised the manuscript. VB and LC-T received funding acquisition. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the study 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.2023.1040110/full#supplementary-material

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Examining the effects of teacher self-compassion, emotion regulation, and emotional labor strategies as predictors of teacher resilience in EFL context

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Introduction: This study investigates the effects of teacher self-compassion, emotion regulation, and emotional labor strategies on teacher resilience in the English as a foreign language (EFL) context. The study aims to understand the relationships between these variables and their potential implications for promoting teacher resilience.

Methods: A sample of 711 Chinese EFL teachers participated in the study. Confirmatory factor analysis (CFA) was conducted to assess the psychometric properties of the instruments used to measure teacher self-compassion, emotion regulation, emotional labor strategies, and teacher resilience. Structural equation modeling (SEM) was employed to examine the relationships between these variables.

Results: The results of the study revealed that teacher self-compassion and emotional labor strategies had direct positive effects on teacher resilience. Specifically, higher levels of self-compassion and effective use of emotional labor strategies were associated with greater teacher resilience. Furthermore, teacher emotion regulation was found to indirectly predict teacher resilience through the mediation of emotional labor strategies. This suggests that the ability to regulate emotions influences the adoption of effective emotional labor strategies, which in turn contributes to higher levels of teacher resilience.

Discussion: The findings of this study highlight the importance of teacher self-compassion, emotion regulation, and emotional labor strategies in promoting teacher resilience in the EFL context. Interventions aimed at enhancing teacher emotional regulation skills and fostering self-compassion may have significant implications for supporting teachers in managing the demands and challenges of their profession, ultimately enhancing their resilience. These findings contribute to the understanding of factors that can promote teacher resilience and inform the development of targeted interventions in the EFL context.

KEYWORDS

self-compassion, emotion regulation, emotional labor strategies, resilience, EFL teachers

Introduction

Teaching is a difficult and labor-intensive profession, due to the demands of responsibility and its foundation in service-providing, and that is why educators are regarded as the primary stakeholders in the challenging field of language instruction (Mercer, 2020). In the context of teaching English as a foreign language (EFL), educators encounter unique obstacles stemming from language and cultural differences. These challenges not only heighten the demands on their

emotional and cognitive resources but also pose distinct difficulties compared to other professions (Chen and Goh, 2011; Derakhshan et al., 2022; Liu et al., 2023). Unlike many occupations, second/foreign language teachers have responsibilities that transcend the boundaries of the classroom (Johnston, 1997). Their duties encompass assigning meaningful homework, providing valuable feedback, and monitoring students' progress (Kalaja and Ferreira, 2008; Zhang, 2021). Thus, gaining a comprehensive understanding of teachers' perspectives and standards becomes pivotal for promoting academic achievement. Within EFL contexts, a critical concern lies in the cultivation of resilience among teachers as they confront various challenges (Dewaele and Wu, 2021; Liu and Chu, 2022).

The notion of resilience which pertains to one's capacity to rebound and move forward after facing challenges has been recognized as a significant factor in promoting teacher well-being and job satisfaction (Fried and Chapman, 2012). Put another way, it is the capacity to adjust to challenging conditions and boost one's proficiency or skill when dealing with pressure and traumatic events (Bobek, 2002). It is a mental concept in education that has a significant impact on both instructors and students (Gu and Day, 2013). As noted by Hong (2012), one of the best methods to reduce the rate of EFL instructors' quitting their jobs is to increase their resilience using the right techniques.

The second variable under investigation in this study is self-compassion. Self-compassion has been shown to be an important resource for coping with stress and adversity (Neff, 2003b) and has been related with reduced burnout and increased job satisfaction in instructors (Neff, 2011). Mindfulness and self-compassion are suggested to be effective strategies for reducing stress among instructors (Jennings et al., 2017). Self-compassion can help people to stay happily present even in painful situations, by keeping a healthy attitude towards personal flaws and avoiding dwelling on setbacks, rejection, or shame (Neff, 2003a; Allen and Leary, 2010). Individuals who practice self-compassion are less likely to feel threatened and more capable of handling difficult circumstances (Chishima et al., 2018; Tandler et al., 2019), which can improve their ability to cope with stress.

Teaching inevitably involves dealing with emotions. It is crucial for teachers to use successful coping mechanisms to regulate their feelings, given the undeniable importance of workplace emotions for teachers' effectiveness (Deng et al., 2022). Teachers are able to assess and alter the duration and intensity of emotional events in the classroom using the concept of emotion regulation (Chang and Taxer, 2021). Koole (2009) defines emotion regulation (ER) as the range of techniques employed by individuals to manage their emotional states, including specific emotions, mood, affect, and stress. ER is crucial in L2 classes, in which educators must continuously regulate their feelings due to a variety of irritations and anxieties (Morris and King, 2018). It appears that L2 instructors cannot foster a positive learning environment in their classrooms unless they have control over their feelings, especially the negative ones (Namaziandost et al., 2022). This capacity to regulate emotions is a crucial socioemotional quality for EFL teachers, as it fosters resilience and adaptability in the face of challenging teaching circumstances (Wijaya, 2021). To put it another way, it is a technique that can enhance, sustain, and lessen the frequency, strength, and process of both positive and negative feelings (Koole, 2009).

Emotional labor, the last variable under research in this study, is defined by Hochschild (1983) as "the management of feeling to create a publicly observable facial and bodily display" (p. 7). It is a term frequently employed to explain how people alter their emotional expressions from their actual, felt feelings in order to communicate (Wang et al., 2019). Moreover, the endeavor, planning, and control required for teachers to exhibit organizationally wanted feelings during their interpersonal conversations with pupils as well as others in classroom and school settings is referred to as the emotional labor of teaching (Morris and Feldman, 1996; Yin et al., 2013). Despite the fact that instructors may show genuine emotion in front of the class, they frequently pretend to feel something they do not in order to help or hinder the growth of their students. This behavioral aspect of emotion regulation, known as emotional labor, represents the gap between felt and displayed emotions and may affect teachers' psychological, behavioral, and physical adjustment (Taxer and Frenzel, 2015; Wang et al., 2019). Emotional labor strategies, which involve the effort required to regulate one's emotions to meet job demands, have been recognized as a crucial source of stress and burnout in teachers (Wang et al., 2021), but their potential impact on teacher resilience has received less attention. Effective emotional labor strategies, including surface acting or deep acting, have been shown to reduce emotional exhaustion and promote job satisfaction in teachers (Burić and Frenzel, 2021).

