



## Research article

# Influence of early childhood teachers' psychological contracts on teacher competency: Chain mediating role of job crafting and professional identity

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## ABSTRACT

In response to the epochal demand for high-quality development in early childhood education in China, it is imperative and necessary to improve the competency level of early childhood educators. The study aims to investigate the relationship between psychological contracts and teacher competency, and to verify the mediating roles of job crafting and professional identity in the relationship between psychological contracts and teacher competency. This study employed validated measurement scales regarding psychological contracts, teachers' professional identity, job crafting, and teacher competency. Each of these scales has established internal consistency coefficients. Data were collected from 318 early childhood teachers in Sichuan, China. The results highlight the significant impact of psychological contracts on the prediction of teacher competency. It is worth mentioning that the psychological contracts, together with their distinct components such as normative responsibility and development responsibility, have a direct and favorable impact on teacher competency. This implies that developing the psychological contracts might be an effective technique for improving teacher competence. The individual mediation of job crafting and professional identity in the link between psychological contracts and teacher competency has been well-established. However, the combined or chain mediating influence of these factors provides a unique and valuable perspective on the phenomenon of job crafting leading to professional identity, which in turn impacts teacher competency. The study found that psychological contracts have a positive predictive effect on teacher competency, while job crafting and professional identity both have independent and chain mediating roles in the relationship between psychological contracts and teacher competency. Therefore, this study suggests a comprehensive enhancement of the psychological contracts level from aspects such as normative responsibility, interpersonal responsibility, and development responsibility. By stimulating job crafting and professional identity levels in both internal and external environments, we can improve the competency level of early childhood educators.

## 1. Introduction

The early years of the 21st century have been marked by a significant change in the worldwide focus on early childhood education. In the pursuit of sustainable development objectives, there has been a notable increase in the recognition of the need of delivering high-

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quality education at the early stages of development. Various countries across several continents, including affluent nations like North America and Europe, as well as fast growing areas such as Asia and Africa, are making substantial investments in the establishment of early childhood education infrastructure, the creation of curriculum, and the training of teachers [1]. The underlying justification for this worldwide initiative stems from the increasing body of research indicating that early interventions in education have enduring effects on an individual's educational path and overall life achievements [2].

The significance of early childhood educators in the context of this global story cannot be emphasized. These educators serve as the primary workforce responsible for turning educational policy and curriculum into concrete learning experiences for students. The influence of individuals' engagements with children extends beyond the development of cognitive abilities, including a significant role in the cultivation of socio-emotional skills [3]. These skills are now widely acknowledged as essential for achieving success in contemporary society [4]. The competency of early childhood educators plays a crucial part in the success of early childhood education initiatives, considering the diverse nature of their responsibilities. The comprehension of the elements that impact teacher competency has importance that transcends the confines of the classroom. The ramifications of this phenomenon extend to several levels, including educational policy, teacher training programs, and even national economic results [5]. An adept early childhood educator has the capacity to stimulate a child's inherent capabilities, initiating a trajectory towards continuous learning and achievement throughout their lives. On the other hand, deficiencies in teacher proficiency may sustain educational inequities, resulting in broader socio-economic disadvantages over an extended period [6]. Hence, doing an in-depth analysis of the psychological and professional elements that impact teacher competency, including psychological contracts, job crafting, and professional identity, is not only an intellectual pursuit but a crucial need for societies striving for comprehensive advancement, and lens to examine the multifaceted influences on teachers' professional development [7]. Professional identity and job crafting can have an immense impactful influence on teachers' competence. Psychological contracts between educators can create profound impact on teacher competency.

The level of teaching competency in kindergarten teachers affects the quality of early childhood educational instruction and is relevant to the high-quality development of early childhood education in China. However, numerous studies and facts indicate that the current competency of the early childhood teaching workforce needs strengthening, prompting researchers to focus on how to effectively inspire and enhance their competency levels. Nowadays, psychological contracts are considered an essential influence on competency levels. Psychological contracts refer to the implicit expectations, commitments, and beliefs between employees and organizations, beyond formal contracts [8]. Teacher psychological contracts denote the mutual responsibilities perceived by teachers in their relationship with the school [9]. These inherent needs and psychological expectations often can't be presented in contracts, but they are the things that can truly satisfy teachers, significantly impacting their work competency improvement [10]. Thus, this study intends to start with early childhood teachers' psychological contracts, attempting to explore their influence on teachers' competency and their specific paths of effect.

In recent years, there have been notable developments in the field of early childhood education research, as academics have extensively explored many factors that contribute to teacher competency. Although previous research has examined the influence of psychological contracts on teacher behaviors and results [9,11–13], there is still little understanding of the specific processes through which these contracts affect teacher competency. The emergence of the mediating roles of job crafting and professional identity has been a new development in the field [14]. Upon doing a more thorough analysis of the existing literature, it becomes evident that there are some areas that have not been well addressed. There exists a scarcity of comprehensive research that investigates the interrelationship between psychological contracts, job crafting, and professional identity, despite the presence of individual studies on these issues. An integrated approach is crucial in order to get a comprehensive comprehension of the collective impact of these factors on teacher ability. Furthermore, a significant portion of the current body of research employs a cross-sectional design, so constraining the capacity to establish causality and gain insight into the evolving nature of the associations among these factors. Finally, it is evident that there exists a conspicuous dearth of scholarly investigations that specifically concentrate on varied cultural and geographical settings. For a comprehensive understanding of the manifestations of psychological contracts and professional identity, it is crucial to consider the cultural subtleties that are linked with these concepts. This is particularly important when examining these interactions within specific contexts, such as the expanding educational environment in China [15].

Existing achievements provide inspiration for this study. Firstly, numerous studies have discussed the impact of psychological contracts on job competency [12,16,17], with results showing a high positive correlation between psychological contracts and professional core competencies and literacy, providing indirect evidence for the relationship between psychological contracts and competency. Secondly, many studies have empirically demonstrated that psychological contracts can effectively stimulate a positive work attitude and behavior [10,16,18]. As job crafting involves an individual's autonomous change, aligning personal ability with job requirements (i.e., demand-ability matching) and personal needs with job resources (i.e., needs-supply matching), it therefore promotes job satisfaction with personal skills and motivation, driving person-job fit. This conclusion suggests a possible correlation between psychological contracts and job crafting. Meanwhile, related research indicates that as the level of teacher job crafting increases, the time, emotion, and energy invested also increase. The more invested in self-development and teaching, the more individual efficacy, job performance, and work ability are improved, inferring that job crafting has a positive predictive effect on competency. Furthermore, the satisfaction of psychological contracts has a pleasing function, helping teachers generate positive emotional experiences and strengthen professional identity. Meanwhile, a substantial amount of earlier research pointed out the role of professional identity in enhancing competency. Finally, the positive predictive effect of job crafting on professional identity has also been confirmed. It is generally believed that job crafting allows employees to perceive different meanings and values, and changes in work purpose in this process, which is beneficial to achieving a positive professional identity. Based on these research findings, it is inferred that psychological contracts may not only directly affect teacher competency but also indirectly affect it through variables such as job crafting and professional identity. However, related research has not yet been thoroughly explored, and the conclusions require further

verification.

Building on existing theoretical achievements and considering the significant meaning of early childhood teacher competency, this study intends to explore and verify how early childhood teachers' psychological contracts affect teacher competency through job crafting and professional identity. Clarifying these issues is of great significance for understanding, maintaining, and improving the level of early childhood teachers' psychological contracts, strengthening the degree of job crafting and professional identity, and enhancing teacher competency.

Following the introduction, this paper is divided into several segments. The literature review establishes a theoretical base and identifies gaps in research; the methodology outlines the plan and analytical methods; results are then presented, emphasizing key analytical outcomes. The discussion focuses on contextualizing those results within the broader scholarly research. Finally, the conclusion summarizes the findings, acknowledges limitations, and suggests future research directions.

