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Job satisfaction and self-efficacy of in-service early childhood teachers in the post-COVID-19 pandemic era

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Although the global COVID-19 pandemic has drawn public attention to the ecology of teachers' work, little is known about how external and internal factors interact and affect early childhood teachers' job satisfaction and self-efficacy. The purpose of this study is to examine how the external ecology of kindergartens and individual personality traits affect the job satisfaction and self-efficacy of in-service early childhood teachers in the post-COVID-19 pandemic era through a self-reporting questionnaire distributed among 237 kindergarten teachers in online and offline learning community groups. It was found that the job satisfaction of early childhood teachers was a significant predictor of self-efficacy and played a partially mediating role between personality traits and self-efficacy. Furthermore, personality traits are considered significant predictors of job satisfaction and self-efficacy in Chinese early childhood teachers, and it was noted that these teachers were the least satisfied in terms of pay and promotion. With these findings, this study contributes to the job satisfaction and self-efficacy literature by validating their causal associations in the field of early childhood teachers. Our findings also provide guidelines for practitioners and policymakers in promoting early childhood teacher credentialing and external social support to enhance job satisfaction and self-efficacy. The unique value of this study lies in the clarification of how the work environment and ecology of early childhood teachers in the post-COVID-19 pandemic era influenced self-efficacy and of personality traits being the underlying attributions that led to this result.

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Introduction

The COVID-19 outbreak has shaken all sectors of society, including early childhood education (OECD, 2020; Thu et al., 2020), and it has affected the working conditions of early childhood teachers worldwide (Kwon et al., 2022; Jalongo, 2021; UNICEF, 2021). Fifty-seven percent of early childhood educators in Washington State of the USA reported moderate or high levels of stress through workplace closures, job changes, and economic insecurity (Quinn et al., 2022), and 6.7% of early childhood teachers in the Asia-Pacific region faced the risk of dismissal by their seniors owing to the closure of kindergartens. Even in public kindergartens, 49.6% of teachers faced the pressure of living with a suddenly reduced income because of such unforeseen events and had to make ends meet by seeking other sources of income, which significantly lessened their work drive (UNESCO Bangkok, 2020). Female early childhood teachers in China are subjected to multiple layers of stress from childcare and workload due to the drive for online education (Huang et al., 2021; Zhang, 2021). Reports have shown that their overload stress is negatively correlated with job satisfaction (Hong et al., 2021). Under the impact of the epidemic, the psychological state of early childhood teachers changed dramatically as they suffered from psychological stress and well-being-related challenges (Berger et al., 2022). In addition, they faced many obstacles and challenges in terms of family quality of life, professional development, and social support (Jalongo, 2021; Timmons et al., 2021). From 2020 to 2022, China's early childhood teachers experienced significant ups and downs in their careers as well. Not only did they face a paradigm shift from face-to-face to distant online education, but the quality of teachers in rural and urban areas showed a huge disparity (Unicef, 2023; Yu et al., 2022; Jia, 2021; Yan, 2021). As Yan (2021) notes that, for Chinese kindergarten teachers, the challenges of missing out on authentic life experiences and a weak sense of teacher identity were more pronounced during the pandemic. These studies have led to notice that the pandemic outbreak changed the ecology of early childhood teachers, causing not only changes in their physical environment but also in their psychological state. As core elements of psychological states, the job satisfaction and self-efficacy of early childhood teachers have received much attention in the field of early childhood education (Hall-Kenyon et al., 2014; McLennan et al., 2017; Reyhing & Perren, 2021). Little attention has been given to how the changes after the COVID-19 pandemic affect early childhood teachers' self-efficacy and job satisfaction and how they both affect each other. Although previous studies have identified that early childhood teachers face multifaceted work-related challenges, such as undervalued professional well-being, low professional self-efficacy, and high turnover rates due to low job satisfaction (Jia, 2021; Thorpe et al., 2020; Eadie et al., 2021), few have clarified whether these are influenced by the external environment or by internal personality mechanisms or whether they work together. This study strives to investigate the self-efficacy and job satisfaction status of early childhood teachers after returning to work in a Chinese context. Moreover, it aims to clarify the predictive power of personality traits as predictors of early childhood teachers' job satisfaction and self-efficacy.

Literature Review

A branch of previous studies has substantiated the importance of specialized early education and care on child development theoretically and empirically. The professionalism and caregiving skills of early educators play a key role in children's early development. Teaching and responding to children affect their language skills and cognitive, social, and emotional development (Ladd et al., 1988; Marcy et al., 2016; Phillips et al., 1987; Sabol &

Pianta, 2012; Schliecker et al., 1991). In China, the focus on early childhood teachers has become a significant topic of sustained attention by the Chinese government in recent years. In a document on the deepening reform and standardized development of early childhood education, the State Council pointed out the urgency to strictly equip teachers with standards that guarantee their status and salaries, as well as to improve the training system for early childhood teachers and enhance their professional development (The State Council, 2018). Thus, in the Chinese context, early childhood teachers as a group are increasingly being held to higher expectations and demands.

Ecology of early childhood education teachers after the COVID-19 outbreak. The ratio of public to private kindergartens in China is about 43:57 (MoE, 2021), with both government-employed and kindergarten-employed teachers. However, in some public kindergartens, few teachers belong to the kindergarten-employed category and are not government-employed. Those who are employed by the government are known as the "Tie fanwan" (i.e., stable and with a comprehensive pension. Wei, 2009), and their risk to lose their job due to unforeseen events is very low. Contrarily, kindergarten-employed teachers do not have the same security and benefits and are paid differently for the same work as their government-employed counterparts; their salary is entirely dependent on the kindergartens' operation (Li, 2014). Moreover, while many private preschools in China have been forced to shut down due to the pandemic, they still must pay rent, teachers' salaries, and other costs. Therefore, if funds are lacking, teachers lose their jobs or are forced to give up their jobs to earn a living in other professions as they have no source of income (Wei et al., 2021). In some kindergartens with mixed employment relationships, when teachers who are not given any duty and are forced to resign, their work is transferred to the remaining teachers, this creates a greater challenge for the remaining teachers as they must accept many administrative orders unconditionally and change roles. For instance, in Thailand, teachers are responsible for delivering milk to their assigned families. In Japan, they regularly tweet daily childcare content and play instructions to parents through social media channels such as kindergartens, nursery homepages, or YouTube to ensure that childcare is ongoing. Furthermore, videos on lifestyle habits and infection prevention are produced and posted on YouTube, SNS, etc., and checklists on lifestyle habits and health management are distributed. These measures provide scientific guidance to parents who are raising children at home (MEXT, 2020). All these sudden tasks and unprecedented challenges may have further created fear among early childhood teachers (Kim, 2020).