Some studies (e.g., Yonezawa et al., 2011; Pena et al., 2012; Razmjoo and Ayoobiyan, 2019) on teacher resilience and its potential predictors have been performed in response to the importance and value of this factor in L2 education; however, it still needs more investigation to broaden the existing literature. In other words, there is still a lack of consensus on the most important predictors of resilience in teachers, particularly in the EFL context. In addition, existing studies have primarily focused on individual-level factors, such as personality traits or coping styles, and have paid less attention to job-related factors, such as emotional labor and regulation strategies, that may also impact teacher resilience (Ainsworth and Oldfield, 2019; Beltman, 2021). In this study, our aims were designed to explore the effects of teacher self-compassion, emotion regulation, and emotional labor strategies on teacher resilience within the EFL context. Having examined these variables and their relationships, we aim to contribute to the existing knowledge base on teacher resilience and provide valuable insights for educational practitioners specifically working in EFL settings. Understanding the predictors of teacher resilience in the EFL context is essential for the development of targeted interventions and support systems that can enhance teacher well-being and ultimately improve the quality of education in these unique language learning environments.

Literature review

Resilience

Gu and Day (2007) describe teacher resilience as the capacity of a teacher to recover and restore their capabilities or morale quickly and efficiently in challenging situations. Additionally, Mansfield et al. (2012) define this construct as a dynamic process where a teacher's personal traits interact with contextual resources to shape their responses when dealing with adverse events. Although there is no

consensus on the definition of teacher resilience, scholars generally agree that it involves a teacher's ability to respond effectively to challenges (Clarà, 2017). Due to the importance and worth of teacher resilience in instruction, a number of researchers have examined the causes and effects of this construct (e.g., Mansfield and Beltman, 2019; Razmjoo and Ayoobiyan, 2019; Xie, 2021).

Regarding self-efficacy, teacher resilience was examined by Razmjoo and Ayoobiyan (2019). In doing so, two closed-ended surveys were distributed to 92 EFL instructors. The analysis of the participants' answers revealed a strong and advantageous link between teachers' self-efficacy and resilience. Likewise, Xie (2021) investigated the link between teachers' emotional regulation and resilience. To do this, 314 Chinese teachers were given copies of two valid scales measuring the emotional control and resilience of instructors. The results of the correlational analysis showed a connection between teachers' emotional regulation and resilience. Moreover, Neff (2003a) carried out a study and asserted that self-compassion was discovered to have a substantial positive correlation with life satisfaction and a substantial adverse relationship with anxiety and depression. This raises the possibility that practicing self-compassion is an adaptive process that improves psychological resiliency and wellbeing. Additionally, Lefebvre et al. (2020) indicated that developing a self-compassionate mindset is essential to fostering employee resilience at work, and that a variety of factors, including contemplative trainings, guidance and listening approaches, and individual factors, can enhance self-compassion in organizations. In another study by Bluth et al. (2018), results showed a strong favorable relationship between self-compassion and both resilience and curiosity. Adolescents who are more compassionate toward themselves are more resilient and recover more quickly from setbacks. Moreover, Hascher et al. (2021) carried out a study and reported a positive relationship between well-being and resilience.

The difficulties of establishing and sustaining teacher resilience, in addition to its indicators and effects, have also been investigated. For instance, Gu and Day (2013) investigated the issues affecting teacher resilience and discovered that the relational, personal, and organizational contexts in which they operate may have a negative impact on their resilience. They also found that maintaining and developing teacher resilience may be hampered by the socioeconomic environment of the workplace. In a similar vein, the challenges of fostering and sustaining resilience among instructors in Malaysian secondary institutions were examined by Razak (2013). To determine the difficulties and obstacles to their resilience, 46 Malaysian instructors were interviewed. The main challenges to maintaining teacher resilience were found to be a few contextual, personal, financial, and administrative problems.

Different traits that define resilience have been identified in the literature that is currently accessible. According to Tait (2008), resilient teachers frequently report feeling highly satisfied with their work, react favorably to stressful situations, demonstrate useful coping mechanisms, and are extremely effective and emotionally intelligent educators. Additionally, Howard and Johnson (2004) came to the conclusion that resilient instructors show a sense of autonomy, possess behavioral management competencies, can minimize unpleasant emotions, sympathize with their students, have moral goals, and are skilled and encouraging. Besides, Taylor (2013) suggested that instructors with great resiliency have a malleable control system, liberty, positivity, dedication, a positive rapport, and an appreciation of pedagogical changes. Khanshan and Yousefi (2020) asserted the same thing, arguing that resilient instructors are self-assured, optimistic, able to form strong bonds with others, inspired, proficient, and sensitive to crucial events. As stated by Day and Gu (2013), teachers who are resilient have long-lasting efficacy and dedication.

Self-compassion

The concept of self-compassion, introduced by Neff (2003b), draws on Buddhist ideas and serves as an alternative to self-esteem. Compassion involves acknowledging and being responsive to others' suffering without avoiding or disconnecting from it. In contrast to the Western view that compassion is primarily directed towards others, Eastern philosophies like Buddhism do not differentiate between self and others. Self-compassion entails being open to one's own pain, showing kindness and understanding to oneself instead of self-criticism, recognizing that one's experiences are part of the human experience, and holding painful thoughts and emotions in balanced awareness. To provide a comprehensive definition of self-compassion, Neff (2003b) identifies three key components: self-kindness, common humanity, and mindfulness.

