



# Work Hours, Job Resources and Subjective Well-Being of Chinese Faculty: An Empirical Analysis Based on a Sequential Mediation Model

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## Abstract

Several studies have demonstrated the relevance of job demands-resources theory in examining the subjective well-being of Chinese university teachers. Nevertheless, the specific impact and mechanisms of various dimensions of job demands and resources on faculty members' subjective well-being are not well understood. This study seeks to identify the primary predictors of subjective well-being and to explore the connection between specific job demands-resources and subjective well-being through an examination of the sequential mediation of work stress and work-life balance. Questionnaires were completed by a total of 2302 faculty members from 302 universities in China. Correlation analysis and path analysis were employed to examine the relationships between job demands-resources and subjective well-being, as well as their influencing mechanisms. Job demands measured by work hours have a significant negative impact on the subjective well-being of university faculty, with teaching hours emerging as the primary negative predictor. Conversely, job resources have a significantly positive effect on faculty's subjective well-being, particularly decision participation, job security and extensive training, which serve as positive predictors. The relationship between job demands and faculty's subjective well-being is mediated by their work stress, and is further serially mediated by their work stress and work-life balance. Similar patterns are observed in the influence mechanism of job resources on subjective well-being.

**Keywords** Job demands-resources · Faculty's subjective well-being · Work stress · Work-life balance · Sequential mediation model

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## Introduction

Recently, there has been increasingly competitiveness within China's academic profession. Driven by the projects of China's higher education, such as Project 985, "Double World-Class Project", the higher and stricter requirements are put forward for faculty's performance evaluation. In order to increase faculty's research output, lots of universities have set up high research awards. This quantitative evaluation mechanism dominated by administrative power has forced faculty into an "academic tournament" (Ren & Liu, 2021). In the short term, the distorted academic tournament can effectively encourage faculty to publish more papers and secure more funding. However, in the long term, it will greatly increase faculty's work stress in evaluation and promotion and potentially diminish their intrinsic motivation to engage in teaching and research, and thus posing a threat to the quality of talent development and academic research. Furthermore, the increased organizational demands often require faculty to dedicate extensive time to work, leading to a spill-over effect into their personal lives, which may detrimentally impact their overall well-being.

In the increasingly competitive academic circumstance, faculty's subjective well-being may be declining (Xin et al., 2021). In order to solve this problem and further to attract, retain and motivate faculty, "Let the majority of teachers have a sense of well-being in their posts" has become one of the policy goals of construction of teaching staff in China. Against this backdrop, achieving a balance between employee well-being and organizational performances has become a pivotal concern for Human Resource Management (HRM) in China (Zhao et al., 2021), in which universities adopted management strategies aiming to accommodate faculty's well-being at work and organizational performance, such as teacher training, decision-making participation. Aiming to explore the effects of these strategies, we locate the job resources of university at the organizational levels in this study.

To sum up, it is more and more important to explore the effects and mechanisms of job characteristics on faculty's subjective well-being (SWB) in China. Job Demands-Resources Theory (JD-R theory) linking job characteristics and SWB provides theoretical support for this study. The JD-R theory indicates that job characteristics of any occupation could be divided into job demands and job resources, triggering two relatively independent processes that affect employee's subjective feelings, respectively (Demerouti et al., 2001). Based on the JD-R theory, the Conservation of Resources Theory and the Spillover Theory, this study constructs a theoretical framework for analyzing faculty's SWB, examining the association between job demands-resources and SWB, and further exploring the underlying mechanisms. This study has practical implications for improving the well-being of the huge teaching staff in Chinese universities.<sup>1</sup>

## Theoretical Framework and Hypotheses

### The Relationship Between Job Demands-Resources and Subjective Well-Being

The JD-R model proposes that job characteristics can be classified into two broad categories, job demands and job resources, which are differentially related to job-related

<sup>1</sup> According to "National Education Development Statistical Bulletin" issued by China's Ministry of Education, China has more than 1.8 million academic faculty in 2020.

