Preschool Teachers' Beliefs About, and Practices of, Online Teaching during the COVID-19 Pandemic: The Role of Psychological Distress and Professional Identity

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Abstract

The COVID-19 outbreak posed significant challenges for teachers by forcing them to move from face-to-face teaching to online teaching. Against this background, teachers' beliefs about, and practices of, online teaching became particularly important because they might influence teachers' teaching effectiveness and children's learning. However, little is known about the factors affecting teachers' beliefs about, and practices of, online teaching during COVID-19. This study examined the associations of psychological distress and professional identity with perceived value of online courses and perceived quality of online teaching among 127 Chinese preschool teachers during COVID-19. Results showed that depression and loneliness were negatively associated with perceived value of online courses and perceived quality of online teaching, respectively, while professional identity was positively associated with both. Our findings highlight the unique roles of psychological distress and professional identity in shaping preschool teachers' beliefs about, and practices of, online teaching during COVID-19. Policymakers should establish effective policies and guidelines to protect preschool teachers' mental well-being and help alleviate their psychological distress, particularly depression and loneliness, in times of unforeseen disasters such as the pandemic. School leaders and teacher training professionals should prioritize professional identity as a crucial part of preschool teachers' professional development during the COVID-19 outbreak.

Keywords Preschool teachers · Psychological distress · Professional identity · Online teaching · COVID-19

Confronted with the unforeseeable COVID-19 pandemic, governments worldwide implemented a series of containment measures (e.g., school closures, quarantine, and lockdowns) to slow down the transmission of the COVID-19 disease (Orozco, 2022). As a result of these measures, there was a shift from face-to-face instruction to online teaching and learning in many schools (UNESCO, 2020). According to UNESCO et al. (2021), 91% of countries reported that online teaching was an essential approach to providing education during COVID-19. As such, teachers had to adjust to online teaching—a teaching approach they had not been familiar with—and simultaneously strive to develop age-appropriate online content for young children (Hong, 2020). This rapid and unexpected transition posed dramatic challenges to teachers' daily teaching (Atiles et al., 2021). In the specific context of China, on the one hand, the Ministry of Education (2020) prohibited preschools from conducting online education. This likely stemmed from concerns about screen overuse harming young children's eye health (Chen, 2022, April 12; Fan et al., 2021); moreover, online courses were deemed unsuitable for young children, as they might struggle to maintain attention for extended periods of time in online classes and could be easily distracted, particularly in a home setting (Dong et al., 2020). On the other hand, local policies and guidelines regarding online teaching across provinces were inconsistent with this

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national directive. Preschool teachers from provinces such as Jiangsu and Hebei continued online teaching to ensure the completion of daily teaching duties and the continuity of children's learning (Chen, 2022, April 12). Together, the dramatic transition from traditional teaching to online teaching, insufficient preparations for such transition, and the inconsistency in policies regarding online teaching across regions have likely caused confusion and great pressure on Chinese preschool teachers during the pandemic.

While online teaching was widely applied in preschools in China and across the globe during the COVID-19 pandemic, teachers' beliefs about, and practices of, online teaching are particularly important, as these beliefs and practices may shape teaching effectiveness and affect children's learning outcomes (Hong et al., 2021; Li et al., 2019). The present study endeavored to determine the factors that may affect teachers' perceived value of online courses and their perceived quality of online teaching. Research has revealed that pragmatic factors, such as teachers' readiness (Atiles et al., 2021) and home-school cooperation (Ford et al., 2021), played an important role in teachers' beliefs about, and practices of, online teaching during the COVID-19 pandemic. However, little attempt has been made to examine whether teachers' personal factors were related to these beliefs and practices. This study focused on teachers' psychological distress and professional identity as potential risk and protective factors respectively and examined whether both factors were related to preschool teachers' beliefs about, and practices of, online teaching.

Existing empirical studies suggest that teachers' psychological distress and professional identity affect teachers' teaching-related beliefs and practices (e.g., Pham et al., 2021; Richter et al., 2021). However, most studies have not simultaneously considered both psychological distress and professional identity, leaving unclear their unique contributions to teachers' beliefs about, and practices of, online teaching. Further, these studies were predominantly conducted before the pandemic, in a normal teaching context, and the question of whether these findings can be generalized to the context of online teaching during the COVID-19 pandemic requires further exploration. To address these gaps, the present study investigated the relationships of three psychological distress symptoms (loneliness, anxiety, and depression) and professional identity with preschool teachers' beliefs about, and practices of, online teaching.

Online Teaching During the COVID-19 Pandemic

Online teaching refers to the mode of teaching that delivers courses remotely through online platforms (Ko & Rossen, 2017). In the COVID-19 era, UNESCO's *Guidance for Teachers: Online Education During COVID-19 Pandemic* defined online teaching as a teaching format that utilizes curriculum resources and delivers teaching activities with the help of a learning management system (LMS) or other interactive software, enabling teachers and students to stay connected remotely instead of interacting with each other face-to-face (Zhao et al., 2020). Researchers have pointed out several strengths of online teaching. Breaking the constraints of time and geography, online teaching is more flexible than face-to-face teaching (Ko & Rossen, 2017). With the support of learning technology, online teaching can be conducted using diverse and appealing formats (Herodotou, 2018). Furthermore, proper instruction using online teaching can help children prepare for the digital world (Johnston et al., 2018). These benefits became even more pronounced during the COVID-19 pandemic because online teaching sustained the connections between teachers and students and allowed them to continue with teaching and learning activities, especially during school closures and whole city lockdowns (Starkey et al., 2021). Despite the advantages mentioned above, however, the limitations of online teaching have also been highlighted, such as inadequate physical interactions (Ford et al., 2021), difficulty in monitoring students' learning progress and providing feedback (Hu et al., 2021), and a variety of health concerns stemming from excessive screen time (Mineshita et al., 2021; Ouyang et al., 2024).