In a survey conducted by UNESCO Bangkok in April-May 2020 with 2,040 participants from 34 countries, only 1.28% had received crisis management training. 20.1% had received prior training in child-oriented online learning, and 35.2% had received psychosocial support, such as stress management advice from the government (UNESCO Bangkok, 2020). Although lectures or training on online education and preparedness guidelines were given to teachers in different regions during the pandemic (Abdul-Majied et al., 2023), non-staff teachers lacked the motivation to improve their professionalism because of concerns about career stability and future prospects. As Yan's (2021) study showed, post-pandemic early childhood educators (ECE) were at risk of having a weak professional identity, that is, they did not consider themselves to be "real" ECE teachers; thus, they gradually lost motivation to improve their professional skills and showed lower job satisfaction and self-efficacy in their work.

Strategies for comprehensive career support for in-service early childhood teachers were already in place during the COVID-19 outbreak, for example, Early Childhood Australia provided advice and professional guidance to ECE to ensure their mental health and well-being during the pandemic (Eadie et al., 2021). However, the broader context in different cultures still needs to be addressed and emphasized. The question of their experience of the work environment and job satisfaction when they return to face-to-face educational practice still lingers.

Early childhood teachers' job satisfaction. Job satisfaction is defined as having an intrinsic drive for work, being willing to take the initiative to learn and explore, not being afraid of obstacles, and having a sense of belonging and self-actualization (Locke, 1976; Zhu, 2013). It has been demonstrated that high job satisfaction contributes to the quality of early childhood education and brings a different perspective to children's interactions promoting children's language, cognitive, and emotional development, among others. Conversely, low job satisfaction results in low productivity and a lack of self-fulfillment, thus being detrimental to teacher-child interactions (Hu et al., 2012; Ma, 2019; OECD, 2018). In China, with the policy reform in recent years, an increasing amount of attention has been paid to the job status of early childhood teachers, and the implementation of various policies intended to improve the quality of early childhood education (Jiang et al., 2021). The constant introduction of regulations on teachers' requirements can be described as a layer of advancement. Owing to an intense amount of publicity and gradual vapidness set in by social media, teachers are pushed further into the limelight. Many teachers in private kindergartens are losing their jobs or must take the "long road" to get into public kindergartens. In China, some teachers in public kindergartens are employed by the kindergarten and not by the local government, contributing to differences in their benefits and social security (Hu & Szente, 2009; Zhu & Zhang, 2008). As kindergartens return to their normal work schedule, early childhood teachers are faced with various challenges and unknowns; however, it is necessary to understand their state of being and feelings—not only in terms of what they do but also in terms of "who they are" when acting to improve early childhood education. It is important to hear their inner voices to develop the quality of early childhood education (Jiang et al., 2021). Historically, many relevant studies have proven that early childhood teachers' job satisfaction is not only closely related to children's development but also directly related to their own career development (Zhu, 2013). Cazares (2008) argues that inappropriate early educator performance in emotion management can have an irreversible impact on the development of social-emotional skills in children's later school years. Early childhood teachers generally interact with parents to support their children's development, and this harmonious "partnership" with parents achieves the goal of caring for children by balancing the teachers' professional knowledge with the child's nurturing needs met by the parents (Bigras et al., 2021). Prior research documents have shown that the job of nurturing young children itself gives preschool teachers a high level of satisfaction, a sense of value from the process, and an investment of affection and love that is not controlled by external circumstances or policymakers with demands for accountability, organizational performance, and standardization; moreover, it offers them more professional autonomy and morale, and therefore, they feel no desire to leave (Bullough et al., 2012; Kontos & Stremmel, 1988). Early childhood teachers have higher job satisfaction and show more positive attitudes toward teaching, their colleagues, and professional continuity (Crossman & Harris, 2006). Oral interviews and questionnaires with early childhood

teachers by Mathieu have revealed that more than 50% of teachers' job satisfaction is related to organizational commitment and terms of service and can have an impact on teachers' classroom activities (Mathieu, 1991).

Challenges and factors affecting job satisfaction of early childhood teachers. The early childhood teacher population generally suffers from varying degrees of job stress (Zhang & Li, 2019). Several studies have been conducted to prove that early childhood teachers' job satisfaction and status are related to their corresponding various environments and contexts. For example, Wang (2013), a Chinese researcher, conducted a questionnaire survey to explore the characteristics of early childhood teachers' occupational well-being and its relationship with occupational commitment. A total of 533 early childhood teachers in Sichuan and Chongqing were randomly selected for the study; it was found that the psychological and emotional well-being of urban early childhood teachers were significantly higher than those in rural areas, and the social well-being of early childhood teachers in public kindergartens was significantly higher than that of teachers in private kindergartens. A significant positive correlation was found between social well-being and monthly income, and it was noted that the nature of the kindergarten, the location, as well as the salary package affect the job satisfaction of early childhood teachers (Wang, 2013). A study conducted in Germany demonstrated that the highest job satisfaction among teachers was related to leadership, social support, and a sense of community (Kusma et al., 2012). In Taiwan, Cheng and Chen (2011) found that early childhood teachers' job satisfaction was most closely related to compensation, followed by fair treatment by the management, good relationships, values with colleagues, and work environment. The work environment is a huge challenge for early childhood teachers, who typically suffer from low pay, burnout that is 20% higher than in other professions, and little room for career advancement (Whitebook et al., 2016). In addition, they often face concerns about the future of their career mainly due to financial pressures, including income stability, pension insurance, and necessary living expenses, which eventually give rise to stress, and anxiety (Cumming, 2016; Whitebook et al., 2016). In Jordan, Abu Taleb (2013) found that the physical environment and co-worker relationships were the most associated with their job satisfaction (Abu Taleb, 2013). In China, studies have found significant individual differences in the job satisfaction of early childhood teachers (e.g., the job satisfaction of childcare teachers was significantly higher than that of teaching teachers (Wang et al., 2007). Liang and Feng's study documents that the satisfaction of early childhood teachers with teaching experience ranging from less than 1 year to more than 20 years was lower than that of early childhood teachers. This may be because new teachers must deal with adjustment problems; thus, their job satisfaction is lower, and those with more than 20 years of teaching experience are more prone to burnout, resulting in a lower job satisfaction (Liang & Feng, 2004). There is evidence that early childhood teachers' job satisfaction is influenced by both external and individual factors, but very little is known about how exactly these factors they interact with each other to establish a connection with job satisfaction.