outcomes. *Job demands* encompass those physical, social, or organizational aspects of the job that require sustained physical or mental engagement and are associated with certain physiological and psychological costs. *Job resources* refer to the organizational or social resources that can be functional in achieving work goals, reducing job demands and physical or mental losses, and stimulating personal growth and development (Demerouti et al., 2001). Since the JD-R model was proposed, it has been widely utilized in empirical studies across kinds of occupations to explore the relationship between job characteristics and job-related outcomes. With the verification and expansion of the JD-R model, it has evolved into the JD-R theory (Bakker & Demerouti, 2017).

The JD-R theory is a heuristic and flexible model, and the classification of job characteristics depends on the occupational conditions. When applying the JD-R model, it is necessary to elucidate the function of job characteristics in a specific occupational environment and social context (Bakker & Demerouti, 2017; Van Veldhoven et al., 2020). This study focuses on faculty's subjective well-being. Therefore, it is crucial to identify which job characteristics are job demands and which are job resources in the academic profession, and how these characteristics affect faculty's SWB. The study concentrates on the key job characteristics of China's academic environment, in order to build an analytical framework of the organizational factors affecting the faculty's SWB and their mechanisms, and further explains the relationships from two aspects of job demands and job resources.

## Job Demands

Working hours is a typical indicator of job demands (Schaufeli & Taris, 2014). Although faculty have a highly flexible schedule, their work overload has been common, with an average of more than 50 h per week (Shen, 2011). Many studies used working hours as an indicator of job demands to examine its role in the JD-R model. A consistent conclusion is that work overloads leads to burnout, exhaustion, and other negative feelings (Záborská et al., 2018; Wibawa et al., 2021). The long-term nature of teaching and research tasks requires continuous high physical and mental involvement, which is easy to damage faculty's SWB (Beckers et al., 2008). In recent years, the conflict between teaching and research work faced by faculty has become more and more prominent (Lai et al., 2014). Generally, teaching work with more rigid demands and more difficult performance evaluation may more easily reduce faculty's SWB (French et al., 2020). However, since the research hours of Chinese faculty are generally long, research hours are also likely to have a negative impact on faculty's SWB. Based on this, hypothesis 1 is proposed:

**H1** Job demands, including (a) total working hours, (b) teaching hours, and (c) research hours, are negatively associated with faculty's SWB; (d) Teaching hours have a stronger negative association with SWB than research hours.

## Job Resources

The JD-R model includes both the external resources provided by organizations and society and the internal resources of individuals in the analysis framework, the former including peer support, job autonomy, decision-making participation, career development opportunities, and the latter including internal motivation, self-efficacy, optimism, and so on. Moreover, an increasing number of studies attempt to elaborate how HRM decisions at organizational level translate into tangible job resources for employee (Van de Voorde,

2016; Kloutsiniotis & Mihail, 2020; Dorta-Afonso, et al., 2023), which is important for Chinese universities aiming to improve faculty's SWB. The job resources in the current study reflect a group of interconnected HRM policies, including extensive training, job security, and participation. They represent important management strategies for personal resource enhancement, employment practice enhancement and job design enhancement, respectively (Van Veldhoven et al., 2020). We consider these three characteristics to be essential job resources provided by universities in the working environment of the Chinese academic profession. In the following subsections, we will provide a detailed explanation of why these variables were chosen.