## 2. Literature review and research hypotheses

### 2.1. *The impact of psychological contracts on teacher competency*

The concept of psychological contract was first introduced by the organizational psychologist Argyris [19], to present the association between factory workers and foremen. With further research, Rousseau [20], and Robinson et al. [21], defined a psychological contracts from the perspective of the employee as the commitment, understanding, or perception of the exchange relationship. Guest [22] and Herriot and Pemberton [23] viewed psychological contracts from the perspective of both employer and employee, subjectively understanding or perceiving each other's various responsibilities and obligations.

Given the substantial variance in the content of psychological contracts, several scholars have distilled various dimensions of the psychological contracts. Rousseau [8] extracted "transactional contract" and "relational contract", with the former focusing on the contract relationship based on economic exchange, and the latter emphasizing social and emotional exchange. Meanwhile, Shapiro and Kessler [24] proposed "transactional obligations", "training obligations", and "relational obligations" from the perspective of organizational responsibility. Yuan [25] suggested that organizational responsibilities consist of three dimensions after conducting confirmatory factor analysis: material incentives, environmental support, and development opportunities. Employee responsibility was identified as compliance with norms, organizational identification, and entrepreneurial orientation. Yue [26] empirically investigated the structure of the psychological contracts of early childhood teachers and divided it into the dimensions of normative responsibility, interpersonal responsibility, and development responsibility. Drawing on the previous results, this study intends to explore the psychological contracts from the perspective of employees, that is, early childhood teachers, and classify it into the dimensions of normative responsibility, interpersonal responsibility, and development responsibility.

Competency is the individual behavioral characteristics that favor effective work in a specific organizational environment, cultural atmosphere, and work activities, possessing the capability to distinguish between good and bad job performance [27]. Consequently, teacher competency differs from teacher ability, and is a comprehensive manifestation of individual motivations, self-concept, knowledge, abilities, behavior, emotions, and personality traits that are possessed by excellent teachers in specific situations.

Existing research shows a potential mutual promotion between psychological contracts and competency. In terms of the impact of competency on psychological contracts and similar variables, limited studies have shown a positive correlation. Some scholars point out that psychological contracts play a key role in mediating the impacts of servant leadership on employee engagement, organizational commitment, and citizenship behaviors [28–30]. To maximize the abilities of employees, the level of psychological contracts must be taken into consideration. Based on the results of previous research and the needs of this study, we propose the following research hypotheses.

**H1.** Psychological contracts positively affect teacher competency.

**H1A.** Normative responsibility positively affect teacher competency.

**H1B.** Interpersonal responsibility positively affect teacher competency.

**H1C.** Development responsibility positively affect teacher competency.

### 2.2. *The mediating role of job crafting*

#### 2.2.1. *The influence of psychological contracts on job crafting*

The concept of job crafting was first presented by Wrzesniewski and Dutton [31], which refers to the bottom-up proactive actions taken by employees to make their work tasks and relationship boundaries align with their interests, motivations, and passions. This encompasses three dimensions: task crafting, cognitive crafting, and relational crafting. Among the numerous studies on the antecedents of job crafting, scholars generally agree that the influencing factors can be analyzed from two main perspectives: individual factors include proactive personality traits [32,33], personal motivational orientations [34], regulatory focus [35], and work value orientation [36]; environmental factors include the degree of managerial environmental monitoring [37], job rank [34], and job task characteristics [38].

In terms of the existing research on the psychological contracts and job crafting, the two are somewhat correlated. Relevant research shows that the psychological contracts are positively correlated with positive employee behavior and positive work attitudes (job satisfaction, organizational loyalty, etc.) [39], while it is highly negatively correlated with negative employee behavior (turnover,

carelessness) [40] and negative work attitudes (job burnout, etc.) [41]. Job crafting is a manifestation of positive work attitudes and behaviors [42]. These views provide support for a deeper understanding of the relationship between the psychological contracts and job crafting. Moreover, only a few studies have indirectly discussed the relationship between the psychological contracts and job crafting [43]. Namely, the lower the level of psychological contracts violation, the stronger the positive relationship between high-performance human resource practices and job crafting, and vice versa. Based on the related theoretical logic and indirect research results, it can be inferred that the psychological contract has a positive influence on preschool teachers' job crafting. In line with the needs of this research, the following hypotheses are proposed.

**H2.** The psychological contracts positively influence job crafting.

**H2A.** Normative responsibility positively influence job crafting.

**H2B.** Interpersonal responsibility positively influences job crafting.

**H2C.** Development responsibility positively influences job crafting.

### 2.2.2. *The impact of job crafting on teacher competency*

The concept of teacher competency is relatively new, with existing research mainly focusing on its connotation, dimensions, and evaluation. Although there are few studies on the relationship between teacher competency and job crafting, there are many studies on job competency, performance, and job crafting. Numerous studies suggest that job crafting generates a sense of "rightness" and positive emotional experiences in employees' current behaviors, thus enhancing their behavioral motivations leading to positive psychological experiences [37], improving job enthusiasm and focus, increasing work engagement, and improving individual efficacy [44] and job capability [3]. Moreover, a large number of studies have shown that this conclusion is also applicable to the teaching profession, suggesting that an increase in teachers' job crafting levels positively predicts their work engagement and job performance [32,33,45, 46]. In addition, a few studies have explored the impact of employee job crafting on competency, indicating that employees' crafting behavior can spontaneously improve work efficiency and quality to enhance competency [40]. Based on the above literature logic, this study suggests that job crafting has a direct impact on preschool teacher competency, thus proposing the hypothesis.

**H3.** Job crafting positively affects teacher competency

### 2.2.3. *The mediating role of job crafting in the influence of the psychological contracts on teacher competency*

Based on the statements of research hypotheses **H1**, **H2**, and **H3**, research on similar variables suggests that the psychological contracts may have a positive influence on competency; moreover, a large number of studies have shown that the psychological contracts positively influence work attitudes and behaviors, indicating that the psychological contracts may positively affect job crafting; meanwhile, job crafting is a behavior where employees autonomously alter their job content, relationships, and increase work resources, which is crucial for improving job performance and capability. Given the previous conclusions, this study predicts that the psychological contracts positively influence teacher competency through job crafting, thus proposing the research hypothesis.

**H4.** Job crafting mediates the effect of the psychological contracts on teacher competency.

**H4A.** Job crafting mediates the effect of normative responsibility on teacher competency.

**H4B.** Job crafting mediates the effect of interpersonal responsibility on teacher competency.

**H4C.** Job crafting mediates the effect of development responsibility on teacher competency.

## 2.3. *The mediating role of professional identity*

### 2.3.1. *The influence of psychological contracts on professional identity*

Professional identity refers to the preference or value perception for a certain profession [47]. Sachs [48] reported that two distinct identities that have been established for teachers are the entrepreneurial identity and the activist identity. Although these professional identities are not static, instructors have the ability to transition between them in different situations and places. A good professional identity can encourage teachers to fully devote themselves to work and experience a sense of happiness, achievement, and value in their work, reducing teacher attrition rates, and stimulating teachers to proactively improve their professional capabilities [14,49]. Meanwhile, low-level professional identity is closely related to high levels of professional fatigue and a tendency to resign, affecting the stability of the teaching staff [50].

The antecedent variables of professional identity are primarily related to external factors such as social environment, cultural environment, and institutional environment [34], or internal factors such as gender, professional title, stage of education, same profession motivation, salary [51]. Although the relationship between psychological contracts and teacher professional identity needs further verification and deepening, based on the above theoretical results and empirical data, this study hypothesizes that psychological contracts have a positive impact on the professional identity of preschool teachers. In line with the research needs of this paper, the following hypotheses are proposed.

**H5.** Psychological contracts positively influence teacher professional identity.

**H5A.** Normative responsibility positively influence teacher professional identity.

**H5B.** Interpersonal responsibility positively influence teacher professional identity.

**H5C.** Development responsibility positively influence teacher professional identity.

### 2.3.2. *The influence of professional identity on teacher competency*

Strong work abilities contribute to the formation of professional identity [52]. A large number of research results indicate that teacher competency positively influences teacher's professional identity. For instance, Khater [53] investigated the impact of the pandemic and online instruction on the professional identity of in-service EFL instructors, and revealed that Over the duration of online teaching, participants experience a decline in their professional identity and its components - teaching beliefs, professional competence, teacher autonomy, and career professional growth, among others. Kumar et al. [54] argued that participants had a favorable impression of the use of micro-credentials as a means to supplement and address difficulties encountered in online learning.