Early education is often considered an emotionally demanding job. de Schipper et al. (2008) investigated the impact of teachers' emotions on early childhood practice and found that optimism and positive emotions contributed positively to educators' caregiving behaviors and children's well-being (de Schipper et al., 2008). Another study conducted by Kotaman (2014) focused on the "personal emotional problems" of ECE in Turkey. Based on interview data, Kotaman identified two main emotional

problems—anger management and self-blame—and also found that the main influences on these educators' emotional problems were language barriers, underestimation of early childhood education by parents or colleagues, different expectations between educators and parents, and isolation. He proposed an individualized solution to this problem, that is, educators should develop “emotional skills” that enable them to adjust their self-awareness and “personal” emotions to better serve the families with which they work (Kotaman, 2014). In practice, however, many early childhood teachers are treated as “babysitters” rather than professional educators, and their value and commitment are overlooked or undervalued, which causes self-abandonment in performance or their being unmotivated, eventually leading to burnout ((Schaack & Stedron, 2020). Early childhood teachers' self-personality traits and work experiences generated by different contexts (e.g., public or private, supported by professional skills such as training or not) will likely influence their overall job satisfaction, which may have a direct impact on self-efficacy in terms of professional skills output in subsequent practice. Therefore, this study sought to investigate whether professional training support and personality traits of Chinese early childhood teachers in the context of the COVID-19 pandemic significantly influenced job satisfaction and thus their self-efficacy as professional educators.

Teacher self-efficacy. Self-efficacy is considered a core skill necessary for work and life in the 21st century (Lamb et al., 2017). According to Bandura's (1995) definition, self-efficacy refers to an individual's beliefs about their ability to organize activities or execute a given program. Another interpretation of self-evaluation and belief is “self-affirmation,” namely “I believe I have a combination of qualities, such as motivation, perseverance, and execution, to accomplish this task or goal.” Teachers' self-efficacy is based on Bandura's (1986) social learning theory, which states that an individual's thoughts influence their behavior in a given environment, it refers to a teacher's self-perceived competence in teaching and helping students in the classroom (Pan, 2014); for instance, teachers with high self-efficacy believe that their interactions with children have a significant impact on children's learning and development rather than being attributed to other external conditions, such as the children's home environment; therefore, they also improve the quality of their interactions with children through continuous learning and improvement. This, in turn, enhances their teaching and learning (Tschannen-Moran & Woolfolk Hoy, 2001). Woolfolk Hoy & Spero (2005) showed a significant association between teachers' self-efficacy and burnout and reported that teachers who have a high level of self-efficacy experience a greater sense of achievement, fulfillment, or satisfaction in their workplace development and have more motivation and persistence (Ross & Bruce, 2007); thus, they are less likely to experience burnout. Moreover, numerous studies have explored the factors that influence job satisfaction as an outcome variable—for example, self-efficacy affecting job satisfaction (Alifuddin & Widodo, 2021). The studies in China have proven that the self-efficacy of private kindergarten teachers is positively related to job satisfaction (Hou et al., 2021; Liu et al., 2017). Moreover, teachers' self-efficacy depends on their acquired professional competence and experience, social persuasion, as well as physical and emotional state (Bandura, 1995). Studies have confirmed that teachers' self-efficacy has a positive and significant effect on the output of teaching performance, efficient teaching methods, and professional satisfaction (Alifuddin & Widodo, 2021; Goddard et al., 2004; Ortan et al., 2021); however, it is possible that when the workplace environment induces a low level of satisfaction, teachers' self-efficacy also

decreases. Teachers' self-perception and self-efficacy may also be affected in cases of low level of satisfaction and fulfillment provided by the workplace environment. A study of Australian early childhood teachers' self-efficacy showed that this is an important predictor of career commitment and continuation (Kilgallon et al., 2008) and that a supportive environment and a sense of value in the workplace to promote a better life for children promotes engagement at work (Lipscomb et al., 2021). Lipscomb et al. (2021) demonstrated that the self-efficacy of early childhood teachers is dynamically moldable and depends on adequate preparation, professional training and development, and leadership support (Ciyer et al., 2010; Von Suchodoletz et al., 2018). It may be important to explore the factors that influence the self-efficacy of ECE to provide further support for them to be able to devote themselves selflessly to their work. Therefore, this study explores the specific factors that affect their self-efficacy based on the current status of Chinese early childhood teachers' job satisfaction in the context of the COVID-19 pandemic to support the professional development of Chinese early childhood teachers and high-quality teacher-child relationship interactions.

Personality traits and self-efficacy. Allport and Odbert (1961) state that personality traits are a combination of physiological and physical dynamic organization with the ability to perceive the external environment and adapt to it. Personality traits may be defined as a person's inherent character (McCrae & Costa, 1999); they are also defined as the persistent and stable psychological characteristics that have varying degrees of influence on an individual's way of thinking and behavior (Bastian et al., 2017). It has been shown that individual personality traits are important factors that influence self-efficacy (Stajkovic et al., 2018). A study conducted by Zhang et al. (2019) on Chinese national athletes showed a significant correlation between self-efficacy and personality traits, and the findings of the study by Djigić et al. (2014) showed that self-awareness predicted teachers' self-efficacy, whereas personal responsibility and extraversion were significantly and positively correlated with self-efficacy (Judge et al., 2007; Schmitt, 2007). These studies provide a strong empirical basis for the association between self-efficacy and personality traits.

It has been established that the personality traits of early childhood teachers are significantly associated with job satisfaction and that the Big Five personality traits have a significant impact on preschool teachers' emotional labor (Zhang, 2021). Jin and Kin's (2018) study showed that early childhood teachers' personality traits have a significant impact on their workplace relationships in general, in particular, neuroticism, agreeableness, and conscientiousness were found to have a significant impact (Jin & Kin, 2018). Different personality traits create different emotional perceptions of the external work environment. This dynamic state of psychological needs is likely to bring about different levels of self-efficacy to support or repel or even reject an individual's behavior for the work being done or to be continued in the future. Based on the existing research, the present study investigates the mediating role of personality traits and self-efficacy in the context of the post-COVID-19 pandemic using Chinese early childhood teachers' job satisfaction as a moderating variable, ultimately seeking to provide supportive strategic suggestions for improving Chinese early childhood teachers' job satisfaction and the quality of teaching and learning.