First, *extensive training* refers to systematic teaching and scientific research skills training provided by the government or universities to help faculty perform better in their jobs. Extensive training is a regular and systematic practice within the Chinese academic profession, which has been mentioned in the policy guidelines many times. For example, *Opinions on Deepening the Reform of Undergraduate Education and Teaching to Comprehensively Improve the Quality of Talent Cultivation*, issued by the Ministry of Education, stipulates that it is necessary to carry out pre-service and on-the-job professional subject training for the purpose of improving teaching ability. On the other hand, some studies also found that teachers' professional development has a significantly positive impact on their job satisfaction and well-being (Pei et al., 2020; Tang et al., 2018). For faculty, it is required interaction, transformation, and integration between multiple knowledge and abilities from new faculty to expert faculty (Zhang & Kuang, 2017). Training courses and programs provided by all relevant departments can help to promote new and young faculty' pre-service teaching preparation and teaching adaptation, and then smooth the path and channel of young faculty's teaching and academic development (Zhou & Yu, 2022). Therefore, extensive training is viewed as a job resource to promote professional development and stimulate the positive job feelings among faculty.

Second, as an index for dividing the dual-labor market, *job security* refers to the individual's subjective expectations of employment stability and continuity within organizations (Probst, 2003). Bakker and Demerouti (2007) regarded job security as a job resource. Studies have shown that job security is positively related to work-life balance and job performance (Carlson et al., 2011; Loi et al., 2011). In China, the *Bianzhi* system<sup>2</sup> is an important institutional guarantee for the security of teachers' work. Therefore, compared with enterprises and research institutions, the profession of faculty is more favored by most PhD graduates. However, a growing body of Chinese universities have recently adopted the "up or out" system, which allows them to dismiss faculty who fail to meet assessment requirements. The "up or out" system greatly increases perceived job insecurity and negative feelings among faculty (Huang et al., 2018). Under this system, faculty's work stress and career anxiety have been widely discussed by Chinese researchers (Lai, 2010; Meng & Wang, 2018). Therefore, we believe that job security is one of the important job resources.

Third, *Participation* is the inherent requirement of democratization and scientific governance in colleges and universities. It occurs mainly in the workplace and has a more positive direct impact on job-related feelings (Xia et al., 2016; Goñi-Legaz & Ollo-López, 2017). Faculty members are likely to have better information for decisions concerning curriculum, the creation of new academic programs and general faculty governance decisions than administrators or trustees (Brown, 2001). In China, participation is the legal right of

<sup>2</sup> *Bianzhi* can be understood as officially budgeted posts, that is, a position of duty, employment, or trust to which one is assigned or appointed. Faculty on the *Bianzhi* are usually not fired by universities.

faculty, and the correct exercise of this right concerns the success or failure of the construction of the modern university system (Tan, 2014). A study pointed out that faculty's participation in university governance is conducive to the unification of faculty's dual loyalty in discipline and organization (Liu & Peng, 2015). Supportive participation in academic work management decision-making allows faculty to better feedback the above information to management decision-making leaders and departments, thereby positively affecting their performance. Al-Zo'bir and Bataineh (2018) analyzed the relationships between the contents of participation and job satisfaction, drawing the conclusion that decisions concerning students' affairs, faculty members, study plans, college building, and financial issues are positively correlated with job satisfaction. Thus, participation can also be regarded as one of the job resources for faculty. Accordingly, we make the following hypothesis 2:

**H2** Job resources including (a) extensive training, (b) job security, and (c) participation, are positively associated with faculty's SWB.

### The Mediation Role of Work Stress and Work-Life Balance

Further analysis reveals that the key indicators of job demands and job resources selected in this study may affect the faculty's SWB in three ways.

The first path is that the increase of job demands and lack of job resources may trigger a process of elevating work stress, which can hinder faculty's SWB (Ng et al., 2009; Ng & Diener, 2021). On one hand, faculty need to exert significant efforts to meet job demands. When they have not fully recovered from physical or psychological losses, job demands may be transformed into a source of work stress, leading to more negative outcomes such as burnout and reduced satisfaction (Bakker & Demerouti, 2007; Demerouti & Bakker, 2011). Many studies provide empirical support for this (Boyd et al., 2011; Fontinha et al., 2019; Lee et al., 2022). On the other hand, according to the Conservation of Resources Theory, employees tend to protect a variety of valuable resources, such as time, social support, and when these resources are threatened or depleted, it triggers stress (Hobfoll, 1989). There are cross-links between job resources and the negative job outcomes (Bakker et al., 2004; Hakanen et al., 2008). Demerouti et al. (2001) found the absence of job resources can lead to faculty experiencing loss factors and increased work stress, while an increase in job resources would reduce work stress (Bottiani, et al., 2019). In other words, job resources are negatively related to work stress. Accordingly, hypothesis 3 and hypothesis 4 are proposed:

**H3** Job demands, including (a) total working hours, (b) teaching hours, and (c) research hours, have indirect negative effects on SWB through work stress.