According to research by Neff et al. (2007), self-reported measures of happiness, positivity, positive affect, intelligence, personal initiative, interest, and inquiry, life satisfaction, extroversion, and conscientiousness all showed a significant positive relationship with self-compassion. According to some researchers, compassion is a type of emotion that is different from other feelings that are comparable to it, such as love, empathy, sorrow, or grief (Goetz et al., 2010). Others see this notion as a mindset, suggesting that people deliberately choose to think compassionately (Sprecher and Fehr, 2005). There are numerous aspects of compassion, including cognitive, emotional, purposeful, and motivational ones (Jazaieri et al., 2013). Despite the disagreements over what exactly constitutes compassion, most people concur that it entails a general awareness of another person's suffering combined with a desire to provide assistance in some way (Sprecher and Fehr, 2005; Jazaieri et al., 2013).

Studies have demonstrated that self-compassion has a positive impact on well-being and satisfaction with life (Raes, 2010; Baker and McNulty, 2011). By reducing feelings of threat and enhancing control over stressful situations (Chishima et al., 2018), self-compassion enables the use of effective stress-coping techniques (Tandler et al., 2019). Moreover, self-compassion safeguards the ego against self-criticism, promotes motivation for self-improvement and performance enhancement, and encourages making amends when necessary (Breines and Chen, 2012). It appears that greater acceptance of one's imperfections increases the likelihood of taking corrective action. Instructors who are self-compassionate are more helpful, happier, and experience greater professional achievement (Moè and Katz, 2020). In fact, research suggests that self-compassion may be linked to effective and adaptive emotion regulation (Diedrich et al., 2014).

Self-compassion differs from self-esteem. Having self-esteem requires assessing one's worth (Neff, 2011). Analysis of the study on self-esteem reveals a decrease in its appeal, which may be caused by its link to exaggerated self-perceptions or a general obsession with the self (Neff, 2011). When practicing self-compassion, the emphasis is on providing helpful responses to hardship or making links to the experiences of others rather than on evaluating oneself or comparing

oneself to others (Neff, 2003b). In this regard, Leary et al. (2007) discovered that self-compassionate individuals did not replay embarrassing or humiliating situations in their thoughts when they were faced with failure, rejection, or humiliation. Instead, they analyzed their flaws and acknowledged the role they played in how things turned out.

Emotion regulation

The physiological, behavioral, and cognitive processes that people use to efficiently control and react to emotional experiences are referred to as emotion regulation (Gross and Thompson, 2007). That is, people's ability to regulate their emotions affects the types of emotions they encounter, when they feel them, as well as how they convey them. Experienced emotions are controlled to achieve educational goals, like other kinds of self-regulation and self-management skills. To do this, a variety of strategies—referred to as emotion regulation strategies—may be used (Taylor et al., 2020; Li and Liu, 2021). Both instructors and students encounter a range of emotional situations in the classroom. As the focal point of the classroom, instructors are expected to create an ideal emotional environment in which they should control both their own and their students' feelings (Taxer and Gross, 2018; Deng et al., 2022). In other words, emotion regulation provides both instructors and pupils with the ability to strengthen positive emotions while reducing negative ones (Fried, 2011).

Emotion regulation is regarded as an interpersonal endeavor that is linked to a person's ability in controlling how and when they should perceive and express feelings (Gross, 1998). Emotion regulation techniques are frequently used by effective pupils and instructors in the instructional realm (Shafiee Rad and Jafarpour, 2022). Up-regulating positive feelings is a technique used in L2 emotion regulation to make learning more pleasant, handle academic duties effectively, and increase their effectiveness (Zhang et al., 2020). Through efficient interpersonal relations, effective teaching, and pupils' accomplishments in the learning process, pupils and instructors in L2 education can skillfully control their negative and positive feelings (Teng and Zhang, 2016; Bing et al., 2022; Shafiee Rad and Jafarpour, 2022). Instructors are better able to handle difficulties that arise during the teaching/learning process and propose remedies by regulating their emotions (Greenier et al., 2021; Thoma, 2021; Zhao, 2021).

Earlier studies in the domain of emotion regulation have demonstrated the prevalence and major contributions of teacher emotion regulation to successful instruction. For example, Shafiee Rad and Jafarpour (2022) carried out a study and concluded that well-being, grit, emotion regulation, and resilience can greatly enhance L2 learners' writing abilities. In conclusion, they asserted that using positive emotion interventions can enhance people's learning abilities as well as their feelings. Besides, Morris and King (2018) examined how effectively emotion regulation techniques helped university language instructors deal with their frustration during class. They discovered that instructors at language universities used context-dependent emotion regulation techniques that helped them feel more in control and confident in the face of stress. Similarly, the purpose and effectiveness of emotion regulation in classrooms were examined by Taxer and Gross (2018). They came to the conclusion that educators with hedonic and instrumental emotion regulation objectives attempted to control their own emotions as well as those of their students. Besides, the use of teacher emotion regulation techniques in reaction to student misbehavior was examined in recent research by Chang and Taxer (2021). They came to the conclusion that instructors who regularly reappraise are less likely to feel unpleasant emotions in the presence of pupils' misbehavior and show less repression when unpleasant emotions are felt. The methods applied to regulate emotions were categorized as reappraisal or suppression.

Emotional labor

Teachers are required to regulate their emotions by suppressing negative ones and amplifying positive ones, while also avoiding displays of excessively strong or weak emotions, regardless of their valence (Burić and Frenzel, 2021). Additionally, they are expected to display enthusiasm and passion, and use emotional displays to enhance their teaching effectiveness, maintain professionalism, and manage student misbehavior (Winograd, 2003; Taxer and Gross, 2018). To meet these expectations, teachers often engage in emotional labor, which involves regulating their internal and external emotional experiences in accordance with the emotional display norms of their professional roles (Yin and Lee, 2012; Taxer and Frenzel, 2015; Burić and Frenzel, 2021). Hochschild (1983) defines emotional labor as an individual's effort to regulate the components of their emotions in accordance with the emotional display standards of their professional roles. Wang et al. (2021) asserted that emotional labor is positively connected to well-being.