Simultaneously, professional identity is also the driving force for individual professional growth and ability development [4,49,55]. Qoyyimah et al. [56] investigated the professional identity of English as an International Language (EIL) instructors in Islamic schools and its influence on their perspectives on their professional obligations and the future prospects of their pupils, and argued that Instructors consider themselves more as caretakers and moral guardians than simply English instructors. Through prior research results, it can be seen that professional identity and teacher competency may have a mutual promotion effect.

Through prior research results, it can be seen that professional identity and teacher competency may have a mutual promotion effect. This study mainly explores the unidirectional influence of professional identity on preschool teacher competency, and hence proposes the research hypothesis.

**H6.** Professional identity positively influences teacher competency.

### 2.3.3. *Mediating role of professional identity in the influence of psychological contracts on teacher competency*

The research hypotheses H1, H5, H6 have been discussed. Indirect theories suggest that psychological contracts may positively influence teacher competency, professional identity may positively predict teacher competency level, and numerous studies have confirmed that psychological contracts are protective factors for professional identity. Based on prior results, this study predicts that psychological contracts may affect teacher competency through professional identity, and hence proposes the research hypothesis in line with research needs.

**H7.** Professional identity mediates the impact of psychological contracts on teacher competency.

**H7A.** Professional identity mediates the impact of normative responsibility on teacher competency.

**H7B.** Professional identity mediates the impact of interpersonal responsibility on teacher competency.

**H7C.** Professional identity mediates the impact of development responsibility on teacher competency.

## 2.4. *The chain-mediation role of job crafting and professional identity*

### 2.4.1. *The impact of job crafting on professional identity*

Job crafting, essentially, is a proactive behavior in which employees intentionally design their work in a meaningful way. It is characterized by distinct proactivity, initiative, and adaptability. Based on these attributes, numerous scholars have investigated the role of job crafting, which is to actively match work demands and resources with personal capabilities and needs by readjusting and reconstructing the job. This process enhances work engagement and a sense of meaning in work, improves job performance, fosters positive professional identity, and effectively copes with adversity. Specifically, regarding professional identity, extensive research indicates a positive correlation between the two. Wrzesniewski and Dutton [31] argue that job crafting alters work significance mainly through task and relational crafting, enabling employees to experience varying meanings, values, and work purposes, thereby fostering a positive professional identity. Fredrickson [57] points out that job crafting aids in constructing a positive work identity with high self-esteem and self-worth. Thai et al. [58] argued that job crafting increases work engagement, suggesting that managers' clear communication and delegation of authority may result in successful job crafting. Based on the aforementioned research, this study proposes the hypothesis.

**H8.** Job crafting has a positive impact on professional identity.

### 2.4.2. *The chain-mediation role of job crafting and professional identity in the influence of psychological contracts on teacher competency*

Based on hypothesis H8, it is evident that job crafting effectively promotes personal growth and enhances employees' sense of work meaning and professional identity. Meanwhile, hypotheses H1, H2, and H6 have explained prior research confirming or predicting the positive predictive effects of psychological contracts on teacher competency, psychological contracts on job crafting, and professional identity on teacher competency. Consequently, this study anticipates that psychological contracts may stimulate job crafting to influence professional identity, thereby enhancing teacher competency. In line with the needs of this study, the following research hypothesis is proposed.

**H9.** Psychological contracts and professional identity play a chain-mediating role in the impact of psychological contracts on teacher competency.

**H9A.** Psychological contracts and professional identity play a chain-mediating role in the influence of normative responsibility on teacher competency.

**H9B.** Psychological contracts and professional identity play a chain-mediating role in the influence of interpersonal responsibility on teacher competency.

**H9C.** Psychological contracts and professional identity play a chain-mediating role in the influence of development responsibility on teacher competency.

In short, although plenty of research has discussed the relationships between psychological contracts, job crafting, professional identity, and teacher competency with other variables, none have explored the interplay among these four variables. Based on previous research findings, this study postulates that psychological contracts can affect job crafting and professional identity, which in turn impact the level of teacher competency. Therefore, this study plans to develop a theoretical model (see Fig. 1) to verify the relationships among these four variables.

### 3. Materials and methods

#### 3.1. Selection criteria and basic information of the study object

The survey of this study was conducted within the Sichuan province in China, by combining online and offline questionnaires. A total of 360 questionnaires were distributed, with 342 collected in return. After removing invalid and missing questionnaires, 318 effective questionnaires were obtained, yielding an effectiveness rate of 88.3%. To ensure the representativeness, ethics, and rationality of the sample, the following standards were adhered to in selecting representative samples: first, a balanced distribution of different types of preschool teachers, and data was collected using random sampling. Second, before selecting subjects, each was given a detailed and objective introduction to the purpose of this survey, and it was pledged that the research results and materials will only be used for this study. Any confidential personal information related to the subjects was strictly kept confidential. Third, as competency specifically refers to the comprehensive traits possessed by top performers, to ensure that the subjects have competency, this study referenced the four comprehensive principles proposed by Shenghong et al. [59] for identifying superior preschool teachers (having rich teaching experience; backbone teachers; deeply loved by children and affirmed by parents; achieved outstanding results), and excellent preschool teachers were chosen as the subjects of the survey.

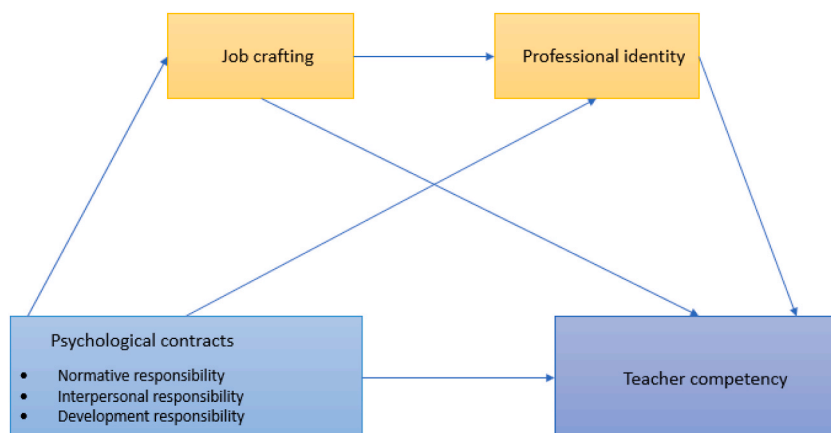
As most preschool teachers are female, this study did not record the gender of the survey teachers. The basic information of the sample is shown in Table 1.

#### 3.2. Measurement tools

To confirm the reliability and validity of the measurement tools, this study consulted expert opinions, read authoritative research results, comprehensively revised and used mature scales in domestic and foreign literature, and improved each factor dimension and specific items. All scales used Likert's 5-point scoring (5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, 1 = strongly disagree). The higher the score, the higher the degree or level of correlation.