Over the past few decades, online teaching has grown in popularity in the educational context (Martin et al., 2020). Before the COVID-19 pandemic, however, it was more prevalent at the higher educational level and received less attention at the K-12 level (Martin et al., 2020). Nevertheless, the unexpected outbreak of COVID-19 resulted in the unavoidable switch from face-to-face instruction to online teaching. In general, two forms of online teaching have been categorized (Murphy et al., 2011): synchronous and asynchronous online teaching. Synchronous online teaching allows teachers and students to participate in online lessons in real time via online communication platforms (Murphy et al., 2011). In this form of online teaching, teachers and students could engage in real-time interactions (e.g., students could respond to teachers' questions while teachers could offer real-time, responsive feedback to students' questions) via platforms such as Zoom and Tencent Meeting. In contrast, asynchronous online teaching occurs when teaching and learning do not happen at the same time (Murphy et

al., 2011). In this online teaching format, teachers usually upload learning materials (e.g., pre-recorded lesson videos and handouts) to an online learning platform, while students can download these materials and study them at their own pace without temporal constraint. During the COVID-19 pandemic, both synchronous and asynchronous online teaching formats were commonly adopted by preschool teachers in China (e.g., Hu et al., 2021; Yang & Zhang, 2023). As an example, some Chinese preschool teachers adopted a synchronous online teaching format to engage in spontaneous interactions and real-time teaching and learning activities with children via the Tencent Meeting platform (Yang, 2020). They also sent e-learning materials (e.g., video recordings) to parents via WeChat or Ding Talk apps, while parents downloaded the materials and engage children to study them flexibly according to their own schedules (Luo et al., 2023). Nevertheless, despite the widespread use of online teaching during the COVID-19, preschool children usually lack the technological knowledge and skills for online learning (Kim, 2020), and it is often hard for them to engage in hands-on learning activities through online platforms (Ethridge et al., 2022). Hence, the sudden shift, together with the lack of resources and preparation for preschool teachers to conduct online teaching (Ford et al., 2021), imposed great difficulty in implementing effective online teaching.

Teachers' Beliefs About, and Practices of, Online Teaching During the COVID-19 Pandemic

Given that online teaching was widely adopted during the COVID-19 pandemic, how preschool teachers perceived and conducted online teaching was critical for ensuring the effectiveness of their teaching and children's learning experiences (Kim, 2020). According to Wigfield and Eccles's (2000) expectancy-value theory, utility value, defined as perceived usefulness for future goals, comprised one of the key components of task value motivating one's devotion to goal achievement. In light of Wigfield and Eccles (2000), teachers' perceived value of online courses can be defined as the extent to which teachers believe that online courses are useful. Moreover, the expectancy-value theory underscored the importance of perceived value in determining later achievement-related choices (Wigfield & Eccles, 2000). In this sense, teachers who perceive higher values of online courses may deliver higher-quality online teaching, which is essential for improving students' learning outcomes. Indeed, Alghamdi (2022) has demonstrated that teachers had mixed beliefs about the value of online courses during the COVID-19 pandemic: some teachers held positive perceptions and believed that online courses had the potential to replace face-to-face courses at that particular time, while others questioned its applicability for young children. Such variations in teachers' perceptions of the values of online courses, from the perspective of expectancy-value theory (Wigfield & Eccles, 2000), may affect teachers' persistence, effort, and performance in online teaching, which is likely to contribute to students' later achievement gaps. Given the importance of preschool teachers' perceived value of online courses during COVID-19, understanding its predictors would be of great significance.

Perceived quality of teachers' online teaching can be defined as the extent to which teachers perceive the quality of their online teaching practices, delivery, content, and approaches (Tuomainen, 2023). According to Powell and Oliver (2019), the characteristics of high-quality online teaching include presenting best practices in online courses, creating a supportive online learning community, and offering diverse and individualized guidance to support students' online learning. Steinmayr et al. (2021) suggested that high-quality online teaching characteristics, including appropriate cognitive activation (e.g., providing task-related feedback during online teaching), sufficient learning support (e.g., establishing supportive teacher-student relationships and scaffolding students' online learning), and classroom management (e.g., forming order for the online lesson), could benefit students' motivation, engagement, and achievement during COVID-19. Alan (2021) also emphasized several key features of high-quality online teaching in the preschool setting during COVID-19. These features include teachers' effective application of technology (e.g., online teaching platform), the utility of learning resources that can promote classroom interactions, and the empowerment of family members (e.g., parents) as important facilitators in supporting online teaching. Together, these features may have helped boost the quality of online courses and further enhance children's online learning during COVID-19 (Alan, 2021).

In view of the significance of teachers' beliefs about, and practices of, online teaching, investigating the factors that influenced these beliefs and practices during the COVID-19 pandemic is important. This study focused on preschool teachers' psychological distress and professional identity as two potential personal factors and examined their relationships with teachers' perceived value of online courses and perceived quality of online teaching during COVID-19.

Psychological Distress as a Risk Factor of Teachers' Beliefs About, and Practices of, Online TeachingDuring the COVID-19 Pandemic

The COVID-19 containment measures, such as quarantines, school closures, and lockdowns, dramatically affected individuals' work and daily lives, elevated the risk of mental

health problems, and increased psychological distress (Wu et al., 2021; Zhang, 2022). Psychological distress is defined as negative emotions that individuals experience when reacting to certain stressors or demands (Ridner, 2004). The present study operationalized psychological distress as feelings of loneliness, anxiety, and depression, which were reported as common symptoms during the COVID-19 pandemic (Li et al., 2024; Wang et al., 2022). More specifically, loneliness refers to individuals' feeling of isolation and lack of social support and sense of belonging (Weiss et al., 1987); anxiety refers to a future-oriented mood state featuring one's feelings of tension and worries and physical symptoms (e.g., heartbeat and increased blood pressure) (Eifert et al., 2005); depression refers to one's experiences characterized by a low mood, a lack of interest or pleasures, and a negative perception of self, world, or future, for a considerable period of time (Beck & Alford, 2009).