Moreover, emotional labor (EL), as described by Arlie Hochschild (1983), is "the management of feeling to create a publicly observable facial and bodily display" (p. 7). In the teaching context, emotional labor is mainly understood as the procedure by which instructors attempt to suppress, produce, and control their feelings and emotional expression in accordance with the moral beliefs and standards held about the teaching profession (Yin and Lee, 2012). Teachers must use specific techniques to regulate their emotions and feelings while working in order to teach EL successfully. Surface acting and deep acting are the two most commonly mentioned classical tactics in EL studies (Hochschild, 1983; Wharton, 2009).

Prior studies have suggested two primary emotional labor strategies: deep acting and surface acting. Deep acting is the deliberate management of interior emotions through the intentional engagement in ideas and actions that promote the experience and manifestation of the necessary emotion. Deep acting results in the experience and sincere display of acceptable feelings as specified by emotional rules (Burić and Frenzel, 2021). Surface acting, on the other hand, is concerned with the direct alteration of one's apparent expression to match with the needed mood (Brotheridge and Grandey, 2002). As a result, there is a mismatch between the perceived emotion and the emotion communicated (Grandey, 2015). Surface acting has been defined as hiding or repressing one's true emotions, as well as simulating necessary emotional responses.

When it comes to instructors' emotional regulation, some circumstances may necessitate hiding specific emotions they consider insufficient. Instructors, for example, may wish to hide excessive concern for a student in order to avoid being biased or laughter at a poor student joke in order to keep their control (Taxer and Frenzel,

2015). In turn, other circumstances necessitate instructors acting out feelings such as anger in order to maintain classroom management or excitement to increase student engagement (Sutton et al., 2009).

The hypotheses of the study

> *H1:* Teacher self-compassion directly predicts teacher resilience.

Some studies have documented a positive relationship between teacher self-compassion and resilience (Nery-Hurwit et al., 2018; Chen, 2022). Self-compassion is concerned with treating oneself kindly, recognizing one's shared humanity with others, and being mindful of one's experiences. These qualities can help instructors cope with the many stressors and challenges they face in their work, and may promote greater resilience in the face of adversity. For example, Sauve (2017) reported that teacher self-compassion was associated with resilience, teacher efficacy, and burnout. Theoretical background supports this hypothesis, as self-compassion has been associated with further resilience, mindfulness, well-being, and classroom quality (e.g., Jennings, 2015; Kotera et al., 2021; Demetriou et al., 2023).

> *H2:* Teacher self-compassion directly affects teacher emotional labor strategies.

From a theoretical viewpoint, self-compassion may help instructors manage the emotional demands of their job, potentially reducing the emotional burden of teaching (Newcomb, 2021). Self-compassion may also promote greater well-being and job satisfaction, which could mitigate the negative effects of emotional labor (Hwang et al., 2019; Moè & Katz, 2020) or help them to use adaptive emotional labor strategies.

> *H3:* Teacher emotion regulation directly affects teacher emotional labor strategies.

Effective emotion regulation can help teachers manage the emotional demands of their work, using their emotional labor strategies more effectively (Ye and Chen, 2015; Burić, 2019; Xie et al., 2022). For example, teachers who use adaptive emotion regulation strategies (e.g., reappraisal) are better able to manage emotional labor than those who use maladaptive strategies (e.g., suppression). This hypothesis is supported by Ghanizadeh and Royaei (2015) who found that emotion regulation was significantly associated with emotional labor strategies.

> *H4:* Teacher emotion regulation directly affected teacher resilience.

In light of Theoretical and empirical literature, it can be hypothesized that emotion regulation can directly affect resilience. Effective emotion regulation can help individuals maintain a positive outlook, manage stress, and bounce back from adversity (Beltman et al., 2011; Beltman, 2021). Teachers who are better able to regulate their emotions may be better equipped to handle the many stressors and challenges they face in their work, and may be more resilient as a result (Gu and Day, 2007, 2013; Li and Lv, 2022).

> *H5:* Teacher emotional labor strategies directly affect teacher resilience.

The relationship between emotional labor and resilience is also supported in the literature (Yin et al., 2013; Hyun-Ji and Hyunkyung, 2017; Wang et al., 2019; Yang Y. et al., 2022). Using effective emotional labor strategies can be a significant source of managing stress and burnout for teachers, helping teachers cope with stressors and maintain a positive outlook. Emotional labor may also contribute to other negative outcomes, such as teacher burnout and turnover intention (Cheung et al., 2011; Yin et al., 2019). As such, reducing emotional labor may be an important strategy for promoting teacher well-being and resilience (McKay and Barton, 2018).

The present study

In this research, our primary objective is to investigate the influence of teacher self-compassion, emotion regulation, and emotional labor strategies as predictors of teacher resilience in the unique context of EFL instruction. EFL teaching poses distinct challenges for educators as they navigate linguistic barriers, cultural diversity, and varied learning needs among their students (Johnston, 1997; Lee, 2010). Beyond simply teaching English, EFL teachers are responsible for creating a supportive and engaging environment that nurtures language acquisition and cultural understanding (Murphy, 1988; Chen and Goh, 2011; Fathi et al., 2023). Managing emotions effectively, cultivating resilience, and handling the emotional demands inherent in this context are crucial for EFL instructors to deliver quality education and address the diverse needs of their students (Yang S. et al., 2022). Moreover, EFL teachers frequently encounter situations where emotional regulation and the use of emotional labor strategies become necessary (Aragão, 2011; Greenier et al., 2021). They may need to conceal their genuine emotions to maintain a positive classroom atmosphere, motivate students, and foster inclusivity (Dewaele, 2015). Understanding how self-compassion, emotion regulation, and emotional labor strategies function within the specific context of EFL teaching is pivotal in developing targeted interventions and support systems that enhance teacher resilience and overall well-being. By examining these factors in the EFL context, our study contributes valuable insights into the dynamics and predictors of teacher resilience within this distinct educational setting. Furthermore, the findings from this research will inform the development of contextually relevant training programs and interventions that specifically address the challenges faced by EFL teachers, ultimately elevating their professional practice and well-being. Through a comprehensive exploration of the objectives and significance of the EFL context within our study, we aim to provide a clearer understanding of its contextual importance and contribute to the existing body of literature on teacher resilience in EFL instruction.