##### 3.2.1. Psychological contracts

This study absorbed and used Robinson [21] psychological contracts questionnaire, Rousseau [60] psychological contracts questionnaire, and Li Yuan [25] employee psychological contracts questionnaire, and took into account Yue and Jinliang [61]'s



**Fig. 1.** Conceptual model diagram of this study.

**Table 1**  
Descriptive statistics.

| Variables               | Group                                  | Frequency | Percentage |
|-------------------------|--|-----------|------------|
| Academic qualifications | Junior high school and below           | 14        | 4.4        |
|                         | High School/Technical Secondary School | 82        | 25.8       |
|                         | College                                | 90        | 28.3       |
|                         | Undergraduate                          | 79        | 24.8       |
|                         | Master degree and above                | 53        | 16.7       |
| Teaching age            | 2–4 years                              | 101       | 31.8       |
|                         | 5–7 years                              | 119       | 37.4       |
|                         | 8 years and above                      | 98        | 30.8       |
| Prepared by             | No establishment                       | 161       | 50.6       |
|                         | There is establishment                 | 157       | 49.4       |
| Nature                  | Private                                | 147       | 46.2       |
|                         | Office                                 | 171       | 53.8       |
| Urban and rural         | City                                   | 162       | 50.9       |
|                         | The countryside                        | 156       | 49.1       |

“expectations of kindergarten teachers” psychological contracts structure to compile the questionnaire. This questionnaire mainly includes three dimensions and 12 items. The scale’s internal consistency coefficient in this investigation was determined to be 0.904.

### 3.2.2. Job crafting

The measurement tool employed in this study was the job crafting scale, which was established by Slemp and Vella-Brodrick [62]. The scale comprises three dimensions, each consisting of five elements. The scale’s internal consistency coefficient in this investigation was determined to be 0.910.

### 3.2.3. Professional identity

This study used Shuhua et al. [63] teacher professional identity scale, which consists of four dimensions and 18 items. The scale’s internal consistency coefficient in this investigation was determined to be 0.922.

### 3.2.4. Teacher competency

This study used the Teacher Competency Scale developed by Shujun and Hong [64]. This scale includes 4 dimensions with 22 items. The dimensions include Personality Charisma (7 items), Education Orientation (6 items), Professional Literacy (5 items), and Professional Commitment (4 items). The scale used in this investigation demonstrated a high level of internal consistency, with a coefficient of 0.933.

## 3.3. Data analysis

This study employed a multifaceted method for data analysis to ensure a comprehensive examination of psychological contracts job crafting professional identity development as well as levels of competence of early elementary school teachers. At first, descriptive statistics were employed to characterize the characteristics of samples before moving on to evaluate Cronbach’s Alpha to assess validity of scales employed. Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were employed to confirm the structure and factors of constructs as well as evaluate AMOS 21.0’s theoretical model, respectively. To assess any bias due to common methods used, Harman’s single-factor test was employed which ensures data integrity.

Structural Equation Modeling (SEM) was employed to examine hypothesized relationships among variables and understand their potential roles as mediators in job creation and professional identities. Bootstrap analysis was utilized to ascertain indirect effects and verify mediatory and chain-mediating functions within the model. Independent samples t-tests and one-way ANOVA were employed to examine differences among groups based on variables associated with professional and demographic aspects of each case. This data analysis technique provided a deeper understanding of how psychological contracts influence teacher competence both directly and through job writing and professional identity issues. Furthermore, this study provided evidence-based support for its hypothesis.

## 3.4. Analysis of common method bias

This study used Harman’s single-factor test to detect whether there was common method bias in the survey data. The principle of Harman’s single-factor test is that if the factor analysis results in a single factor, or if one factor explains most of the covariance among the variables, it can be inferred that there exists a presence of common method bias among the variables. If the variation explained by the first common factor exceeds 50% during the factor analysis, it means that the common method bias is relatively severe. This study carried out exploratory factor analysis based on 318 questionnaire data, and the variance explanation rate of the first principal component was only 29.9%, much lower than 50%. This indicates that there was no common method bias in the data analysis of this survey, which means that there was no individual or several factors that were too prominent in this study. The common method bias is within the normal range and does not affect the accuracy of the research results.

### 3.5. Fit of factor model

This study used AMOS 21.0 software to test the fit of the structural equation model. The results showed that  $X^2/df = 0.927$ , RMSEA = 0.000, GFI = 0.972, NFI = 0.949, RFI = 0.916, IFI = 1.003, TLI = 1.004. According to the viewpoint of Wen et al. [65], the chi-square value to degrees of freedom ratio ( $X^2/df$ ) is close to 1–3, and the root mean square error of approximation (RMSEA) should be less than 0.05, other fit indexes (such as GFI) should preferably be more than 0.9. Therefore, the confirmatory factor analysis model in this article has a good fit.

### 3.6. Descriptive statistics and reliability and validity

The mean, standard deviation, correlation matrix, and reliability and validity of variables are shown in Table 2. The reliability of each variable is greater than 0.7, and the AVE value is greater than 0.5, indicating that each variable has good reliability and convergent validity. A summary of the correlation coefficients between all variables was also performed, with the numbers on the diagonal representing the square root of the AVE value of each variable. The square root of the average value (AVE) of each variable exceeds the absolute value of the correlation coefficient between said variable and other variables. This finding demonstrates that all variables exhibit strong discriminant validity.

### 3.7. Ethical statements

The research was conducted in accordance with the Declaration of Helsinki. All methods were carried out in accordance with relevant guidelines and regulations. This study has been approved by the Ethics Committee of the College of Teachers, Chengdu University, China. The ethical number is CDDXSFX20230006. The research ethics committee, namely the Ethics Committee of the College of Teachers at Chengdu University, China, has approved the use of verbal consent for face-to-face interviews with respondents in this study. Ethical considerations were strictly adhered to throughout the study. Participants were provided with detailed and objective explanations of the survey’s purpose before their selection. We confirm that verbal informed consent was obtained from the participant before each face-to-face interview. Participants were assured that the research results and data would be used solely for this study. Strict confidentiality was maintained to safeguard any personal information that should not be disclosed publicly.

## 4. Results

### 4.1. Analysis of group differences in sample characteristic variables of the teachers

Independent sample T-tests were conducted for preschool teachers of different compilations, kindergartens’ nature, and urban-rural regions. At the same time, a one-way variance analysis was conducted for preschool teachers with different educational backgrounds and years of teaching experience, with the results shown in Table 3. For the four variables of psychological contracts, job crafting, professional identity, and teacher competency, no significant differences were observed among preschool teachers with different educational backgrounds. Significant differences were observed in all four variables among preschool teachers with different teaching experience, and the mean of the group of preschool teachers with more than 8 years of teaching experience was higher than other groups. Whether the preschool teacher has a compilation, there are significant differences in their psychological contracts, job crafting, professional identity, teacher competency, and other variables, and the mean of the group of preschool teachers with a compilation is higher than the group of preschool teachers without a compilation. There are significant differences among preschool teachers in kindergartens of different natures in terms of psychological contracts, job crafting, professional identity, and teacher competency, and the average of the public group is higher than the average of the private group. There are also significant differences in the four variables between the urban and rural groups, and in terms of psychological contracts and teacher competency, the urban group average is higher than the rural group average.

**Table 2**  
Descriptive statistics and analysis of reliability and validity of variables.

| Variable                       | Mean  | SE    | Convergent validity |       | Discriminant validity |              |              |              |              |              |  |
|--------------------------------|-------|-------|---------------------|-------|-----------------------|--------------|--------------|--------------|--------------|--------------|--|
|                                |       |       | alpha               | AVE   | 1                     | 2            | 3            | 4            | 5            | 6            |  |
| 1 Normative responsibility     | 3.556 | 0.057 | 0.862               | 0.682 | <b>0.826</b>          |              |              |              |              |              |  |
| 2 Interpersonal responsibility | 3.596 | 0.053 | 0.912               | 0.636 | 0.472**               | <b>0.797</b> |              |              |              |              |  |
| 3 Development responsibility   | 3.459 | 0.058 | 0.837               | 0.634 | 0.482**               | 0.472**      | <b>0.796</b> |              |              |              |  |
| 4 Job crafting                 | 3.583 | 0.041 | 0.910               | 0.585 | 0.315**               | 0.434**      | 0.288**      | <b>0.765</b> |              |              |  |
| 5 Professional identity        | 3.657 | 0.040 | 0.922               | 0.584 | 0.325**               | 0.461**      | 0.323**      | 0.542**      | <b>0.764</b> |              |  |
| 6 Teacher competency           | 3.640 | 0.041 | 0.933               | 0.593 | 0.287**               | 0.379**      | 0.346**      | 0.444**      | 0.460**      | <b>0.770</b> |  |

Note: \*\*\*p ≤ 0.001, \*\*p ≤ 0.01, \*p ≤ 0.05.