According to Fredrickson's (2001) broaden-and-build theory, positive emotional experiences can broaden individuals' thought-action repertoires, which enables them not only to develop their enduring personal, physical, cognitive, social, and psychological resources but also to enhance their adaptive actions that lead to success and thriving (Fredrickson, 2001). Conversely, distressing emotional experiences and feelings narrow such repertoires, preventing people from seeking and developing resources, limiting their ability to function adaptively, and impeding a sense of flourishing and well-being (Fredrickson, 2001). In addition, Beck's (1976) model underscores that individuals with depressive symptoms are likely to maintain negative perceptions of themselves, the world, and the future.

The theoretical works of Fredrickson (2001) and Beck (1976) provide important insights into the understanding of the negative impacts of preschool teachers' experiences of psychological distress on their beliefs about and practices of online teaching during COVID-19. Specifically, some preschool teachers may have encountered numerous challenges due to the implementation of strict containment measures (e.g., lockdowns), which may exacerbate their psychological distress symptoms (Wu et al., 2021). These symptoms, according to Fredrickson's (2001) broaden-and-build theory, can narrow preschool teachers' thought-action repertoires, hindering their construction of coping resources and impeding their work performance. Moreover, depressive symptoms, specifically, can elevate teachers' negative perceptions of themselves (e.g., their teaching ability), the world (e.g., online courses), and the future (e.g., quality of their online teaching in the future). Therefore, in light of Fredrickson (2001) and Beck (1976), preschool teachers' psychological distress symptoms may ultimately prevent them from perceiving the value of online courses and impede the quality of their online teaching during COVID-19.

Although empirical research on the relationships between psychological distress and teachers' perceived value of online courses is scant, some indirect evidence may support such a link. Prior to COVID-19, Başpinar and Peker (2016) found that pre-service primary teachers who reported higher levels of math teaching anxiety held a more negative attitude towards math teaching. In the preschool context, Jeon et al. (2019) showed that preschool teachers who exhibited more depressive symptoms had lower professional motivation, which, in turn, led to weaker beliefs about developmentally appropriate teaching practice in classroom settings. As for the effects of psychological distress on teachers' quality of teaching, Uğurlu and Kaplan (2021) found that elementary teachers' loneliness was detrimental to their efficacy in classroom teaching. In another study, Kwon et al. (2019) observed that Early Head Start teachers who reported fewer depressive symptoms had better quality in face-to-face classroom teaching, as indicated by more emotional, behavioral, and learning support.

While the above studies supported the hypothesis that psychological distress could be a risk factor influencing teachers' beliefs and practices of teaching, they were conducted before COVID-19 and predominantly focused on face-to-face classroom teaching. We only identified two studies investigating such associations during COVID-19 and targeting online teaching. Specifically, Pham et al. (2021) found that higher levels of COVID-related stress and anxiety were related to a lower effectiveness of online teaching among teachers at primary, secondary, and post-secondary school levels. Likewise, Wong et al. (2021) reported that secondary school teachers' psychological distress symptoms, including anxiety and depression, were negatively related to their e-teaching competencies. Nevertheless, no one study has examined the relationships between psychological distress and teachers' beliefs about and practices of online teaching during COVID-19 in the preschool context.

Taken together, the aforementioned studies have revealed the relationships between teachers' psychological distress and their teaching-related beliefs and practices. Nevertheless, most previous studies focused on beliefs about, and practices of, face-to-face teaching (Başpinar & Peker, 2016; Jeon et al., 2019; Uğurlu & Kaplan, 2021). Whether the findings can be extended to the case of online teaching is still unclear. Additionally, these studies targeted only one or two indicators of psychological distress (Kwon et al., 2019; Pham et al., 2021). A comprehensive picture of how various psychological distress symptoms contribute uniquely to teachers' beliefs about, and practices of online teaching is lacking. Moreover, most of the existing studies were not contextualized in the pandemic context (Başpinar & Peker, 2016; Jeon et al., 2019; Kwon et al., 2021; Uğurlu & Kaplan, 2021) and targeted preschool teachers (Kwon et

al., 2021). It remains unknown whether the same pattern of results could be observed in preschool teachers during the COVID-19 pandemic.

Professional Identity as a Protective Factor of Teachers' Beliefs About, and Practices of, Online Teaching During the COVID-19 Pandemic

Teachers' professional identity refers to the degree of teachers' role understanding, social connection, professional commitment, and passion for the teaching profession (Beijaard et al., 2004). In the specific context of COVID-19, teachers' professional identities may have undergone dramatic changes due to the unprecedented transformation of teaching and learning. For instance, the sudden shift from face-to-face teaching to online teaching required teachers to adjust their understanding of roles, evolving from traditional educators who merely impart knowledge to, for example, both teachers and managers of online teaching and learning platforms (Hu et al., 2021). Additionally, teachers had to adapt to new forms of social connections, such as using online instant messaging applications to communicate with students, parents, and colleagues (Chen & Rivera-Vernazza, 2023). Moreover, they needed to attain new commitments amid unprecedented circumstances, such as attending to students' psycho-emotional needs when face-to-face interactions were not permitted (Watts & Pattnaik, 2023). These changes created a unique perspective to understand teachers' professional identity and how it impacted teachers' online teaching.