Method

Participants

The study recruited a sample of 711 Chinese EFL teachers including 398 female (56%) and 3,131 male (44%) English teachers. The average age of the participants was 38 years, with a range from 23 to 65 years. Concerning teaching experience, about 30% of the participants had less than 5 years of experience, 44% had 5–15 years of

TABLE 1 Demographics of participants (N = 711).

Demographic variable	Frequency	Percentage
Gender		
Female	398	56
Male	313	44
Age		
Mean	38	
Range	23–65	
Teaching experience		
< 5 years	219	30.80
5–15 years	314	44.16
> 15 years	178	25
Educational background		
Bachelor's degree	293	41.20
Master's degree	249	35
Doctoral degree	169	23.76
Region		
Eastern	148	20.8
Central	175	24.61
Western	216	30.37
Northern	172	24.1

experience, and 25% had more than 15 years of experience. As far as educational background was concerned, 41% of the participants had a bachelor's degree in mostly in English majors, 35% have a master's degree, and about 23% have a doctoral degree in an English related field. Regarding regional distribution of the sample., about 20% of the participants are from the Eastern region of China, 24% are from the Central region, 30% are from the Western region, and 24% are from the Northern region. Table 1 illustrates the demographic information of the participants.

Instruments

The Teacher Resilience Scale was utilized in this study to measure the resilience of teachers. The Resilience Scale, which consists of 14 items, was originally developed by Wagnild and Young (1993) and has demonstrated high reliability and validity. In this study, the English version of the scale was used, which has five subfactors: meaning and purposeful life, perseverance, equanimity, self-reliance, and existential aloneness. Participants rated each item on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). In this study, the reliability of the Resilience Scale was assessed using Cronbach's alpha, which was found to be 0.83.

The Self-Compassion Scale (SCS; Neff, 2003a) evaluates individuals' compassionate attitudes towards themselves when facing challenges or hardships. The scale assesses the extent to which individuals can offer themselves care and understanding when acknowledging their flaws, instead of criticizing or neglecting themselves. It also measures individuals' ability to recognize that suffering and failure are common to human experience, and to manage negative emotions in a balanced way. Respondents rate 26 items on a five-point Likert scale, ranging from 1 (almost never) to 5 (almost always). The SCS comprises six subscales: self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identification. For this study, a composite score of self-compassion was computed by averaging the scores of the self-judgment, isolation, and over-identification subscales (reverse scored). The reliability coefficient of the scale was evaluated using Cronbach's alpha, which was reported to be 0.79 in this research.

The study assessed emotional labor strategies of teachers using the Teacher Emotional Labor Strategy Scale (TELSS) developed by Yin (2012). The TELSS has three subscales: surface acting (five items), deep acting (three items), and genuine expression (three items). Respondents rated their level of agreement on a seven-point Likert scale, ranging from one (strongly disagree) to seven (strongly agree). The internal consistencies of the scale were found to be acceptable in a previous study with Chinese teachers (Yin, 2012), with coefficients of 0.84 for surface acting, 0.70 for deep acting, and 0.67 for genuine expression. In this study, only the items from the deep acting and genuine expression subscales were employed. In this study, the reliability coefficients of these two sub-scales were reported to be 0.82 and 0.85, respectively.

To evaluate the emotional regulation of EFL teachers, the researchers utilized the emotion regulation scale created by Gross and John (2003). The scale consists of 10 items and measures the respondents' inclination and methods for regulating their emotions in two areas: (1) Cognitive Reappraisal and (2) Expressive Suppression. Participants were asked to use a 7-point Likert-type scale varying from 1 (strongly disagree) to 7 (strongly agree) to answer each item.

Procedure

The study used an online survey to collect data from the participants. They were invited to complete the survey voluntarily, and informed consent was obtained before the survey. The survey consisted of two sections: demographic information and the four self-report measures. The demographic information included gender, age, educational background, teaching experience, and region of teaching. The participants accessed the survey using their personal computers or smartphones through online platforms and professional networks. The study assured the participants that their participation was confidential, and they could give up from the study at any time. The data collection process lasted for 1 month.

Data analysis

Firstly, the data was examined for adherence to fundamental assumptions, such as case-to-variable ratios, normality, linearity, missing data, and outliers (Tabachnick et al., 2013; Kline, 2016). Descriptive statistics and variable reliability were then calculated using SPSS 23.0. The instruments' psychometric properties were assessed by conducting confirmatory factor analysis (CFA), refining the model by evaluating the overall fit of the measurement model and the ability of individual items to define their assigned latent factors. Structural equation modeling (SEM) was subsequently employed to test the study's hypotheses by analyzing the relationships' structural

coefficients. The model fit was evaluated using the maximum likelihood estimation method, with values less than three indicating an acceptable data-model fit for relative chi-square (Tabachnick et al., 2013). For comparative fit indices (CFI) and Tucker-Lewis index (TLI), values greater than 0.90 were deemed acceptable, while root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR) values less than 0.06 were considered a close fit (Hu and Bentler, 1999).

Results

Before proceeding with the primary analyses, initial analyses were performed to verify that the data satisfied key assumptions. Missing data, univariate and multivariate outliers, and non-normality were dealt with. SPSS 23.0 was used to determine the data's distribution and identify any potential outliers through descriptive statistics and reliability analysis. To identify univariate outliers, the *z*-scores of each variable were examined, while Mahalanobis distance values were used to detect multivariate outliers (Kline, 2016). The expectation–maximization algorithm was used to manage missing data. Skewness and kurtosis values were used to assess normality, while scatter plots of the independent and dependent variables were used to examine linearity. Additionally, Mardia's value, a measure of multivariate skewness and kurtosis, was calculated to further assess the multivariate normality of the data (Mardia, 1970).