Previous studies have clarified the importance of early childhood teachers' job satisfaction and self-efficacy for early childhood development and career prospects. In addition, they have identified the extent to which job satisfaction and self-efficacy are influenced by different levels of variables, including

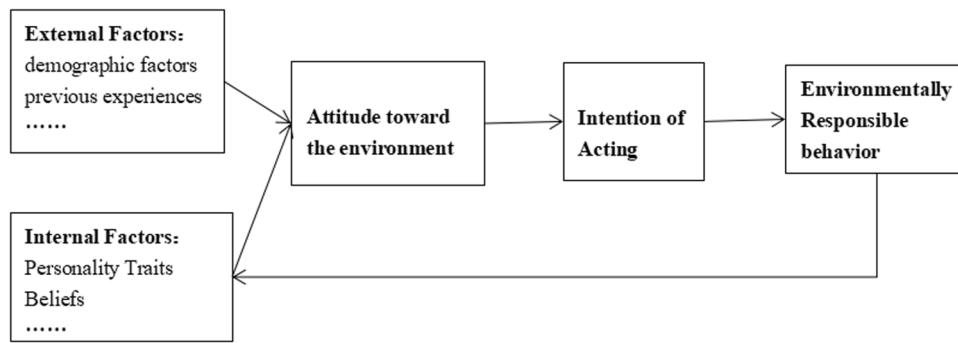


Fig. 1 Conceptual model for environmentally responsible behavior (ERB) of early childhood teachers. The figure depicts the construction and application of the Environmentally Responsible Behavior Theory among early childhood teachers. The direction of the arrows indicates the influenced variables. Both internal factors, such as personality traits, and external factors, such as prior experiences and the kindergarten work environment, collectively influence the attitudes of early childhood teachers toward their work. These attitudinal inclinations further affect their behavioral intentions, ultimately leading to responsible behaviors in their work environment.

demographic variables, institutional policies, and psychological mechanisms. However, the COVID-19 pandemic has changed the ecological context for early childhood teachers, and the available empirical evidence notes that they have experienced or are experiencing many professional challenges and shocks. In terms of the relations between the job satisfaction and self-efficacy, to the author’s knowledge, a unified conclusion on the relationship between the two has not yet formed. Most studies have pointed out that self-efficacy affects job satisfaction, and although several studies have elucidated that job satisfaction affects self-efficacy, their generalizability in the field of early childhood education is far from adequate. Thus, it is necessary to continue gaining knowledge in different cultural contexts (especially that of the COVID-19 pandemic) on the multiple factors of the external environment and internal psychological mechanisms that may related to job satisfaction and self-efficacy. In addition, how job satisfaction affect self-efficacy must be further clarified. Given this background, we propose three research questions as follows:

RQ1: What is the level of job satisfaction of Chinese early childhood teachers in the post-COVID-19 pandemic era?

RQ2: What factors influence Chinese early childhood teachers’ job satisfaction and self-efficacy?

RQ3: How do external environmental factors and internal psychological mechanisms affect Chinese early childhood teachers’ job satisfaction and self-efficacy?

Theoretical Framework

This study seeks to provide Chinese early childhood teachers with specific strategies for enhancing job satisfaction and self-efficacy to improve career development and the quality of the early childhood education profession; therefore, it is necessary to understand the internal and external factors that influence their job satisfaction and self-efficacy. The environmentally responsible behavior (ERB) model in this study is a concept inspired by Hines, Hungerford, and Tomera’s model (1986–1987), and it considers the preceding factors, such as demographic factors, past experiences, personal knowledge, beliefs, and the ability to act in interaction. This interaction facilitates the development of positive environmental attitudes toward the issue in question, which in turn strengthens the behavior’s intention and finally its implementation through specific actions. Based on the multiple internal and external environmental factors faced by Chinese early childhood teachers in the post-COVID-19 pandemic era, this study takes into account not only demographic variables but also individual personality traits as a factor in the model (see Fig. 1) to explore their attitudes toward job satisfaction and self-efficacy intentions in practice.

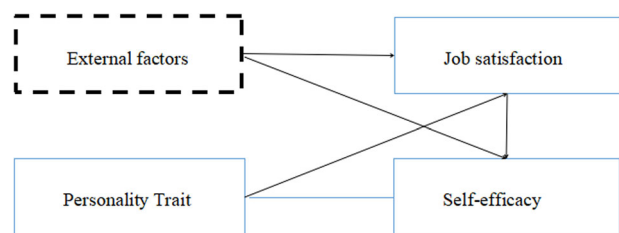


Fig. 2 Path hypothesis of variable interrelationship. The figure specifically outlines the path hypothesis for this study’s research objectives. Dashed box represent a collective term for multiple external factors, while solid boxes denote specific variables. The direction of the arrows indicates the influenced variables. It aims to explore the relationships between external factors, personality traits, job satisfaction, and self-efficacy. This path hypothesis is reflected not only in direct effects but also in indirect impacts.

Based on the conceptual theory above (Fig. 1), four hypotheses were formulated for this study (Fig. 2).

Hypothesis 1: The level of job satisfaction of in-service early childhood teachers shows significant differences.

Hypothesis 2: The external factors and early childhood teachers’ personality traits affect their job satisfaction.

Hypothesis 3: The external factors and early childhood teachers’ personality traits affect self-efficacy.

Hypothesis 4: Early childhood teachers’ job satisfaction affects self-efficacy.

Methodology

This study quantitatively investigated the status of Chinese early childhood teachers upon their return to work in the post-COVID-19 pandemic by adopting targeted sampling. Considering that it was conducted in the context of “reopening preschools” after the outbreak of the COVID-19 pandemic, the respondents were required to meet the following criteria: (a) they were in-service early childhood teachers before and after the COVID-19 pandemic; (b) the kindergartens they worked in before the outbreak and after they returned to work were the same. The reason for taking these factors into account is to control for variables caused by changes in the kindergarten site to ensure the objectivity of the data.

Participants. Since the authors are university faculty members, and one of them can train and learn with early childhood teachers and professional institutional ECE from different regions, they were able to obtain a survey sample that met the criteria in some

community network. The participants of this study were recruited from volunteers based on offline and online co-learning groups. The community-based participants were early childhood teachers who participated in local training programs or had been invited by one of the authors to fill out a questionnaire after attending their lecture on professional improvement online. The questionnaire was sent to them via email after obtaining their consent. The other source, the “community” was an online learning community formed spontaneously by practitioners in the field of early childhood education due to some common interests, and it comprised kindergarten teachers from different regions of China. The participants of this learning community would exchange practical education issues and read books about early childhood education together. Participants were recruited by posting information in this community through the referral of the founder of the learning community, and the study was conducted as an anonymous online survey with questionnaires collected by mail. All the data were collected from August 1, 2021 to November 30, 2021 through a paper-and-pencil survey and online self-reporting questionnaire. We collected the sample with 5-10 times the number of observed variable question items (Kotrlík & Higgins, 2001). In total, there were 45 observed variables in our study, so a sample of at least 225 or more was required. A total of 250 questionnaires were sent out in this survey, and 237 questionnaires were effectively returned, with a valid return rate of 94.8%. Participants in the questionnaire came from all regions of China, with 89% of them coming from the Eastern China.

Measures. The measurement instrument for this study contains two parts. The first part is basic information, specifically demographic variables; the external environment of the kindergarten, such as whether it is public or private; and whether it provides training opportunities for early childhood teachers. The second part includes scales on job satisfaction, personality traits, and self-efficacy. We employed IBM SPSS 23.0 and AMOS 23.0 to analyze the valid data. First, we tested reliability and validity were tested by Cronbach’s alpha, composite reliability (CR), average variance extracted (AVE), and confirmatory factor analysis (CFA). Then, we performed descriptive statistics, analysis of variance (ANOVA) test, and correlation analysis according to the hypothesis. Third, we adopted the structural equation model (SEM) to validate the direct effect between the variables. Lastly, we used the bootstrap confidence interval method (5000 samples) to test the mediating effect.