The connections between teachers' professional identity and their beliefs about, and practices of, online teaching during the COVID-19 pandemic can be informed by Bakker et al.'s (2003) JD-R Model. According to this model, job resources, which refer to the promotive factors that can reduce physical and mental costs and promote individual development, can facilitate the motivational process that is helpful for work engagement, efficiency, achievement, and positive job-related perceptions (Bakker et al., 2003). Hence, during COVID-19, teachers who held a stronger professional identity may better adjust their roles, communicate more effectively with students, parents, and colleagues, and strengthen their commitment to online teaching to a larger extent. As such, professional identity, according to Bakker et al.'s (2003) JD-R Model, likely serves as teachers' job resources increasing the motivational process promotive to their engagement in online teaching and buffering the energetic process caused by challenges and demands from online teaching. In this sense, teachers with a stronger professional identity may maintain positive beliefs about and demonstrate better practices of online teaching during COVID-19.

Previous research has suggested relationships between teachers' professional identity and their teaching beliefs and practices. Prior to COVID-19, Vanassche and Kelchtermans (2014) demonstrated that teacher educators from teacher education programs had three kinds of professional identity: a teacher educator of "pedagogues", a teacher educator of reflective teachers, and a teacher educator of the subject teacher. Each of the identities was closely linked to unique patterns of beliefs about and practices of classroom teaching. As an example, teachers holding professional identity as "pedagogues" tended to value not only subject knowledge but also students' whole-person development and respect and care students' psycho-emotional needs apart from learning needs in their daily teaching (Vanassche & Kelchtermans, 2014). In another study, Richter et al. (2021) targeted teachers who served as both teachers' educators and in-service primary or secondary school teachers and found that those with higher levels of professional identity as facilitators exhibited more constructivist beliefs about teaching and learning and applied more effective teaching practices (e.g., using explicit modeling and focusing on student learning). Furthermore, Lai and Jin (2021) focused on English teachers from universities in China and found that professional identities, indicated by educator identity orientation towards educational goals, didactic and pedagogical identity orientation towards professional knowledge base, and learner-centered orientation towards instruction, were predictors of their application of technology for content delivery, learning enrichment, and learning transformation in daily teaching.

Nevertheless, while the abovementioned studies demonstrated evidence of the relationships between teachers' professional identity and their teaching beliefs and practices, they focused on face-to-face classroom teaching or did not clarify any mode of teaching. Additionally, most of them focused on higher grades, such as primary and secondary or university levels, while no study has targeted teachers in preschools. Furthermore, there is a lack of studies examining such relationships in the specific context of COVID-19. Therefore, more investigations on the extent to which preschool teachers' professional identity was linked to their beliefs about and practice of online teaching during COVID-19 were warranted.

The Present Study

The strict COVID-19 containment measures dramatically changed the mode of teaching from face-to-face to online (UNESCO, 2020) and posed numerous challenges for preschool teachers (Atiles et al., 2021; Ford et al., 2021). Given the broad application of online teaching during the COVID-19 pandemic, a comprehensive understanding of

teachers' beliefs about, and practices of, online teaching and their antecedents are essential as such understanding can inform measures to improve the effectiveness of preschool teachers' online teaching while ensuring children's learning. Grounded on Fredrickson's (2001) broaden-and-build theory and Bakker et al.'s (2003) JD-R Model, the present study examined the relationships of preschool teachers' psychological distress symptoms (loneliness, anxiety, and depression) and professional identity with their perceived value of online courses and perceived quality of online teaching during COVID-19. The research questions and hypotheses were as follows:

Research Question 1 Are teachers' loneliness, anxiety, and depression related to teachers' perceived value of online courses and perceived quality of online teaching?

Hypothesis 1 Teachers' loneliness, anxiety, and depression are negatively related to teachers' perceived value of online courses and perceived quality of online teaching.

Research Question 2 Is teachers' professional identity related to their perceived value of online courses and perceived quality of online teaching?

Hypothesis 2 Teachers' professional identity is positively related to their perceived value of online courses and perceived quality of online teaching.

Since previous studies have found that teachers' income (Tang, 2020), age and marital status (Chandwani et al., 2021), and years of teaching (Alghamdi, 2022) were related to teachers' perceptions or practices of their teaching, these variables were treated as control variables in this study.

This study distinguishes itself from the existing literature in the following aspects. First, the study was conducted in the context of the COVID-19 pandemic, which provided a critical window into preschool teachers' beliefs about, and practices of, online teaching and their antecedents in this unforeseeable period. Second, the study can add to Fredrickson's (2001) broaden-and-build theory by examining whether various negative emotional experiences—that is, psychological distress symptoms including loneliness, anxiety, and depression—are potential risk factors influencing preschool teachers' beliefs about, and practices of, online teaching. Third, the study can extend Bakker et al.'s (2003) JD-R Model by exploring the role of professional identity, as a job resource, in preschool teachers' beliefs about, and practices of, online teaching. Fourth, methodologically, this study is the first of its kind to consider psychological distress symptoms and professional identity simultaneously as potential factors affecting both preschool teachers'

perceived value of online courses and perceived quality of online teaching in a comprehensive model. Furthermore, standing at a new point in history—the post-COVID era—this study offers critical insights into the unique contributions of each factor to teachers' beliefs about, and practices of, online teaching and provides a reference for school leaders and policymakers to support teachers' professional development for future teaching practice more effectively, particularly during an unexpected pandemic.