**Table 3**  
Comparison of differences in variables for different sample characteristics.

| Sample issue            |  | Psychological contracts | Job crafting | Professional identity | Teacher competency |
|-------------------------|--|-------------------------|--------------|-----------------------|--------------------|
| Feature variables       |  | (M±SD)                  | (M±SD)       | (M±SD)                | (M±SD)             |
| Academic qualifications | Junior high school and below           | 3.45 ±0 .82             | 3.41 ±0 .80  | 3.51 ±0 .71           | 3.43 ±0 .81        |
|                         | High School/Technical Secondary School | 3.51 ±0 .81             | 3.60 ±0 .67  | 3.64 ±0 .69           | 3.65 ±0 .74        |
|                         | College                                | 3.51 ±0 .80             | 3.62 ±0 .72  | 3.70 ±0 .69           | 3.66 ±0 .73        |
|                         | Undergraduate                          | 3.71 ± 85               | 3.51 ±0 .75  | 3.59 ±0 .73           | 3.64 ±0 .71        |
|                         | Master degree and above                | 3.47 ±0 .75             | 3.63 ±0 .81  | 3.74 ±0 .77           | 3.64 ±0 .71        |
| f                       |  | 1.042                   | 0.493        | 0.599                 | 0.323              |
| Teaching age            | 2–4 years                              | 3.38 ±0 .80             | 3.46 ±0 .69  | 3.56 ±0 .69           | 3.47 ±0 .72        |
|                         | 5–7 years                              | 3.55 ±0 .84             | 3.49 ±0 .75  | 3.59 ±0 .71           | 3.63 ±0 .74        |
|                         | 8 years and above                      | 3.72 ±0 .74             | 3.82 ±0 .71  | 3.85 ±0 .71           | 3.83 ±0 .67        |
| f                       |  | 4.487*                  | 7.636***     | 5.168**               | 6.309**            |
| Prepared by             | No establishment                       | 3.43 ±0 .86             | 3.49 ±0 .73  | 3.56 ±0 .71           | 3.50 ±0 .74        |
|                         | There is establishment                 | 3.67 ±0 .74             | 3.68 ±0 .73  | 3.66 ±0 .71           | 3.78 ±0 .68        |
| T                       |  | -2.560*                 | -2.22*       | -2.588*               | -3.507***          |
| Nature                  | Private                                | 3.44 ±0 .86             | 3.28 ±0 .65  | 3.24 ±0 .65           | 3.55 ±0 .68        |
|                         | Office                                 | 3.65 ±0 .75             | 3.85 ±0 .70  | 3.86 ±0 .71           | 3.72 ±0 .76        |
| T                       |  | -2.340*                 | -7.471***    | -5.749***             | -2.155*            |
| Urban and rural         | City                                   | 3.68 ±0 .78             | 3.49 ±0 .70  | 3.54 ±0 .67           | 3.74 ±0 .57        |
|                         | The countryside                        | 3.42 ±0 .81             | 3.68 ±0 .76  | 3.78 ±0 .74           | 3.54 ±0 .85        |
| T                       |  | 2.853**                 | -2.25*       | -2.957**              | 2.504*             |

Note: \*\*\*p ≤ 0.001, \*\*p ≤ 0.01, \*p ≤ 0.05.

#### 4.2. The relationship among key variables

Based on the constructed structural equation model, Amos 21.0 software was used to test the relationship between psychological contracts and its sub-dimensions, job crafting, professional identity, teacher competency, and other variables.

As shown in Table 4, Psychological contracts → job crafting (β = 0.603, p < 0.001), psychological contracts → professional identity (β = 0.340, p < 0.001), job crafting → professional identity (β = 0.582, p < 0.001), psychological contracts → teacher competency (β = 0.241, p < 0.01), job crafting → teacher competency (β = 0.307, p < 0.01), professional identity → teacher competency (β = 0.376, p < 0.001), which indicates that all paths' positive prediction functions are established. These results suggest that the research hypotheses H1, H2, H3, H5, H6, H8 are all established.

As shown in Table 5, normative responsibility → job crafting (β = 0.283, p < 0.001), normative responsibility → professional identity (β = 0.117, p < 0.05), job crafting → professional identity (β = 0.733, p < 0.001), normative responsibility → teacher competency (β = 0.087, p < 0.05), job crafting → teacher competency (β = 0.366, p < 0.001), professional identity → teacher competency (β = 0.434, p < 0.001), which indicates that all paths' positive prediction functions are established. These results suggest that the research hypotheses H1A, H2A, H3A, H5A, H6A, H8A are all established.

As shown in Table 6, interpersonal responsibility → job crafting (β = 0.380, p < 0.001), interpersonal responsibility → professional identity (β = 0.186, p < 0.001), job crafting → professional identity (β = 0.649, p < 0.001), interpersonal responsibility → teacher competency (β = 0.083, p > 0.05), job crafting → teacher competency (β = 0.353, p < 0.001), professional identity → teacher competency (β = 0.423, P < 0.001), it indicates that apart from the Interpersonal responsibility not having a significant impact on Teacher Competency, the positive prediction functions of the remaining paths are all established. These results suggest that the research hypothesis H1B is not established, and H2B, H3B, H5B, H6B, H8B are all established.

As depicted in Table 7, development responsibility → job crafting (β = 0.243, P < 0.001), development responsibility → professional identity (β = 0.111, P < 0.05), job crafting → professional identity (β = 0.722, P < 0.001), development responsibility → teacher competency (β = 0.101, P < 0.01), job crafting → teacher competency (β = 0.358, P < 0.001), professional identity → teacher competency (β = 0.422, P < 0.001), suggest that each path's predictive role is positively confirmed. This result affirms the research hypotheses H1C, H2C, H3C, H5C, H6C, and H8C.

**Table 4**  
Regression test results of psychological contracts, job crafting, professional identity, and teacher competency.

| Path  | Estimate | SE    | P   | Conclusion |
|---|----------|-------|-----|------------|
| Psychological contracts → job crafting          | 0.603    | 0.091 | *** | Support    |
| Psychological contracts → professional identity | 0.340    | 0.100 | *** | Support    |
| Job Crafting → Professional Identity            | 0.582    | 0.102 | *** | Support    |
| Psychological contracts → teacher competency    | 0.241    | 0.085 | **  | Support    |
| Job crafting → teacher competency               | 0.307    | 0.097 | **  | Support    |
| Professional identity → teacher competency      | 0.376    | 0.089 | *** | Support    |

Note: \*\*\*p ≤ 0.001, \*\*p ≤ 0.01, \*p ≤ 0.05.

**Table 5**  
Regression test results of normative responsibility, job crafting, professional identity, and teacher competency.

| Path   | Estimate | SE    | P   | Conclusion |
|--|----------|-------|-----|------------|
| Normative responsibility → job crafting          | 0.283    | 0.053 | *** | Support    |
| Normative responsibility → professional identity | 0.117    | 0.054 | *   | Support    |
| Job crafting → professional identity             | 0.733    | 0.093 | *** | Support    |
| Normative responsibility → teacher competency    | 0.087    | 0.044 | *   | Support    |
| Job crafting → teacher competency                | 0.366    | 0.097 | *** | Support    |
| Professional identity → teacher competency       | 0.434    | 0.088 | *** | Support    |

Note: \*\*\*p ≤ 0.001, \*\*p ≤ 0.01, \*p ≤ 0.05.

**Table 6**  
Regression test results of interpersonal responsibility, job crafting, professional identity, and teacher competency.

| Path   | Estimate | SE     | P     | Conclusion  |
|--|----------|--------|-------|-------------|
| Interpersonal responsibility → job crafting          | 0.380    | 0.0502 | ***   | Support     |
| Interpersonal responsibility → professional identity | 0.186    | 0.056  | ***   | Support     |
| Job crafting → professional identity                 | 0.649    | 0.095  | ***   | Support     |
| Interpersonal responsibility → teacher competency    | 0.083    | 0.046  | 0.073 | Not support |
| Job crafting → teacher competency                    | 0.353    | 0.098  | ***   | Support     |
| Professional identity → teacher competency           | 0.423    | 0.089  | ***   | Support     |

Note: \*\*\*p ≤ 0.001, \*\*p ≤ 0.01, \*p ≤ 0.05.