External factors. External factors include demographic factors and the nature of the kindergarten (e.g., public or private kindergarten), as well as the number of professionally relevant skills training programs attended in the year following the COVID-19 outbreak.

Job satisfaction scale. The job satisfaction scale for early childhood teachers in this study used Bloom’s (2010) 5-point Likert-type scale, which was divided into five categories: colleague relationships, supervisor relationships, the job itself, working conditions and pay, and opportunities for advancement. Co-worker relationship questions included “My coworkers care about me” and “My coworkers share ideas and resources with me,” whereas supervisor relationship items include questions such as “I am given helpful feedback about my performance” and “My supervisor is very dependable.” The items under the job itself items included “my work is stimulating and challenging,” and items on working conditions included “My work schedule is flexible” and “My pay is fair considering my background and skills.” The teacher–child ratio was adequate. All items were scored from 1-5,

with 1 indicating strong disagreement and 5 indicating strong agreement; higher scores indicate higher levels of agreement. The reliability of this scale was 0.88.

Personality trait scale. The personality trait measure is a revised personality trait scale for Chinese early childhood teachers based on the Big Five personality scale and research literature. It includes three aspects mentioned in Jin and Kin’s (2018) study, namely neuroticism, agreeableness, and conscientiousness, with specific items with an alpha reliability coefficient of 0.93, such as “I am an emotionally stable person,” “I am an active learner,” “I actively communicate with teachers and parents to seek solutions to problems,” “I am willing to think about problems from the perspective of others,” etc. These items were rated on a Likert-type rating scale, with scores ranked in increasing order from 1 to 5 (1 = “strongly disagree; 5 = “strongly agree”). Higher scores indicate higher emotional stability, active learner, good communicator, and empathic traits.

Self-efficacy scale. In this study, we used the Teachers’ Sense of Efficacy Scale, a Chinese translation of the Tschannen-Moran and Woolfolk Scale (Tschannen-Moran & Woolfolk, 2001), which comprises 24 items asking questions such as “How much can you do to control disruptive behavior in the classroom?” It includes teacher input on student engagement, instructional strategies, and classroom management, and items are self-reported on a 9-point scale ranging from *nothing* to a *great deal*, with higher scores indicating higher self-efficacy and an overall alpha coefficient of 0.95.

Results

Since the data for all variables in this study were obtained from questionnaires, common method biases may exist. To reduce the influence of common method biases on the results, firstly, the study conducted procedural controls during the administration process (e.g., the questionnaire was administered with the instructions that it would be filled out anonymously, that there would be no right or wrong answers, and that the results would be kept confidential and used only for academic research.). Second, the Harman one-factor method was used to test for common method bias. It found that 11 factors had eigenvalues greater than 1, and the explanation rate of the first factor was 29.87%, which was lower than the critical criterion of 40% (Baumgartner et al., 2021), indicating no common method bias issue in the data of this study.

We used IBM SPSS 23.0 and AMOS 23.0 to analyze the valid data. First, Cronbach’s alpha was tested for the questionnaire structure; for job satisfaction, personality trait, and self-efficacy, this was distributed between 0.88 and 0.95 as presented, indicating high reliability (greater than 0.7). Second, CR and AVE were used to measure convergent validity. The composite reliability of job satisfaction, personality traits, and self-efficacy were 0.883, 0.881, and 0.787, respectively, and their AVE were 0.502, 0.513, 0.521, respectively, which were acceptable (CR > 0.58, AVE > 0.41) according to the standard validated by Fornell and Larcker (1981). On the basis that convergence was accepted, we employed descriptive analysis, ANOVA, and correlation analysis to verify hypothesis 1. Finally, we used CFA to test the fitness of the model formulated in this study. As presented in the test, $X^2/df = 3.95$ (within norm chi-square value X^2/df ranged between 2 and 5); NFI (normed fit index) = 0.92 > 0.9; GFI (goodness of fit index) = 0.91 > 0.9; CFI (comparative fit index) = 0.93 > 0.9; SRMR (standardized root mean square residual) = 0.04 < 0.06; and RMSEA (root mean square error of approximation) = 0.07 < 0.08. These results demonstrated that the measurement model had a good fit.

As shown in Table 1, among the 237 kindergarten teachers surveyed, 98.73% were women; 87.77% were under the age of 35; 97.89% had a college degree or higher; 97.47% earned less than 100,000 yen (about 1500 USD) per year. Moreover, 98.31% came from public kindergartens. Even though 89% of them came from eastern China, which is among the most economically developed regions in China and has higher education levels and resources

than other regions, 7.59% of them never attended any training in the previous year, and only 27% of them had attended one–two training sessions in the past year; 38.4% had attended three–four trainings, and 16.88% had attended no less than 12 trainings a year. Moreover, 43.46% of them had less than 3 years of teaching experience; 19% of them had 4–5 years of teaching experience; 16.88% had 6–10 years of teaching experience, and 20.68% had more than 11 years of teaching experience.

Preliminary descriptive statistical analysis (Table 2) shows that Chinese kindergarten teachers who returned to work after the COVID-19 pandemic had the lowest mean in terms of salary and promotion opportunities ($M = 11.79$); this result shows that the pay and promotion of in-service early childhood teachers in China are important indicators of high or low levels of job satisfaction. The teachers who participated in the survey showed significant disparity in the dimension of the work itself ($SD = 4.13$). These disparities not only provide a potential perspective to further clarify whether the job satisfaction level is related to the external kindergarten environment, such as the nature of the kindergarten and the opportunities available in it to support professional development, but they may also provide a perspective on the individual practices (e.g., years of experience) and personality traits of working kindergarten teachers. In addition, the ANOVA test showed significant differences in pay and promotion dimension between public and private kindergartens, and whether or not they attended training showed significant differences on co-worker relations. These findings provide an empirical basis for further clarifying whether these external factors affect overall job satisfaction and self-efficacy.

Among the results of the correlation analysis, this study found a significant correlation between personality traits, self-efficacy, and job satisfaction of in-service early childhood teachers (see Table 3). This finding provides a prerequisite basis for the previously posed research questions and an empirical basis for the clarification of the research hypotheses. Based on this, a structural equation modeling was performed.

As shown in Fig. 3 and Table 4, personality traits were significantly and positively associated with job satisfaction ($\beta = 0.522, p = 0.001$) and self-efficacy ($\beta = 0.351, p = 0.001$). However, training attended ($\beta = 0.032, p = 0.065$) and years of teaching ($\beta = 0.121, p = 0.058$) were not related to job satisfaction; thus, H2 was partially supported. The training attended ($\beta = 0.489, p = 0.01$) and years of teaching ($\beta = 0.366, p = 0.01$) were both positive and significant predictors of self-efficacy; thus,

Table 1 Description Statistics (N = 237).