Method

Participants and Procedure

Three hundred and twenty teachers were recruited using convenience sampling from seven provinces in China through Tencent's WeChat. WeChat is the most popular social network and instant messaging application in China. By the time of data collection, the number of monthly active users of WeChat reached 1.2 billion (Tencent, 2021). Given the wide use of WeChat in China, we chose to recruit and deliver the questionnaires to the participants through WeChat. We first contacted preschool principals via WeChat, who then shared the link to the electronic questionnaires, including a brief introduction to the current study and a set of scales, with all teachers in their preschools. Teachers who agreed to participate signed the electronic consent form and completed the electronic questionnaires. Given that the current study aimed to examine preschool teachers' online teaching during COVID-19, data from 193 teachers were excluded due to their unemployment status ($n = 39$) or lack of online teaching practice ($n = 154$), leaving a total of 127 teachers with a mean age of 32.29 years (SD = 8.42 years) as the valid sample for the present study. The average monthly income of the participating teachers before COVID-19 was between 3,001 RMB and 4,000 RMB (equivalent to 419 USD to 559 USD). The demographic information is presented in Table S1 in the Supplementary Material.

Data collection was conducted in June and July 2020. After giving their informed consent, teachers completed a set of online questionnaires assessing their psychological distress, professional identity, perceived value of online courses, perceived quality of online teaching, and a set of demographic information. The institutional review board of the last author's university provided ethical approval, including the approval of recruitment and data collection process, for this study.

Measures

Loneliness

Teachers' loneliness was measured using the UCLA Loneliness Scale Version 3 (Russell, 1996). This is a 19-item (e.g., "I felt isolated from others"), 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Total scores were calculated. Higher scores indicate higher levels of loneliness. Cronbach's α for this scale was 0.93.

Anxiety

Teachers' anxiety was measured using the Generalized Anxiety Disorder 7-Item Scale (GAD-7; Spitzer et al., 2006). This is a 7-item (e.g., "worrying too much about different things"), 4-point Likert scale ranging from 0 (not at all) to 3 (nearly every day). Total scores were calculated. Higher scores indicate higher levels of anxiety. Cronbach's α for this scale was 0.94.

Depression

Teachers' depression was measured using the Center for Epidemiological Studies Depression Short Form (CESD-R10; Björgvinsson et al., 2013) scale. This is a 10-item (e.g., "my sleep was restless") 4-point Likert scale ranging from 0 (rarely or none) to 3 (all the time). Total scores were calculated. Higher scores indicate higher levels of depression. Cronbach's α for this scale was 0.90.

Professional Identity

Teachers' professional identity was measured using the Teachers' Professional Identity Scale (Wei, 2008). This is an 18-item, 5-point Likert scale ranging from 1 (hardly ever) to 5 (always). It comprises four sub-scales assessing teachers' professional value (4 items; e.g., "I think the work of teachers is important in promoting the growth and development of students."), role value (6 items; e.g., "As a teacher, I often feel respected."), professional belonging (3 items; e.g., "I feel insulted when someone baselessly accuses teacher groups."), and professional behavior tendency (5 items; e.g., "In order to maintain the normal teaching order of the school, I will abide by those informal systems."). As in the study of Sun et al. (2022), this study only adopted overall professional identity, rather than its sub-dimensions, because of the multicollinearity issue indicated by high inter-correlations (rs = 0.73– 0.96) between, and high variance inflation factors (VIFs = 3.14–15.19) for, all four factors. Average scores were calculated. Higher scores indicate

a stronger professional identity. In this study, Cronbach's α for this measure was 0.98.

Perceived Quality of Online Teaching

Teacher-reported online teaching quality was assessed using a questionnaire developed specifically for this study. We followed a three-step approach for developing the questionnaire: literature review, expert evaluation, and validity and reliability assessment. First, an initial item pool was developed based on previous literature (e.g., Ko & Rossen, 2017; Copple & Bredekamp, 2009; Powell, & Oliver, 2019). These items were then evaluated by an expert panel of two professors in the field of early childhood education through iterative discussions. As a result, a 31-item questionnaire was constructed and used. The questionnaire is a 4-point Likert scale ranging from 0 (hardly ever) to 3 (always). A sample item is "*I will consider children's strengths, interests, and needs when looking for developmentally appropriate online teaching methods during the COVID-19 pandemic.*" Furthermore, we adopted principal component analysis (PCA) and calculated Cronbach's *α* to examine the construct validity and reliability of this questionnaire. PCA demonstrated a two-factor structure of the scale, with 30 items loading on Factor 1 and one item loading on both Factor 1 and Factor 2. After removing the cross-loading item, the results revealed a single-factor structure of this scale (factor loadings > 0.78). Cronbach's α for this measure was 0.99. Total scores were calculated. Higher scores indicated higher teacher-reported online teaching quality.

Perceived Value of Online Courses

Teachers' perceived value of online courses was measured using a questionnaire developed specifically for this study. We followed the same three-step approach as for the questionnaire measuring the perceived quality of online teaching. After a thorough literature review (Aldhafeeri & Khan, 2016; Konca et al., 2016; Hassell, 2016) and expert evaluation, a 16-item questionnaire was constructed and used. The questionnaire is a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A sample item is "*online courses can help achieve high-quality teacher-child interaction during the COVID-19 pandemic.*" PCA supported a single-factor structure of the scale (factor loadings > 0.77). Cronbach's α for this measure was 0.98. Total scores were calculated. Higher scores indicate higher perceived value of online courses.

Demographic Information

Teachers reported demographic information, including age, years of teaching, educational level, marital status, grade of teaching, monthly income before the COVID-19 pandemic, and changes in monthly income since the start of COVID-19.

Data Analyses

First, the descriptive statistics, including mean, standard deviation (SD), skewness, and kurtosis, of the key study variables were computed. Second, Pearson's correlation analysis was conducted to preliminarily explore the zero-order correlations between the study variables. Third, a multivariate multiple regression (MMR) model was estimated to examine the relationships of teacher-report psychological distress and professional identity with their perceived value of online courses and perceived quality of online teaching. In this model, teachers' perceived value of online courses and perceived quality of online teaching were regressed on three psychological distress symptoms (i.e., loneliness, anxiety, and depression), professional identity, and a set of control variables (i.e., teachers' age, years of teaching, educational level, marital status, monthly income before COVID-19, and changes in monthly income since the start of COVID-19). To handle the missing data, the full information maximum likelihood estimation (FIML) method with non-normality robust standard errors (MLR) was adopted. This approach allowed us to take into account available data from all cases in the study without removing those with incomplete data and produced unbiased parameter estimates as well as robust standard errors (Newman, 2014). Although this model is saturated, it allows for interpreting the path coefficients (Muthén & Muthén, 1998–2012).