Table 2 presents the means, standard deviations, and correlations among the study variables. The results showed that all the correlations among the variables were significant at the $p < 0.01$ level, indicating that there were significant relationships among the study variables. The mean scores for teacher self-compassion, emotion regulation, emotional labor, and teacher resilience were 3.37 (SD = 0.63), 4.07 (SD = 0.80), 3.46 (SD = 0.56), and 3.73 (SD = 0.60), respectively.

Confirmatory factor analysis was conducted to assess the validity of the scales used in the study. The results showed that the four-factor model had a good fit to the data, as indicated by the following fit indices: χ^2 (478) = 1069.42, $p < 0.001$; RMSEA = 0.05; CFI = 0.96; TLI = 0.95. The factor loadings for all the items were significant at the $p < 0.001$ level, ranging from 0.49 to 0.90, indicating good convergent validity.

Once the measurement model was confirmed, various structural models were assessed to verify the hypotheses. The partial mediation model (Model C) was compared with the full mediation model (Model B) and the direct model (Model A). Table 3 presents the fit statistics for all three models. The results revealed that the hypothesized model (Model C) had a significantly better fit compared to the other models. Therefore, Model C was deemed the most parsimonious fit for the data.

TABLE 2 Descriptive statistics and correlations.

	M	*SD*	1	2	3	4
1. Teacher self-compassion	3.37	0.63	1			
2. Emotion regulation	4.07	0.80	0.44**	1		
3. Emotional labor	3.46	0.56	0.37**	0.42**	1	
4. Teacher resilience	3.73	0.60	0.46**	0.54**	0.45**	1

M, mean; SD, standard deviation; **$p < 0.01$.

The final fitted model's path and parameter estimates are presented in Figure 1. As illustrated in Figure 1, all path coefficients were statistically significant, except for the relationship between teacher self-compassion and resilience. The structural model revealed that teacher self-compassion significantly affected teacher emotional labor ($\beta = 0.44$, $p < 0.01$), and teacher emotion regulation had a significant positive influence on teacher emotional labor ($\beta = 0.59$, $p < 0.01$). Moreover, teacher emotional labor was positively associated with resilience ($\beta = 0.54$, $p < 0.01$).

Next, the study used Baron and Kenny's (1986) method to examine whether teacher emotional labor acted as a mediator between the variables. The direct model (displayed in Table 4) indicated significant path coefficients between teacher self-compassion, teacher emotion regulation, and resilience (self-compassion → resilience: 0.17, $p < 0.05$; emotion regulation → resilience: 0.42, $p < 0.001$), confirming the first step of Baron and Kenny's method. The full mediation model showed that self-compassion and emotion regulation significantly influenced emotional labor (self-compassion → emotional labor: 0.37, $p < 0.001$; emotion regulation → emotional labor: 0.62, $p < 0.001$), thus confirming the second step of the method. The partial mediation model indicated that teacher emotional labor partially mediated the relationship between teacher self-compassion and teacher resilience. Furthermore, teacher self-compassion had an insignificant path coefficient on resilience, while teacher emotional labor acted as a complete mediator between teacher emotion regulation and resilience. Hence, the impact of self-compassion on teacher emotional labor impacted resilience.

Discussion

The current study sought to explore the relationship between teacher self-compassion and emotion regulation as predictors of teacher resilience in EFL context via the mediating role of emotional labor. First of all, the results of this study indicated that teacher self-compassion directly predicted teacher resilience. This finding is in accordance with previous research that has emphasized the importance of positive relationships between individuals' self-compassion and their resilience (e.g., Neff, 2003a,b; Bluth et al., 2018; Nery-Hurwit et al., 2018; Lefebvre et al., 2020; Kotera et al., 2021; Chen, 2022). It can be argued that teacher resilience at work requires a self-compassionate attitude, and higher self-compassion is linked to greater resilience among teachers. From this perspective, instructors who were more self-compassionate were much more resilient; they recovered more quickly from setbacks; they were more tolerant and understanding and faced less anxiety when they failed to fulfill their moral preferences. One potential cause for the association between self-compassion and resilience is that the mindfulness component of self-compassion helps people stay focused on difficult situations, allowing them to respond constructively instead of worrying or responding irrationally (Bluth et al., 2018). Previous studies have shown that self-compassion is associated with higher levels of resilience in various populations, including healthcare workers (Benzo

TABLE 3 Results of fit indices of structural models.

Model	χ^2	df	GFI	CFI	RMSEA	TLI	SRMR
Direct effect model (A)	1174.420**	625	0.82	0.90	0.06	0.89	0.18
Full mediation model (B)	949.185**	621	0.87	0.96	0.04	0.94	0.07
Partial mediation model (C)	867.246**	616	0.90	0.97	0.03	0.96	0.06

$\Delta\chi^2$ shows differences between model and the subsequent model; **p-value < 0.001.

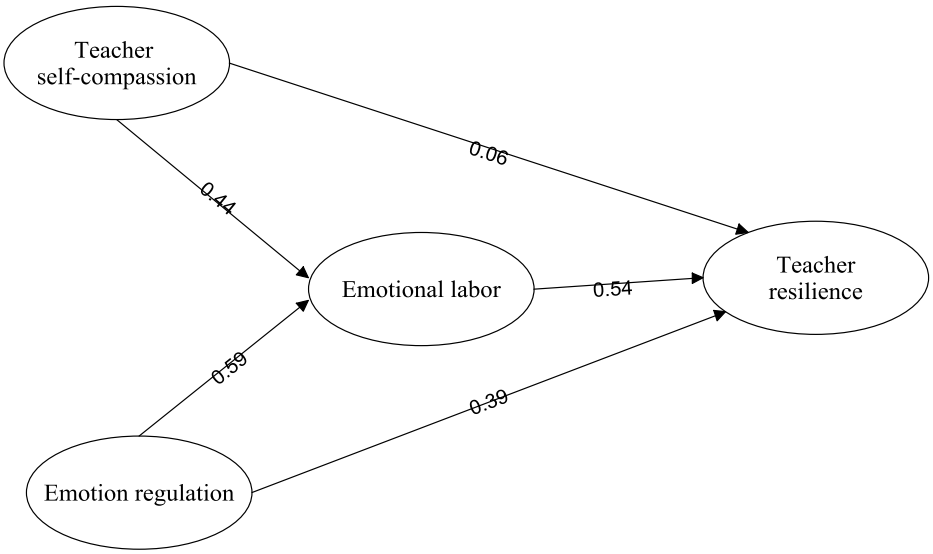

FIGURE 1
The final fit model.