**Table 7**  
Regression test results of development responsibility, job crafting, professional identity, and teacher competency.

| Path   | Estimate | SE    | P   | Conclusion |
|--|----------|-------|-----|------------|
| Development responsibility → job crafting          | 0.243    | 0.047 | *** | Support    |
| Development responsibility → professional identity | 0.111    | 0.046 | *   | Support    |
| Job crafting → professional identity               | 0.722    | 0.092 | *** | Support    |
| Development responsibility → teacher competency    | 0.101    | 0.038 | **  | Support    |
| Job crafting → teacher competency                  | 0.358    | 0.096 | *** | Support    |
| Professional identity → teacher competency         | 0.422    | 0.088 | *** | Support    |

Note: \*\*\*p ≤ 0.001, \*\*p ≤ 0.01, \*p ≤ 0.05.

### 4.3. Mediation effect test

The study further employs the Bootstrap method in Amos 21.0 (number of repetitions set to 5000) to examine the mediating effects of job crafting and professional identity on the impact of the psychological contracts on teacher competency.

As Table 8 shows, in the mediation effect test of job crafting and professional identity in the impact of the psychological contracts on teacher competency, the independent mediation effect value of job crafting is 0.185, with a confidence interval not including 0; the independent mediation effect value of professional identity is 0.128, with a confidence interval not including 0; and the chain mediation effect value of job crafting → professional identity is 0.132, with a confidence interval not including 0. This indicates that all three mediation effects are significant, affirming research hypotheses H4, H7, and H9. Overall, the total indirect effect value between the psychological contracts and teacher competency is 0.445, the total effect value is 0.686, and the proportion of the total indirect effect in the total effect is 64.87%, suggesting that 64.87% of the psychological contracts' impact on teacher competency operates

**Table 8**  
Mediation effect test of job crafting, professional identity on the impact of the psychological contracts on teacher competency.

| Effects                     | Path  | Estimate | SE    | Confidence interval (95%) |              | Conclusion |
|-----------------------------|---|----------|-------|---------------------------|--------------|------------|
|                             |   |          |       | Bias-corrected            | Percentile   |            |
| Between catch effect answer | Psychological contracts → job crafting → teacher competency                         | 0.185    | 0.066 | 0.058, 0.321              | 0.057, 0.319 | Support    |
|                             | Psychological contracts → professional identity → teacher competency                | 0.128    | 0.048 | 0.047, 0.241              | 0.051, 0.241 | Support    |
|                             | Psychological contracts → job crafting → professional identity → teacher competency | 0.132    | 0.045 | 0.055, 0.234              | 0.057, 0.234 | Support    |
| Direct effect               | Psychological contracts → teacher competency  | 0.241    | 0.098 | 0.057, 0.441              | 0.052, 0.448 | Support    |
| Total effect                | Psychological contracts → teacher competency  | 0.686    | 0.095 | 0.513, 0.882              | 0.513, 0.890 | Support    |

through job crafting and professional identity.

The results revealed that the independent mediating effect of job crafting is 0.103, with a confidence interval that does not include 0 (Table 9). Similarly, the independent mediating effect of professional identity is 0.051, and its confidence interval also does not include 0. Additionally, the chain mediating effect of job crafting → professional identity is 0.090, with a confidence interval that excludes 0. These findings indicate that all three mediating effects are significant, confirming research hypotheses H4A, H7A, and H9A. Overall, the total indirect effect of psychological contracts on teacher competency is 0.244, and the total effect value is 0.332. The total indirect effect accounts for 73.49% of the total effect. This suggests that normative responsibility significantly impacts teacher competency, with 73.49% of this impact being mediated through job crafting and professional identity.

According to the research results shown in Table 10, during the test of mediation effects of job crafting and professional identity on the impact of interpersonal responsibility on teacher competency, the independent mediation effect of job crafting is 0.134, the confidence interval does not include 0; the independent mediation effect of professional identity is 0.079, the confidence interval does not include 0; the chained mediation effect of job crafting → professional identity is 0.104, and the confidence interval does not include 0, indicating that all three mediation effects are significant, thus validating the research hypotheses H4B, H7B, and H9B. Overall, the total indirect effect of the psychological contracts on teacher competency is 0.317, the total effect is 0.400, and the total indirect effect accounts for 79.25% of the total effect, suggesting that 79.25% of the impact of interpersonal responsibility on teacher competency is due to job crafting and professional identity.

As shown in Table 11, during the test of mediation effects of job crafting and professional identity on the impact of development responsibility on teacher competency, the independent mediation effect of job crafting is 0.087, the confidence interval does not include 0; the independent mediation effect of professional identity is 0.047, the confidence interval does not include 0; the chained mediation effect of job crafting → professional identity is 0.074, and the confidence interval does not include 0, indicating that all three mediation effects are significant, thus validating the research hypotheses H4C, H7C, and H9C. Overall, the total indirect effect of the psychological contracts on teacher competency is 0.208, the total effect is 0.309, and the total indirect effect accounts for 67.31% of the total effect, suggesting that 67.31% of the impact of development responsibility on teacher competency is due to job crafting and professional identity.

## 5. Discussion

The aim of this study was to explore the impact mechanism of psychological contracts on teachers' competency from the perspective of preschool teachers, and to verify the mediating role of job crafting and professional identity in this process. The research conclusions can aid in the dissection of the pathways, methods, and extents of the influence of the psychological contracts on teachers' competency, providing reference and basis for subsequent studies and the improvement of teacher competency.

### 5.1. Comparison of the current state of preschool teachers in various variables

No significant differences were observed in the psychological contracts, job crafting, professional identity, and teacher competency among preschool teachers with different educational backgrounds. However, there were significant differences in the four variables among teachers with different years of teaching, formats, types, and urban-rural areas.

The study indicates that there are no differences in the four variables among preschool teachers of different educational backgrounds. In terms of professional identity. Chen et al. [66] conducted a study to examine the mechanism via which social support influences professional identity. The association between these variables is potentially influenced by psychological adjustment and school belonging. The study demonstrated a substantial and positive correlation among social support, professional identity, school belonging, and psychological adjustment, specifically in relation to well-being and self-identity. It is apparent, therefore, that the relationship between educational background and professional identity is not definitive, and whether a higher level of education in preschool teachers translates to a higher level of professional identity still needs further verification.

Simultaneously, the study shows that preschool teachers with over eight years of teaching experience have the highest mean values

**Table 9**  
Mediation effect test of job crafting, professional identity on the impact of normative responsibility on teacher competency.

| Effects                     | Path   | Estimate | SE    | Confidence interval (95%) |              | Conclusion |
|-----------------------------|--|----------|-------|---------------------------|--------------|------------|
|                             |  |          |       | Bias-corrected            | Percentile   |            |
| Between catch effect answer | Normative responsibility → job crafting → teacher competency                         | 0.103    | 0.034 | 0.049, 0.185              | 0.043, 0.175 | Support    |
|                             | Normative responsibility → professional identity → teacher competency                | 0.051    | 0.025 | 0.007, 0.112              | 0.005, 0.110 | Support    |
|                             | Normative responsibility → job crafting → professional identity → teacher competency | 0.090    | 0.028 | 0.047, 0.158              | 0.045, 0.153 | Support    |
| Direct effect               | Normative responsibility → teacher competency  | 0.087    | 0.045 | 0.001, 0.181              | 0.001, 0.180 | Support    |
| Total effect                | Normative responsibility → teacher competency  | 0.332    | 0.054 | 0.234, 0.443              | 0.233, 0.442 | Support    |

**Table 10**

Test of mediation effects of job crafting and professional identity on the impact of interpersonal responsibility on teacher competency.