Results

Table S2 presents the descriptive statistics (i.e., mean, SD, skewness, and kurtosis) of, and Pearson's correlations between, the key study variables. As for the descriptive statistics, the means of the study variables ranged from 4.44 to 97.82, while the SDs of the study variables ranged from 0.59 to 19.03. Additionally, all the study variables had an absolute value of skewness lower than three (i.e., ranging from 0.20 to 1.36), and an absolute value of kurtosis lower than eight (i.e., ranging from 0.07 to 3.14), suggesting that the non-normality was not an issue (Kline, 2011). As for the Pearson's correlation analyses, assumptions were met (for details, see Supplementary Materials). Teachers who

reported higher levels of loneliness, anxiety, and depression perceived lower value of online courses (loneliness: $r=-.40$, $p<.001$; anxiety: $r=-.43$, $p<.001$; depression: $r=-.45$, $p<.001$) and lower quality of online teaching (loneliness: $r=-.47$, $p<.001$; anxiety: $r=-.26$, $p=.006$; depression: $r=-.32$, $p=.001$). Teachers who scored higher on the Professional Identity scale reported higher levels of perceived value of online courses ($r=.43$, $p<.001$) and perceived quality of online teaching ($r=.67$, $p<.001$). All three teacher-reported psychological distress symptoms were positively related to one another ($rs=0.60$– 0.80, $ps<0.001$) and were negatively related to teachers' scores on the scale of professional identity (loneliness: $r=-.41$, $p<.001$; anxiety: $r=-.34$, $p<.001$; depression: $r=-.32$, $p=.001$). Teachers who perceived higher value of online courses also perceived higher quality of online teaching ($r=.57$, $p<.001$).

Table 1; Fig. 1 present the results of the MMR model. After controlling for the effects of teachers' ages, years of teaching, educational levels, marital status, monthly income before COVID-19 pandemic, and changes in monthly income since the start of COVID-19, depression was negatively related to perceived value of online courses ($\beta = -0.42$, $p=.01$), meaning that teachers who reported more severe depressive symptoms perceived online courses to have less value. At the same time, loneliness was negatively related to perceived quality of online teaching ($\beta = -0.28$, $p=.01$), indicating that teachers who reported higher levels of loneliness perceived lower online teaching quality. Professional identity was positively related to both perceived value of online courses ($\beta=0.24$, $p=.01$) and perceived quality of online teaching ($\beta=0.56$, $p<.001$), suggesting that teachers who reported a stronger professional identity perceived online courses to have more value and online teaching practice to be of a higher quality. Educational level was positively related to perceived value of online courses ($\beta=0.30$, $p<.001$), demonstrating that teachers with higher educational levels perceived online courses to have more value. The model explained 40.6% ($p<.001$) and 54.5% ($p<.001$) of the variance in perceived value of online courses and perceived quality of online teaching respectively.

Discussion

This study examined the relationships of different psychological distress symptoms (loneliness, anxiety, and depression) and professional identity with preschool teachers' perceived value of online courses and their perceived quality of online teaching during COVID-19. Results demonstrated that teacher-reported depressive symptoms were negatively related to their perceived value of online courses,

Table 1 Standardized path coefficients in the Multivariate multiple regression Model Predicting Perceived Value of Online courses and Perceived Quality of Online Teaching during the COVID-19 pandemic

Variables	Perceived value of online courses ($R^2 = 0.41, p < .001$)			Perceived quality of online teaching ($R^2 = 0.55, p < .001$)		
	β	SE	p	β	SE	p
Age	−0.26	0.16	0.11	0.20	0.14	0.15
Years of teaching	0.23	0.14	0.11	−0.08	0.13	0.55
Educational level	0.30***	0.08	0.00	0.14	0.09	0.10
Marital status	0.03	0.09	0.78	−0.07	0.08	0.40
Monthly income before COVID-19	0.04	0.09	0.64	−0.05	0.08	0.57
Changes in monthly income since the start of COVID-19	0.12	0.08	0.14	0.07	0.07	0.34
Loneliness	0.07	0.13	0.57	−0.28*	0.11	0.01
Anxiety	−0.10	0.14	0.48	0.12	0.12	0.31
Depression	−0.42*	0.17	0.01	−0.11	0.15	0.47
Professional identity	0.24*	0.10	0.01	0.56***	0.07	0.00