Item	Sample group	N	%
Gender	Female	234	98.73%
	Male	3	1.27%
Married	Yes	129	54.43%
	single	108	45.57%
Age	≤35	208	87.77%
	36–50	27	11.39%
	≥51	2	0.84%
Teaching experience	≤3	103	43.46%
	4–5	45	18.99%
	6–10	40	16.88%
	≥11	49	20.68%
Annual household income	1. Less than 100,000CNY (low-income group)	231	97.47%
	2. 100,000–500,000 CNY (middle-income group)	6	2.53%
	3. Above 500,000 CNY (high-income group)	0	0
Education level	1. primary education	5	2.11%
	2. High education	232	97.89%
Kindergarten	1. Public	233	98.31%
	2. Private	4	1.69%
Class Capacity	Within 20	10	4.22%
	21–30	61	25.74%
Location	31 or more	166	70.04%
	Northeast	8	3.38%
	East	211	89.03%
	Middle	16	6.75%
Number of trainings attended in the past year	West	2	0.84%
	0	18	7.59%
	1–2	64	27%
	3–6	91	38.4%
	7–11	24	10.13%
	≥12	40	16.88%

Table 2 Summary of ANOVA tests between variables (N = 237).

Item		Co-Worker Relations	Supervisor Relations	The work itself	Work condition	Pay and Promotion Opportunities
M ± SD		18.91 ± 2.12	18.46 ± 2.81	25.81 ± 4.13	20.77 ± 3.81	11.79 ± 3.14
Teaching experience	≤3	18.97 ± 1.91	18.5 ± 2.72	25.61 ± 4.31	20.93 ± 3.83	11.66 ± 3.12
	4–5	18.33 ± 2.71	17.6 ± 3.17	25 ± 4.11	19.77 ± 3.66	11.84 ± 2.67
	6–10	18.85 ± 2.44	18.6 ± 2.92	26.32 ± 4.12	21.25 ± 3.88	12.47 ± 3.21
	≥11	19.38 ± 2.12	18.9 ± 2.41	26.57 ± 3.65	20.97 ± 3.78	11.48 ± 3.53
Kindergarten	F	1.992	1.883	1.426	1.348	0.840
	Public	18.89 ± 2.13	18.45 ± 2.82	25.75 ± 4.13	20.72 ± 3.81	11.74 ± 3.15
	Private	20 ± 0.92	19.25 ± 1.5	29 ± 2	23.75 ± 2.5	14.75 ± 0.5
Number of trainings attended in the past year	F	4.969*	1.319	2.435	2.498	8.016**
	0	18.61 ± 2.32	17.94 ± 2.89	24.33 ± 5.07	19.94 ± 4.03	11.27 ± 2.84
	1–2	18.96 ± 1.94	18.41 ± 2.58	25.82 ± 3.8	20.51 ± 3.66	11.59 ± 3.05
	3–6	18.70 ± 2.45	18.29 ± 3.26	25.51 ± 4.19	20.43 ± 3.83	11.73 ± 3.14
	7–11	19.08 ± 2.01	18.91 ± 1.97	26.87 ± 3.53	22.29 ± 3.18	12.33 ± 3.42
	≥12	19.35 ± 1.49	18.92 ± 2.4	26.5 ± 4.26	21.42 ± 4.06	11.79 ± 3.14
	F	6.781*	0.664	1.377	1.730	0.511

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

Table 3 Summary of means, standard deviations and correlations for variables (N = 237).

Variable	M	SD	1	2	3	4	5	6	7	8	9
1. Gender	1.99	0.112	1	0.069	-0.111	-0.278**	0.002	0.078	0.061	0.086	0.038
2. Age	1.44	0.726	0.069	1	0.149*	-0.079	-0.074	0.720**	0.108	0.013	0.178**
3. Education Level	2.47	0.541	-0.111	0.149*	1	-0.115	0.061	0.135*	-0.108	-0.092	-0.082
4. Nature of Kindergarten	1.02	0.129	-0.278**	-0.079	-0.115	1	-0.058	-0.016	0.092	0.104	0.103
5. Training Attended	3.02	1.164	0.002	-0.074	0.061	-0.058	1	-0.026	0.074	0.121*	0.171*
6. Years of Teaching	2.15	1.189	0.078	0.720**	0.135*	-0.016	-0.026	1	0.123	0.061	0.263**
7. Personality Traits	18.46	2.61	0.061	0.108	-0.108	0.092	0.074	0.123	1	0.532**	0.704**
8. Job Satisfaction	95.78	13.85	0.086	0.013	-0.092	0.104	0.121	0.06	0.532**	1	0.601**
9. Self-efficacy	184.49	30.03	0.038	0.178**	-0.082	0.103	0.071	0.263**	0.704**	0.601**	1

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

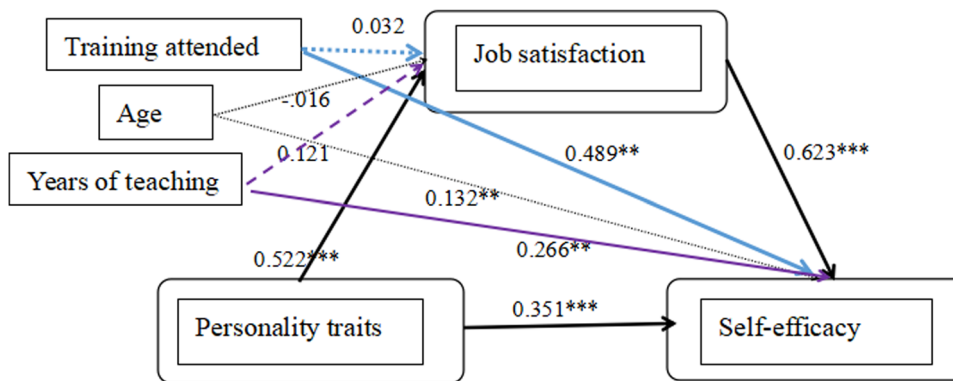


Fig. 3 Structural model and standardized estimate values. The figure presents the results of the structural model analysis. The direction of the arrows indicates the influenced variables, and different colors of solid and dashed lines respectively signify whether different variables have a significant impact on job satisfaction and self-efficacy. ** $p < 0.01$; *** $p < 0.001$.

Table 4 Summary of structural model results.

Path	Direct Effect		Indirect Effect	
	β	95% CI	β	95% CI
PT→JS	0.522***	[0.182, 0.322]		
JS→SE	0.623***	[0.209, 0.311]		
PT→SE	0.351***	[0.016, 0.27]		
PT→JS→SE			0.213***	[0.011, 0.028]

Note. PT = Personality traits; JB = Job satisfaction; SE = Self-efficacy; *** $p < 0.001$.