| Items                       | Path   | Estimate | SE    | Confidence interval (95%) |               | Conclusion  |
|-----------------------------|--|----------|-------|---------------------------|---------------|-------------|
|                             |  |          |       | Bias-corrected            | Percentile    |             |
| Between catch effect answer | Interpersonal responsibility → job crafting → teacher competency                         | 0.134    | 0.043 | 0.058, 0.235              | 0.055, 0.226  | Support     |
|                             | Interpersonal responsibility → professional identity → teacher competency                | 0.079    | 0.030 | 0.029, 0.147              | 0.028, 0.145  | Support     |
|                             | Interpersonal responsibility → job crafting → professional identity → teacher competency | 0.104    | 0.030 | 0.059, 0.186              | 0.055, 0.175  | Support     |
| Direct effect               | Interpersonal responsibility → teacher competency  | 0.083    | 0.051 | -0.016, 0.185             | -0.019, 0.181 | Not support |
| Total effect                | Interpersonal responsibility → teacher competency  | 0.400    | 0.048 | 0.312, 0.508              | 0.309, 0.505  | Support     |

**Table 11**

Test of mediation effects of job crafting and professional identity on the impact of development responsibility on teacher competency.

| Effects                     | Path   | Estimate | SE    | Confidence interval (95%) |              | Conclusion |
|-----------------------------|--|----------|-------|---------------------------|--------------|------------|
|                             |  |          |       | Bias-corrected            | percentile   |            |
| Between catch effect answer | Development responsibility → job crafting → teacher competency                         | 0.087    | 0.029 | 0.039, 0.156              | 0.035, 0.148 | Support    |
|                             | Development responsibility → professional identity → teacher competency                | 0.047    | 0.021 | 0.011, 0.094              | 0.009, 0.093 | Support    |
|                             | Development responsibility → job crafting → professional identity → teacher competency | 0.074    | 0.024 | 0.038, 0.134              | 0.035, 0.128 | Support    |
| Direct effect               | Development responsibility → teacher competency  | 0.101    | 0.040 | 0.023, 0.181              | 0.023, 0.181 | Support    |
| Total effect                | Development responsibility → teacher competency  | 0.309    | 0.048 | 0.22, 0.411               | 0.215, 0.408 | Support    |

in all four variables. In addition, teachers in public institutions with regular posts had higher mean values in all four variables than those in private institutions without regular posts. This might be due to the higher social status, prestige, job security, and development opportunities of teachers in regular public positions, empowering them to cope with job difficulties confidently and maintain high levels of psychological contracts, job crafting, professional identity, and teacher competency [67].

Lastly, in terms of urban-rural differences, the urban group had higher average values in terms of psychological contracts and teacher competency [17]. Hua [68], through his research, pointed out that teachers from urban kindergartens had higher competency than those from township and rural kindergartens, strongly supporting this study's conclusion. At the same time, this study also found that the rural group had higher average values in job crafting and professional identity. This might be because rural kindergarten teachers, compared to their urban counterparts, receive lower pay, face high staff turnover, and shoulder heavy workloads. Those who stay in the profession must have a strong professional motive, a high level of professional belief, and professional identity as emotional support. They must also exhibit a high level of proactive behavior to cope with constantly changing work environments, i.e., a higher level of job crafting.

## 5.2. The relationship between psychological contracts and teacher competency

Based on regression tests, it is evident that the psychological contracts have a positive influence on teacher competency. Prior research primarily focused on the impact of psychological contracts on abilities and competencies, as well as the effects of teacher competency on psychological contracts [10,13,17]. These studies have provided indirect evidence for the impact of psychological contracts on teacher competency. However, this research diverges from past studies by empirically demonstrating that the psychological contracts of early childhood educators positively predict teacher competency. In other words, the higher the psychological contracts of early childhood teachers, the higher the level of teacher competency. Additionally, sub-dimensions of the psychological contracts, such as normative responsibility and development responsibility, also positively predict teacher competency. However, interpersonal responsibility bears no relation to teacher competency, indicating that the interpersonal environment has little direct influence on teacher competency. This finding verifies and expands upon the positive influence of the psychological contract and its dimensions on teacher competency. It suggests that to accurately understand the composition and characteristics of early childhood educators' psychological contracts, efforts should be made to promote teacher competency, particularly through normative responsibility and development responsibility.

### 5.3. The mediating role of job crafting

#### 5.3.1. The relationship between psychological contracts and job crafting

This study finds that the psychological contracts and dimensions positively predict job crafting. Although prior empirical research on their relationship is scarce, many scholars believe that psychological contracts are highly positively correlated with proactive employee behavior and work attitudes. This belief aligns logically with our findings. Our results underscore the important value of the psychological contracts in strengthening job crafting.

#### 5.3.2. The relationship between job crafting and teacher competency

Job crafting has a substantial positive impact on enhancing teacher competency levels. This study finds that job crafting positively predicts teacher competency. In the current context, the development of education poses higher demands on teachers' comprehensive abilities. We should not only emphasize external force-driven enhancements of teacher competency, but also value the intrinsic motivation for reform within teachers themselves [69]. The study identifies a novel approach to job crafting by examining individual differences in job crafting skills. It aims to understand the specific results and tradeoffs associated with different competence profiles. Bruning and Campion [70] identified a novel approach to job crafting by examining individual differences in job crafting skills which helped understand the specific results and tradeoffs associated with different competence profiles. Similarly, Shang [71] emphasizes the importance of job crafting in enhancing teacher performance. Educational managers should actively promote job crafting to enhance the sense of purpose and engagement, which in turn helps maintain high levels of performance at work. Dreer [72] revealed that the impact of both school atmosphere and job crafting is cumulative. Teachers who had the highest levels of school atmosphere and had the highest marks in job crafting had the most well-being. This clarification underscores the importance of job crafting as another influential factor concurrent with the psychological contracts, actively leveraging the level of teacher job crafting for a positive effect on enhancing teacher competency levels.

#### 5.3.3. The mediating role of job crafting in the influence of psychological contracts on teacher competency

According to the test for mediating effect, the mediating role of job crafting in the process of psychological contracts and its dimensions influencing teacher competency is confirmed. Earlier literature provides some indirect evidence by exploring the relationships between psychological contracts and job crafting, job crafting and teacher competency, and psychological contracts and teacher competency. However, based on an empirical survey of 318 early childhood educators, this study verifies the positive mediating role of job crafting in the relationship between psychological contracts and its dimensions on teacher competency. It shows that early childhood teachers with higher psychological contracts demonstrate higher competency levels due to increased job crafting and its dimensions. Among the sub-dimensions of psychological contracts, the mediating effect of interpersonal responsibility → job crafting → teacher competency is the highest. Such research aids in deepening the relationship between psychological contracts and teacher competency. The influence of psychological contracts on teacher competency is not a single or direct linear mechanism, and other factors may also have an impact [36]. For instance, the confirmed mediating role of job crafting between psychological contracts and teacher competency provides a new approach for enhancing competency.

### 5.4. The mediating role of professional identity

#### 5.4.1. The relationship between psychological contracts and professional identity

The research findings indicate that there is a positive correlation between the psychological contracts of preschool teachers and their professional identity. Numerous scholars have proposed that the level of psychological contracts affect work attitudes, job satisfaction, professional happiness, and professional identity [10,13,16,73], which aligns with the conclusions of this study. Moreover, the study indicates that all three sub-dimensions of the psychological contracts significantly and positively predict professional identity.

#### 5.4.2. The relationship between professional identity and teacher competency

The conclusions drawn from this empirical survey suggest that preschool teachers' professional identity has a positive impact on their competency. In fact, a substantial amount of research has effectively demonstrated the relationship between professional identity and employee competency. It is generally believed that individuals with low professional identity harbor negative emotions, experience burnout in their profession, and thus hinder the development of their professional competency [44,51]. In contrast, employees who identify with their profession tend to adopt proactive work methods and continuously learn and improve their professional competency [43]. The research findings indicate that improving the level of preschool teachers' competency should not only consider external factors but also the internal factors, such as professional identity, to promote development.