et al., 2017), college students (Smeets et al., 2014), and adults with chronic pain (Edwards et al., 2019). In the context of teaching, self-compassion has been found to be positively associated with emotional stability and job satisfaction (Jennings, 2015), and negatively associated with stress (Hwang et al., 2019). Theoretically, self-compassion is regarded as an adaptive response to the emotional and physical demands of instruction. By treating oneself with kindness and understanding, teachers may be better able to cope with the stress and emotional demands of their work. Self-compassion may also promote a sense of self-efficacy and control (Liao et al., 2021), which can contribute to greater resilience in the face of adversity.

The second finding of this study was that teacher emotional labor strategies directly predicted teacher resilience. This finding is partially in line with studies by Wang et al. (2021) who reported a positive relationship between emotional labor and well-being. It was found that teachers with higher emotional labor competence, had higher levels of resilience while facing various challenges, resulting in a more positive teaching environment. One justification for this finding can be due to the fact that teachers have a crucial role in setting up a positive learning environment; therefore, by using various strategies of emotional labor, their resiliency will increase, and as a result, they will be better able to cope with the difficulties of the teaching profession and classrooms, boost learners' achievements, and enhance the learning environment. Emotional labor is concerned with the effort that individuals expend to manage their emotions during interactions with others (Hochschild, 1983). In the educational contexts, emotional labor involves managing one's emotions in response to students, colleagues, and parents, and includes strategies such as surface acting (i.e., faking emotions) and deep acting (i.e., modifying one's emotions to align with one's true feelings) (Burić and Frenzel, 2021). Previous research has indicated that emotional labor strategies can have effects on teacher well-being and job satisfaction (Cheung et al., 2011; Kinman et al., 2011). Also, the present finding suggests that emotional labor strategies may also be a positive resource for promoting teacher resilience. This finding is consistent with previous research that has highlighted the adaptive nature of emotional labor strategies (Diefendorff et al., 2005; Yin et al., 2013). Emotional labor strategies may be seen as a form of emotion regulation, which is associated with resilience (Fried and Chapman, 2012). By managing their emotions in response to the demands of their work, teachers may be better able to maintain a sense of control and self-efficacy, which can contribute to greater resilience in the face of adversity (Liu and Chu, 2022; López-Angulo et al., 2022).

The last finding of this study was that teacher emotion regulation indirectly predicted teacher resilience via the mediation of emotion labor strategies. This finding is partially in line with previous research (e.g., Xie, 2021; Li and Lv, 2022; Shafiee Rad and Jafarpour, 2022) that highlight the significant relationship between these two constructs in

TABLE 4 Path estimates of structural model.

Standardized path coefficients (*t*-value)			
	Direct effects model	Full mediation model	Partial mediation model
SC → resilience	0.17 (2.79*)		0.06 (0.47)
ER → resilience	0.42 (4.57***)		0.39 (3.98**)
SC → emotional labor		0.37 (4.54**)	0.44 (5.37***)
ER → emotional labor		0.62 (8.34***)	0.59 (7.88***)
Emotional labor → resilience		0.59 (7.27***)	0.54 (6.08***)

SC, self-compassion; ER, emotion regulation; *p-value < 0.05; **p-value < 0.01; ***p-value < 0.001.

particular domains and contexts. It was revealed that when instructors are able to regulate their emotions, they are more likely to have control over their feelings as a result of their emotional labor strategies, which in turn enhances their resilience. One likely justification for this finding can be the fact that when instructors are able to correctly hide their feelings while facing difficulties or intensify their emotions while trying to boost learners' engagement and achievement, this will result in higher teacher resilience, which in turn provides instructors with higher levels of control over both their feelings and classroom management.

The present study suggests that emotion regulation may promote resilience by facilitating the development of effective emotional labor strategies. This finding is consistent with previous research that has highlighted the role of emotion regulation in promoting adaptive coping strategies (Aldao et al., 2010; Bonanno and Burton, 2013). This finding implies that emotion regulation might play a critical role in promoting resilience among teachers by facilitating the development of effective emotional labor strategies. By regulating their emotions in reaction to different demands and stressors in their work, educators may be better able to develop and employ adaptive emotional labor strategies, which in turn may enhance their resilience. Moreover, this finding is also consistent with the theoretical perspective of the transactional model of stress and coping (Lazarus and Folkman, 1984), which emphasizes the importance of the interaction between environmental demands and an individual's coping resources. According to this perspective, individuals with effective coping resources, such as emotion regulation skills, are better able to cope with stressful situations and maintain resilience (Lazarus and Folkman, 1987).

The findings of this study offer valuable insights into the EFL instructional context and its implications for teacher resilience. The initial finding emphasizes the positive association between teacher self-compassion and resilience, aligning with previous research that underscores the significance of self-compassion in fostering resilience. Given the language barriers and diverse student needs in the EFL context (Lee, 2010; Joe and Lee, 2013), self-compassion plays a pivotal role in managing the emotional demands of teaching. By practicing self-kindness and understanding, teachers can effectively cope with stress, overcome setbacks, and maintain a positive outlook. The second finding highlights the direct link between emotional labor strategies and teacher resilience. In EFL instruction, emotional labor is essential for cultivating a positive learning environment and effectively navigating interactions with students, colleagues, and parents (Aragão, 2011; Dewaele and Wu, 2021). Skillful utilization of emotional labor strategies enhances teacher resilience by enabling them to address challenges and foster a supportive teaching environment. The third finding reveals that teacher emotion regulation indirectly predicts resilience through the mediating effect of emotional labor strategies. By regulating their emotions, EFL teachers gain control over their feelings and can employ effective emotional labor strategies, thereby contributing to higher levels of resilience. Overall, these findings not only underscore the contextual relevance of EFL instruction but also deepen our understanding of the dynamics of teacher resilience within this unique educational setting.