H3 was supported. Notably, job satisfaction ($\beta = 0.623$, $p = 0.001$) had the strongest effect on self-efficacy; thus, H4 was supported. In addition, as SEM is identified as providing strong evidence for mediating effects (Little et al., 2007), we adopted the mediating effect to test the relation between personality trait and self-efficacy via job satisfaction. The result shown in Table 4 indicates that personality trait had a significant indirect effect on self-efficacy via job satisfaction ($\beta = 0.213$, $p = 0.001$).

Discussion and Implication

This study identifies the current situation of kindergarten ecology, job satisfaction, and self-efficacy of in-service early childhood teachers in China in the post-epidemic era. We endeavored to clarify how the external factor, such as the kindergarten environment, and the internal factor, such as the personality trait, influence early childhood teachers' job satisfaction and self-efficacy.

This study demonstrated that Chinese early childhood teachers' job satisfaction had significant predictive power on self-efficacy, and it plays a mediating role between the effects of personality traits on self-efficacy. This finding provides a strong empirical basis to support the conclusion that job satisfaction and self-efficacy are causally dependent on each other. Although our result contrasts with the findings of extant research on the significant effect of self-efficacy on job satisfaction and work engagement (Skaalvik & Skaalvik, 2014), it provides new ideas and insights into how to promote the job satisfaction and self-efficacy levels of early childhood teachers in the context of the COVID-19 outbreak. Owing to the ongoing COVID-19 pandemic, many early childhood teachers lost their jobs or faced unprecedented challenges. The uncertainty of the pandemic's attack on humanity has left all of society in a state of trepidation and insecurity (teachers lost jobs or accessed to few resources), even the trust and dependence between people have reduced (e.g., school closures and social isolation have left many children and adults without learning opportunities and facing mental health problems) (Robinson et al., 2023; Pokhrel & Chhetri, 2021; Will, 2021). Research has shown that early childhood teachers generally receive low salaries and benefits (Whitebook et al., 2018), and they cannot have discretionary free time to consider professional development (Grant et al., 2019; Whitebook et al., 2018). As the results of this study have shown, during the COVID-19 pandemic, Chinese in-service early childhood teachers reported the least satisfaction in salary as well as the least pay and promotion opportunities from kindergarten closure to reopening. This showed significant differences between the nature of kindergartens, with public kindergartens having lower averages and more difficult access to promotion opportunities, and this finding notes the importance of government

attention to the issue of early childhood teachers' pay and promotion in the face of public crises. Early childhood education is one of the key public policies that reflect a country's concern for vulnerable groups. It plays an integral role in promoting equity and social justice, contributing to the productivity of the economy and society as a whole (UNESCO, 2007). Evidence suggests that high-quality ECE programs targeting disadvantaged groups have a potential return of 7–16% per year (Naudeau et al., 2012). In China, however, financial investment in preschool education was only 2.2% of education expenditure in 2011, increasing to 5.9% in 2020 (Ministry of Education, 2021). Developing countries still face significant challenges in this area compared with developed countries. In Japan, for instance, the government subsidizes free kindergarten for 3–5-year-olds, which reduces the financial burden on families. Moreover, most private kindergartens are subsidized, which ensures teacher retention. Current public kindergartens in China decreased public child care services from 60% to 40% in 2001–2007, meanwhile, the proportion of private child care services increased from 40%–60% (Liu, 2010a). With the reform of public institutions and the downsizing of public kindergartens, many public kindergartens do not have sufficient financial support to guarantee the staffing and payment of an adequate number of teachers. Thus, existing teachers are burdened with the same number of children enrolled or various demands from families, which forces the existing teaching staff to engage in work that exceeds their load. On the other hand, public kindergartens hiring support staff under a different title but are not able to maintain the same level of pay as public teachers due to financial pressures. Thus, a huge disparity exists in their salary, even though they work together (Yu, 2021; Luan, 2020; Ren, 2020). The “imbalance” in human resources payments affects their job satisfaction, which may also negatively impact co-worker relations ($F = 4.969, p < 0.05$). Among these core elements that constitute their job satisfaction, early childhood teachers cannot obtain the pay they expect and achieve the realization of their self-worth, which subsequently leads to negative attitudes and negative motivation toward this work environment. This, in turn, causes low self-efficacy, which may produce burnout, low work engagement, or low-quality professional skills (Lipscomb et al., 2022). Jiang et al. (2021) point out that the way forward for China's future early childhood education is to fundamentally improve the teachers' quality by reforming the recruitment system for early childhood teachers to facilitate the executive and institutional functions of kindergartens—especially implementing equal pay policies and balancing the allocation of educational resources. Furthermore, more attention must be paid to the professional identity of “who am I? I am an early childhood teacher” by establishing a credit system for early childhood teachers and increasing the value of the early childhood teacher certification. By increasing the benefits of early childhood teachers in terms of house and car purchase, and they can enjoy travel and other benefits to increase their job satisfaction. Only with a series of improvements in job satisfaction among early childhood teachers will we be able to sustain the output of their professional skills and create positive educational value for young children.

In addition, this study documented the significant role of individual personality traits of active learning, emotional stability, and consideration for others in early childhood teachers, identifying the significant impact of personality traits on job satisfaction and self-efficacy. The work of early childhood teachers includes emotional labor (Purper et al., 2023, moreover, the COVID-19 pandemic has exacerbated their dual burden of occupational stress and self-development (Payton, 2021). Early childhood teachers are expected to behave according to the expectations of parents, children, and society, and they are required to engage in emotional labor as they provide care, respond to behavioral challenges, resolve conflicts, and work collaboratively with other professionals and parents (Meloy et al.,