Note. Ns = 127. *$p < .05$, ***$p < .001$
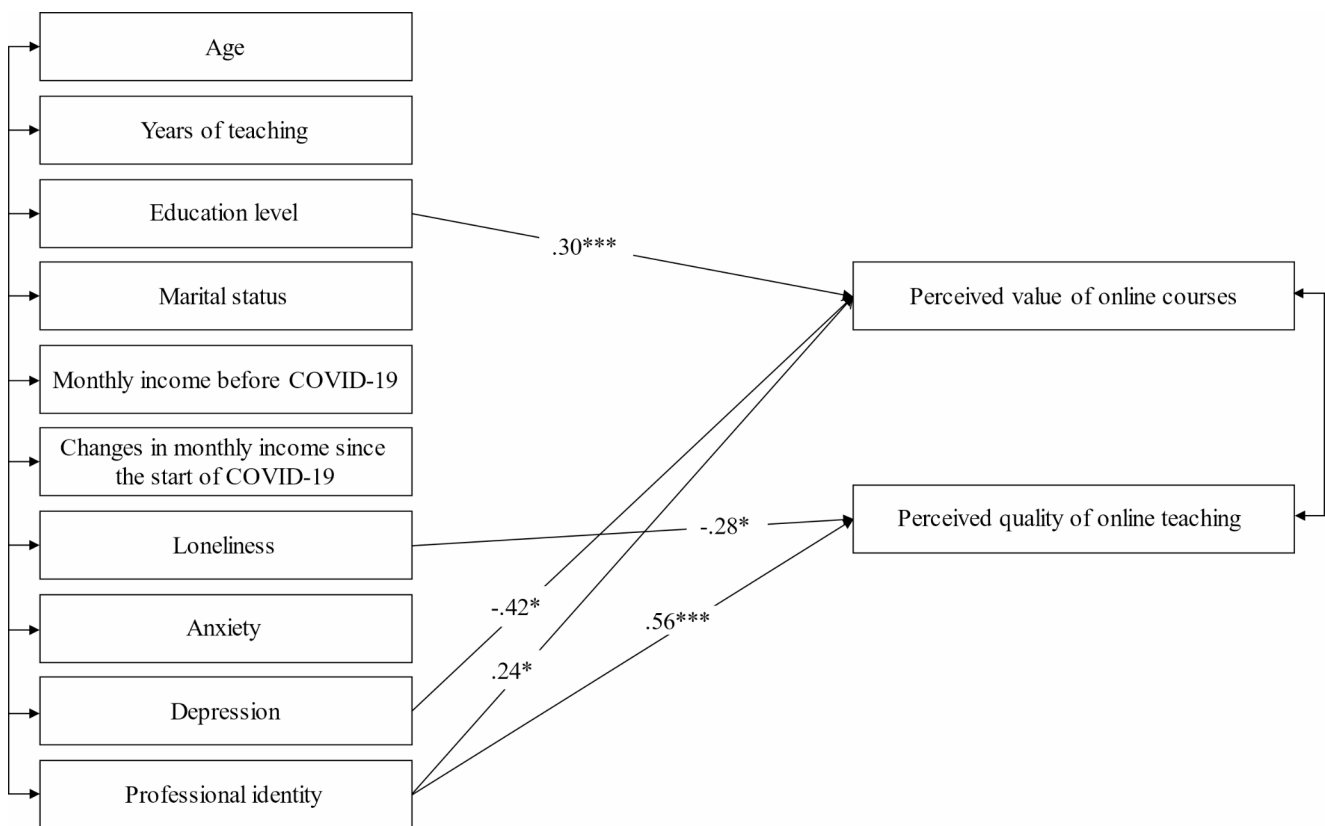
Fig. 1 Multivariate Multiple Regression Model Predicting Perceived Value of Online Courses and Perceived Quality of Online Teaching During the COVID-19 Pandemic. *Note.* Ns = 127. *$p < .05$, ***$p < .001$. For ease of presentation, insignificant paths ($p > .05$) were not presented

while teacher-reported loneliness was negatively related to their perceived quality of online teaching. These findings reveal the potential effects of depression and loneliness on preschool teachers' beliefs about, and practices of, online teaching. Further, teacher-reported professional identity was positively related to both their perceived value of online courses and perceived quality of online teaching. These findings indicate the need to enhance preschool teachers' professional identity, which may enable them to have more positive perceptions of the value of online courses and benefit the quality of their online teaching.

The Role of Psychological Distress in Teachers' Perceived Value of Online Courses

Consistent with Hypothesis 1, it is found that teacher-reported depression was negatively related to their perceived value of online courses. Such relationship continued to be significant after accounting for a set of covariates. This finding is in line with Fredrickson's (2001) broaden-and-build theory: teachers who reported higher levels of depression have a more limited thought-action repertoire, which might hinder their perception of the value of online courses. This finding can also be explained through the lens of Beck's (1976) cognitive model of depression. This theory posits that depressive individuals tend to hold negative perceptions of themselves, their own experiences, and their future (Beck, 1976). Therefore, teachers who reported high levels of depression might maintain pessimistic perceptions of themselves and their own work and, therefore, have perceived less value in online courses. These findings underscore the importance of supporting teachers with depressive symptoms to mitigate the potential adverse effects of these symptoms on their beliefs about online teaching.

Unexpectedly, this study found that, while teacher-reported loneliness and anxiety had negative zero-order correlations with perceived value of online courses, these associations turned out to be nonsignificant after controlling for a set of covariates in this study. These findings are inconsistent with Hypothesis 1 and Fredrickson's (2001) broaden-and-build theory. Together with the aforementioned results regarding the negative relationship between depression and perceived value of online courses, this study suggests that depressive symptoms have a stronger link to teachers' perceived value of online courses than loneliness and anxiety. These findings may be explained by the different characteristics of the three examined psychological distress symptoms. Specifically, depression has been considered a perception-oriented symptom; people suffering from depression tend to have negative perceptions of themselves, their surroundings, and the world (Beck, 1976). However, loneliness emphasizes the interpersonal aspect, such as a lack of safe and intimate relationships with others (Özçelik & Barsade, 2011), while anxiety is characterized by a future-oriented cognitive aspect that involves worries about potential threats in the future (Beck & Perkins, 2001). Given these distinct emphases, it is possible that depression, which places a greater focus on one's negative perceptions, affects teachers' perceived value of online courses to a larger extent than loneliness or anxiety.