#### 5.4.3. The mediating role of professional identity in the impact of psychological contracts on teacher competency

The mediating effect test reveals that the mediating role of psychological contracts and its various dimensions → professional identity → teacher competency is valid. This conclusion fills a gap in previous research. It's noteworthy that the test for mediating effects in this study further suggests that, among the two independent mediating paths of job crafting and professional identity, the indirect effect value of job crafting is higher than that of professional identity. The primary reason could be that explicit factors, in comparison to implicit factors, have a more direct and noticeable positive impact on teachers' behaviors and abilities. At the same time, the study finds that, among the sub-dimensions of psychological contracts, the interpersonal responsibility → professional

identity → teacher competency mediating effect is the highest. These conclusions suggest that professional identity not only directly affects teacher competency but also acts as a mediating variable and is an important protective factor for teacher competency.

### 5.5. *The chain mediating role of job crafting and professional identity*

#### 5.5.1. *The relationship between job crafting and professional identity*

Job crafting is a proactive bottom-up individual behavior, and its adjustment process contributes to the generation of a sense of work meaning, realizing a positive professional identity [74,75]. Consistent with previous research findings, this study concludes that job crafting has a positive predictive effect on professional identity.

#### 5.5.2. *The chain mediating role of job crafting and professional identity in the impact of psychological contracts on teacher competency*

According to the mediating effect test table, the chain mediating role of psychological contracts → job crafting → professional identity → teacher competency is valid. Furthermore, this study finds that the chain mediating role of normative responsibility/interpersonal responsibility/development responsibility → job crafting → professional identity → teacher competency is valid, with the mediating effect of interpersonal responsibility → job crafting → professional identity → teacher competency being the highest. This conclusion suggests that strengthening the psychological contracts and its various dimensions to enhance the level of job crafting, and thus improving the degree of professional identity, can have a significant positive effect on improving the level of teacher competency. Simultaneously, the study further clarifies that the psychological contracts, in addition to its direct effects and impacts via independent mediating paths through job crafting or professional identity, can also exert an effect on teacher competency via the chain mediating path of job crafting → professional identity.

### 5.6. *Policy recommendations*

#### 5.6.1. *Establish a dynamic management system*

Research indicates that preschool teachers with different characteristics exhibit significant variations in psychological contracts, job crafting, professional identity, and teaching competency. Relevant departments and kindergartens should implement dynamic management in response to these differences. Firstly, they should respect and fulfill the unique attributes of preschool teachers, establish flexible management systems, provide diverse development platforms, and acknowledge multiple development potentials. Secondly, targeted adjustments and reforms should be based on empirical research results of sample differences in different regions, leveraging strengths, addressing weaknesses, and maximally mobilizing teacher enthusiasm and developmental potential.

#### 5.6.2. *Holistically enhance the level of psychological contracts*

Psychological contracts are a key element in improving teaching competency. The psychological contracts of preschool teachers comprise normative, interpersonal, and development responsibility. Hence, kindergartens should correspondingly enhance the level and fulfillment of these three aspects. Firstly, improve teachers' compensation, ensure working hours, implement diverse assessment standards, establish flexible management systems and fair title recognition procedures, and strengthen responsibility in terms of salary, work security, and work environment. Secondly, foster a democratic and harmonious interpersonal environment, grant teachers more autonomy, fully understand, support, trust teachers, strengthen the sense of collective belonging, and raise the level of interpersonal responsibility. Lastly, while respecting teachers' personalized development, attention should be given to professional growth by providing diverse training opportunities and sufficient room for individual strengths to be realized, as well as providing ample platforms for showcasing abilities and promotion, thus enhancing development responsibility.

#### 5.6.3. *Increase the positivity of job crafting*

Job crafting is an effective means to improve teaching competency. As an active individual response to the work system, job crafting involves altering and adjusting the existing work system and will inevitably be constrained by existing work habits, a process that requires energy support from both internal and external environments. Firstly, organizations should offer more tolerance, support, and help, establish trust among teachers, rationalize authorization, and maximize the role of individual job crafting. Secondly, strengthen the intrinsic motivation for job crafting, encourage teachers to adjust their workload based on their needs, characteristics, and energy levels, and actively guide teachers in job crafting. Thirdly, provide professional guidance for job crafting, invite experts to analyze and assess real-world problems in teaching content, discuss potential challenges and solutions, and simultaneously provide more work resources and platforms for planned examination, feedback, and summarization in practice.

#### 5.6.4. *Strengthen the degree of professional identity*

Professional identity is closely related to the level of teaching competency, and positive professional identity positively influences the enhancement of teaching competency. To strengthen the professional identity of preschool teachers, internally, teachers should be guided to form a deeper understanding of their profession, establish a positive professional view, fully comprehend the meaning of the teaching profession, and ignite teachers' professional emotions. Externally, the society should give more attention to preschool teachers, provide full respect and recognition for the teaching profession, while increasing teacher salaries and related social security levels to enhance the sense of value from their profession.

## 6. Conclusions

A comprehensive understanding of the many aspects that impact teacher competency is important in order to navigate the complex dynamics of early childhood education. This study focused on the intricate relationship among psychological contracts, job crafting, and professional identity in influencing teacher competency.

The findings demonstrate the significant influence of psychological contracts on the prediction of teacher competency. It is important to note that the psychological contracts, with its distinct components including normative responsibility, and development, responsibility has a direct and positive effect on teacher competency. This indicates that developing the psychological contracts may be an effective method for enhancing teacher performance. This research also sheds light on the intermediate functions of job crafting and professional identity. The individual mediation of work reorganization and professional identity in the relationship between psychological contracts and teacher competence has been well-established. Nevertheless, the combined or chain-mediated effect of these factors provides a unique and valuable perspective. The phenomenon of job crafting resulting in professional identity, which in turn affects teacher competency, is a significant area of study. The aforementioned series of mediations highlights the need of considering explicit elements, such as job crafting, as well as implicit ones, such as professional identity, while seeking to comprehend and improve teacher competency.

Overall, this research offers a comprehensive comprehension of the many factors that impact teacher competency in the field of early childhood education. Through the prioritization of the psychological contracts and its mediation pathways including job crafting and professional identity, educational institutions and policymakers may develop more efficacious measures aimed at augmenting teacher competency, hence resulting in enhanced educational results for young learners. Future study should aim to delve further into the cultural and regional intricacies of these linkages, in order to ensure that policies aimed at improving teacher competency are applicable on a global scale while also considering local contextual factors.

## 7. Limitations and future research directions

This study has several limitations. Firstly, self-reported data may increase the possibility for bias in response, including social desirability bias - where people respond in ways they perceive as more acceptable to others rather than to their actual attitudes or behavior. Secondly, due to its geographical scope being restricted solely to early childhood educators in Sichuan Province of China, generalization may prove challenging. Differences in economic, cultural and educational system dynamics could impede generalization across other nations or regions. Thirdly, this study only considered teachers as stakeholders within the education system, without considering other stakeholder perspectives such as parents, administrators or children themselves. Finally, although the study focused on the mediation role of job crafting in professional and personal identity development, other possible mediators and moderators such as support for organizations were overlooked as potential mediators/moderators.

Future research could employ structured interview questionnaires to evaluate teaching competency levels to improve research precision. Furthermore, this study only explores the connection between psychological contracts and teaching competency from the perspective of preschool teachers. The psychological contracts from the organizational (kindergarten) perspective and their impact on the enhancement of teaching competency level are also of significant research value.

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## Availability of data and materials

Data are not shared. Data will be available on request.

## CRediT authorship contribution statement

**Xiaoshan Hu:** Writing – review & editing, Writing – original draft, Visualization, Software, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Yang Lv:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation. **Mei Tan:** Writing – review & editing, Writing – original draft, Validation, Supervision, Software, Resources, Methodology, Investigation, Formal analysis, Data curation. **Bingyu Hao:** Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Formal analysis.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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