2019). Thus, they are required to remain disciplined and suppress their own emotions and negative feelings to appear “appropriate and graceful”, while their own emotional needs and expressions are easily neglected. Research has noted that the emotional work of early childhood teachers is related to the quality of teacher–child interactions (Ansari et al., 2020). The value of the emotional work of ECE depends on feedback from children and families, and it represents an exchange value. Due to individual differences in psychological mechanisms and personality traits, they may exhibit different attitudes and perceptions of work when faced with emotional labor and professional emotions in early childhood education practice. As shown in Table 2, the greatest standard deviation in the work itself indicates a significant internal disparity in the way Chinese early childhood teachers view their work. Personality traits produce important outcomes in all areas of a person's life, including work (Serrano-Fernández et al., 2019), thus, if teachers are passionate and committed to their work and engaged with an open, inclusive, and positive mindset, they can gain the value in such emotional, labor-intensive work. Purper et al. (2023) proposes the use of positive thinking strategies to address the challenges of early childhood teachers' emotional labor, whereas intrinsic motivation determines the direction of an individual's behavior and self-determination (Deci & Ryan, 1985) as the adoption of positive thinking strategies that require an open, active learner's mindset and approach to embrace new ideas. Early childhood teachers with different personality traits play a critical role in terms of the responses to and interactions with children. Therefore, we must create an external environment that is emotionally supportive for teachers to develop elements of personality traits conducive to co-worker relations and positive emotional adjustment and to motivate them intrinsically. Moreover, a systematic assessment system that aims to assess the premise of the profession and the individual's aptitude to be an early childhood educator should be accessible when pre-service early childhood teachers enter the profession field. An upfront career suitability assessment may reduce burnout and turnover rates among early childhood teachers in the long term. Since such career tendency test will show a higher level of match for some personality traits, it may develop professional competencies to improve the overall quality of early childhood education. The findings on the impact of teacher personality traits on job satisfaction and self-efficacy call for the establishment of future measures of early childhood teachers' career choice preferences, which may facilitate the rational allocation of resources and fundamentally improve the quality of care and education from a long-term perspective.

Lastly, this study found that the years of teaching experience ($\beta = 0.266, p = 0.01$) and number of trainings attended ($\beta = 0.489, p = 0.01$) were significant predictors of self-efficacy of early childhood teachers. In line with Reyhing and Perren's (2021) findings, it was found that previously acquired experiences contribute to the level of self-efficacy, and the tendency of early childhood teachers is to respond positively to the work environment with behaviors derived from past experiences, which can strengthen self-efficacy and related behaviors. Our study clarifies the previously proposed environmental responsible theory, in which external factors may not necessarily show significant attitudes toward the environment; however, they may influence the psychological mechanisms of behavioral intentions because their effect on self-efficacy ultimately works with internal psychological mechanisms and subsequently has an impact on the work environment and satisfaction. Especially after the COVID-19 outbreak, early childhood teachers' satisfying attitudes toward their work stem from the enrichment or development of psychological mechanisms and personality traits as a result of the training attended and past experience. There is one possible

reason why the training attended by early childhood teachers was unexpectedly found to be a non-significant predictor of job satisfaction in this study, although they had received various trainings, these were not based on early childhood teachers' practice needs or job situation needs, thus, ineffective trainings were not practically meaningful to their job satisfaction. To improve the job satisfaction and self-efficacy of early childhood teachers, we must provide not only external professional training support but also psychological support from within—especially, for example, positive emotional strategies and support programs based on individual personality traits of early childhood teachers.

Taken together, given the increasing professionalization of ECE, our results suggest a future need to focus on the comprehensive system for improving the salaries and assessment of early childhood teachers as well as development of early childhood teacher training based on individual personality differences. As an important step toward improving job satisfaction, our policies should support the same pay system for public and private kindergartens and increase the value of early childhood teacher certification. As policymakers and reformers, we must continuously optimize the selection system and assessment system for professional early childhood teachers. The establishment of a system of personality matching tests based on professional development should be introduced into higher teacher education as such an initiative would allow for optimal allocation of educational resources. It would also truly promote the development of professional skills and enhance self-efficacy of pre-service early childhood teachers based on their goal attainment. For in-service early childhood teachers, we should further reform the training system to optimize training programs based on their personality traits to develop positive ones and improve their professionalism and professional skills in an integrated and comprehensive manner.

Strengths, Limitations, and Future Research

This study clarified the predictive role of external and internal factors on early childhood teachers' job satisfaction and self-efficacy. It contributed to a comprehensive examination of the factors that influence job satisfaction and self-efficacy and provided practical insights to facilitate early childhood teachers' job satisfaction and self-efficacy in the context of the post-COVID-19 pandemic in China. This study confirms the positive impact of kindergarten ecology, such as professional teacher training and appropriate individualized psychological support on job satisfaction and self-efficacy. Several strengths drive the empirical relevance of our findings. We used a targeted sampling method in which all respondents were both objectively universal and ensured data validity. All participants in the context of the COVID-19 outbreak were characterized by continuity of work in the kindergarten before and after the pandemic. We extended environmental responsible theory to the field of early childhood education and confirmed the role of external environment and internal individual psychological mechanisms on work environment and self-efficacy tendencies, highlighted the mediating role of job satisfaction in the circular ecology, and emphasized the significant predictive role of individual personality traits. We investigated the correlation between demographic factors, prior experience and knowledge (e.g., years of teaching experience, experience in training) and self-efficacy and job satisfaction based on the Environmentally Responsible Behavior (ERB) model theory, and further validated the extent to which external and internal factors, as highlighted by the theory, influence the kinds of attitudes individuals develop as a result of their interactions with the environment. Our study focused on the particular settings of COVID-19 clarified the applicability of our theory to the

hypothesis, identifying that the self-efficacy behavioral tendencies of early childhood teachers were influenced by factors from both internal and external environments, and that their attitudes toward job satisfaction determined their self-efficacy behavioral tendencies. And whether such behavioral intentions reverse their influence on attitudes toward the work environment is an issue that warrants further clarification in the future. Nevertheless, some limitations of this study must be addressed in the future, of which a glaring one is the sample size. A total of 237 participants were from members of face-to-face local professional training program or online-based learning communities. Although these volunteer survey participants came from different areas of mainland China, they do not represent the country's general outlook—especially with regard to some rural areas. Therefore, the sample size should be expanded in future studies to generalize the findings of job satisfaction and self-efficacy among in-service Chinese early childhood teachers. In addition, although our study confirmed that external and internal individual factors work together to produce predictive effects on job satisfaction and self-efficacy, how these elements interact with each other, how they act, and whether significant differences exist in the degree of their predictive power in what contexts is a topic that must be further addressed in our future research.

Data availability

The datasets generated during and/or analysed during the current study are not publicly available due to privacy or ethical restrictions. Participants from local public kindergartens were given written consent to ensure confidentiality regarding their attitudes and evaluations of job satisfaction and self-efficacy in specific training programs, as this may impact their professional ratings but are available from the corresponding author on reasonable request.

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Competing interests

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.

Ethical approval

Approval was obtained from the ethics committee of Wenzhou University. The procedures used in this study adhere to the tenets of the Declaration of Helsinki. This approval was obtained prior to any data collection.

Informed consent

Informed consent was obtained from all individual participants included in the study. Prior to participation, a detailed explanation of the study's purpose, procedures, potential risks, and the voluntary nature of participation was provided to each participant. This explanation was presented both verbally and in writing. Participants were given ample time to review the provided information and were encouraged to ask any questions they had. Subsequently, they were asked to signify their consent by signing a consent form. We reassured participants that all information collected during this study would be treated with the utmost confidentiality. Participants have the right to withdraw their consent at any point during the study without facing any consequences or loss of benefits.

Additional information

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