The Role of Psychological Distress in Teachers' Perceived Quality of Online Teaching

Surprisingly, although depression and anxiety had negative zero-order correlations with teachers' perceived quality of online teaching, these relationships became nonsignificant when considering the effects of a set of covariates. These findings are inconsistent with Hypothesis 1 and with some previous studies (e.g., Pham et al., 2021). Given the finding concerning the significant relationship between loneliness and perceived quality of online teaching, it seemed that, among the three examined psychological distress symptoms, loneliness stood out in its relationship with teachers' online teaching quality. These findings may be attributed to the specific context of the COVID-19 pandemic. Specifically, researchers widely agree that relatedness to others constitutes a basic psychological need that drives people's motivations, well-being, and flourishing (Ryan & Deci, 2017). However, unfortunately, strict containment measures during the pandemic forced people into isolation (Smith & Lim, 2020); consequently, these measures may perhaps have had the most direct and salient impact on the social aspect of people's lives by drastically limiting people's social interactions and connections (Orozco, 2022). Thus, loneliness, which was the only symptom that was related to the interpersonal aspect of psychological distress in this study, may have generated particularly pronounced effects, compared with anxiety and depression, leading to its stronger relationships with the quality of teachers' online teaching. Taken together, these findings draw attention to preschool teachers' potential loneliness and indicate the need for measures to alleviate the potential adverse effects of preschool teachers' loneliness on the quality of their online teaching during the pandemic.

The Role of Professional Identity in Teachers' Perceived Value of Online Courses and Perceived Quality of Online Teaching

Consistent with Hypothesis 2, professional identity was positively related to both teachers' perceived value of online courses and their perceived quality of online teaching. These relationships persisted when accounting for a set of covariates. These findings supported Bakker et al.'s (2003) JD-R Model and are consistent with previous research (e.g., Richter et al., 2021). According to the JD-R model, job resources may encourage individuals' motivational process by reducing their physical and mental costs and, meanwhile, promoting their work efficiency and positive perceptions of work (Bakker et al., 2003). Therefore, in this study, higher levels of professional identity may serve as an effective job resource promoting the motivational process, could

have facilitated teachers' positive work-related functioning and nurtured their positive beliefs about work. Consequently, these positive qualities may have enabled them to have more positive perceived value of online courses and enhanced the quality of their online teaching. These findings highlight the importance of strengthening preschool teachers' professional identity and underscore the need to integrate training aimed at improving professional identity to enhance preschool teachers' positive beliefs about, and high-quality practices of, online teaching.

Limitations, Future Directions, and Implications

This study had several limitations. First, all the variables in this study were assessed using teacher-report questionnaires, which may have inflated the risk of shared method variance and common rater bias (Podsakoff et al., 2003). Future studies may consider adopting different data collection approaches and multiple reporters to address these issues. Second, the study adopted a cross-sectional design, which has limited power to reveal the directionality of the relationships, and which cannot determine true causal relationships between variables. Future studies can adopt longitudinal or experimental designs to increase the power to draw causal inferences. Again, because of the cross-sectional nature of the study, it is unknown whether the examined relationships persisted over different periods of the pandemic and the post-COVID-19 era. Further studies are needed to examine different stages using longitudinal data. Moreover, given the small sample size and the reliance on Chinese teachers as participants, it remains unclear whether the conclusions could be generalized to a larger or cross-national sample. Future studies should include a more diverse sample to strengthen the findings' generalizability. Furthermore, the small sample size also prevented us from conducting more complex analyses (e.g., analyses of the possible moderation effects of professional identity in the associations between psychological distress and preschool teachers' beliefs about and practices of online teaching). Future studies are recommended to include a larger and more diverse sample and perform additional analyses to obtain a more comprehensive understanding of the dynamics among the variables. Lastly, due to COVID-19, this study recruited participants using a social network application (i.e., WeChat). While WeChat has been widely used in China, it is indeed possible that some preschool teachers did not use this application at the time of data collection. Therefore, this study might not be able to cover those who did not use WeChat. Future research is recommended to apply multiple approaches and use different platforms for participant recruitment to maximize the coverage of the target population.

Despite the aforementioned limitations, this study has important theoretical and practical implications. Theoretically, the study offers a comprehensive picture of the unique contributions of different psychological symptoms and professional identity to preschool teachers' beliefs about, and practices of, online teaching. The findings of the study add to Fredrickson's (2001) broaden-and-build theory in the context of the COVID-19 pandemic and reveal the relationships of depression and loneliness with preschool teachers' perceived value of online courses and perceived quality of online teaching respectively. Moreover, this study offers additional evidence supporting Bakker et al.'s (2003) JD-R Model by showing the significant relationships between professional identity and both preschool teachers' perceived value of online courses and perceived quality of online teaching.

Practically, the findings showing the negative relationships between depression and perceived value of online courses sound a note of caution about the potential adverse effects of preschool teachers' depression and indicate the need for psychological interventions to help teachers cope with depressive emotions. At the same time, the finding showing that loneliness was negatively related to preschool teachers' quality of online teaching draws the attention of school leaders and policymakers to teachers' loneliness and calls for an approach to alleviating the potential negative effects of loneliness on the quality of teachers' online teaching. Lastly, the findings that professional identity was positively related to both preschool teachers' perceived value of online courses and quality of online teaching indicate a need for school leaders and governments to prioritize professional identity as a crucial part of professional development in the preschool context.

Conclusion

The present study examined the relationships of psychological distress and professional identity reported by preschool teachers with their perceived value of online courses and perceived quality of online teaching during the COVID-19 pandemic. The results showed that teacher-reported depression and loneliness were related to their perceived value of online courses and perceived quality of online teaching. Additionally, the study showed that teacher-reported professional identity was positively related to their perceived value of online courses and perceived quality of online teaching. These findings emphasize the significance of approaches to alleviating psychological distress and highlight the crucial role of professional identity in promoting preschool teachers' positive beliefs about, and high-quality practices of, online teaching in the COVID-19 context.

Declarations

Competing interests The authors report there are no competing interests to declare.

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