Conclusion

This investigation was carried out to probe into the impact of teacher self-compassion and emotional regulation as predictors of teacher resilience in the Chinese EFL context via the mediating role of emotional labor. It was revealed that higher levels of self-compassion, emotional regulation, and emotional labor can result in higher teacher resilience, which is a crucial factor for instructors in order to maintain their control over the classroom and learners. Teachers sometimes need to hide their true feelings in order to keep the classroom atmosphere positive. On the other hand, they might need to intensify their emotions in order to encourage learners and motivate them to better engage in classroom activities. These findings highlight the importance of individual and job-related factors in promoting teacher resilience and well-being.

Concerning the theoretical implications, the present findings verify the growing literature on the importance of positive psychological resources, such as self-compassion, in promoting resilience and well-being. Also, they highlight the adaptive nature of emotional labor strategies and the potential for these strategies to contribute to resilience in the face of job-related stressors. In addition, the critical role of emotion regulation in promoting effective coping strategies and resilience is emphasized. The findings of this investigation have significant practical implications for teacher training programs and school-based interventions, aiming to enhance teacher resilience and mitigate burnout in the Chinese EFL context. Firstly, these programs can integrate strategies that foster self-compassion and improve emotion regulation skills among teachers. By nurturing self-compassion, instructors can cultivate a compassionate attitude towards themselves, facilitating better self-care and emotional well-being. Additionally, promoting effective emotion regulation strategies equips teachers with the necessary tools to navigate challenging situations and manage their emotions more effectively. Secondly, providing opportunities for teachers to develop and employ adaptive emotional labor strategies in response to job-related stressors can greatly contribute to their resilience. Recognizing the dual nature of emotional labor, EFL teachers can learn to strike a balance between concealing their true feelings to maintain a positive classroom atmosphere and intensifying their emotions to motivate and engage learners. Equipping EFL teachers with adaptive emotional labor strategies can enhance their resilience by effectively managing the emotional demands of their profession.

Moreover, fostering positive emotions and minimizing negative emotions within the classroom setting can have a profound impact on motivation, effort, and achievement in foreign language learning. By

incorporating strategies that enhance positive emotions and reduce negative ones, teachers can create an optimal learning environment for their students, resulting in improved learning outcomes. Furthermore, these findings support and contribute to existing literature that emphasizes the significance of positive psychological resources, such as self-compassion, in promoting resilience and well-being. They underscore the adaptable nature of emotional labor strategies and their potential to bolster resilience when faced with job-related stressors. Additionally, the critical role of emotion regulation in fostering effective coping strategies and resilience is highlighted. Implementing the practical implications derived from this research can effectively support EFL instructors in their professional development as knowledgeable, compassionate, and resilient educators. Developing resilience not only enhances their commitment and inspiration but also equips them to effectively support students' educational growth (Gu et al., 2015). Embracing the concept of resilience has the potential to transform EFL instructors into highly skilled professionals who are well-prepared to navigate diverse challenges and make positive contributions to teaching and learning initiatives.

Taken together, in EFL settings, where language barriers and diverse student needs are prevalent (Kalaja and Ferreira, 2008), cultivating self-compassion becomes essential for managing the emotional demands of teaching. By showing themselves kindness and understanding, teachers can effectively handle stress, bounce back from setbacks, and maintain a positive outlook. Additionally, the study underscores the importance of employing effective emotional labor strategies to create a supportive and inclusive learning environment while effectively navigating interactions with students, colleagues, and parents. EFL teachers who possess adaptive emotional labor strategies are better equipped to overcome challenges and cultivate a positive teaching atmosphere. These findings provide valuable insights for the development of teacher training programs and interventions tailored to EFL contexts, aiming to enhance teacher resilience and alleviate burnout.

The present study, like other research studies, has limitations. First, the study used only self-report quantitative measures, which may be subject to response biases. Second, the study was cross-sectional in nature, which limits the ability to draw causal conclusions about the relationships among the variables. Third, the study was conducted in a specific cultural and educational context of China, which may affect the generalizability of the results to other EFL settings.

Data availability statement

The raw data will be accessed without any reservation upon request. Requests to access these datasets should be directed to YH, yajuzibisha317@163.com.

Ethics statement

The studies involving human participants were reviewed and approved by School of Maxism, Sichuan International Studies University, Chongqing, 40031 China. The patients/participants provided their written informed consent to participate in this study.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

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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.

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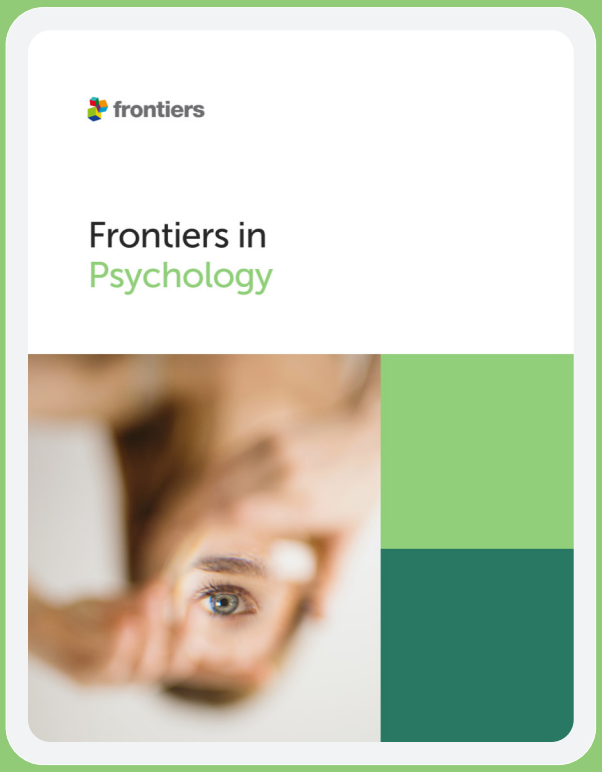

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