**H4** Job resources, including (a) extensive training, (b) job security, and (c) participation, have indirect positive impacts on SWB through work stress.

The second path is that the increase of job demands and the lack of job resources may lead to the imbalance between faculty's work and life, and thus damage their SWB. Faculty have relatively high autonomy and time flexibility, but the balance between work and life is challenging (Ward & Wolf-Wendel, 2012). Watanabe and Falci (2016) constructed an analytical framework to distinguish job demands and job resources from the perspective of within-domain and boundary-spanning. The empirical research results

showed that work-to-family spillover increased the turnover probability of faculty in order to achieve work-life balance. High job demands (e.g., quantitative demands) that require excessive effort are associated with negative load effects spilling over into the home domain. As a consequence, it will be more difficult to recover sufficiently at home from the effort put forth into the job, increasing the possibility that job demands harm psychological health (Peeters et al., 2005). Winefield et al. (2014) and Zábrodská et al. (2018) examined the mediating role of work-life balance by using the samples of faculty.

Based on the Conservation of Resources Theory and the Role Balance Theory, some studies argued that job resources are beneficial for employees to manage their work and life roles, resulting in a high work-life balance, subsequently positively impacting employees' well-being and performance (Haar, 2013; Haar & Brougham, 2022). Carlson et al. (2011) indicated that high job security allowed employees to take on responsibilities both at work and at home without being distracted by exhaustion, thereby creating more opportunities and enriching the relationship between work and family. Additionally, a study showed that work-life imbalance played a mediating role between the linkage job insecurity and burnout (Zábrodská et al., 2018.) We believe that extensive training provides support for faculty's professional growth, enabling them to better adapt to work tasks, so as to be more capable of balancing work and life. As for participation, faculty can express their ideas on matters of their own concern or interests in a good work climate that encourages democratic participation. It can alleviate the spillover from work to life to a certain extent, thereby improving the sense of work-life balance. Accordingly, hypothesis 5 and hypothesis 6 are proposed:

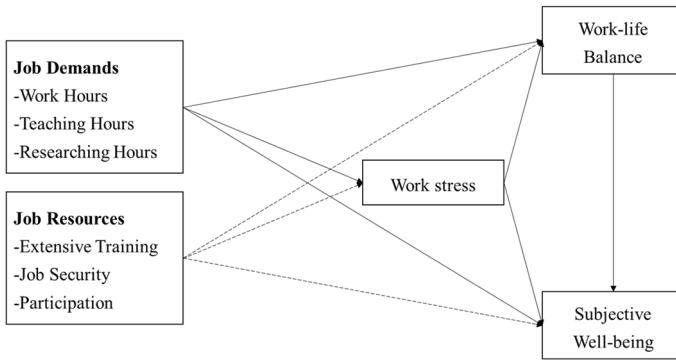
**H5** Job demands, including (a) total working hours, (b) teaching hours, and (c) research hours, are indirectly negatively correlated with SWB through work-life balance.

**H6** Job resources, including (a) extensive training, (b) job security, and (c) participation, are indirectly positively associated with SWB through work-life balance.

The third path is that work stress and work-life balance play a sequential mediating role in the impact of job demands and job resources on SWB. Spillover theory posits that one domain will have a spillover effect on other domains (Frischmann, 2009). Thus, employees who feel more stress at work are more likely to experience imbalance in the life and work (Aruldoss et al., 2021), while under the work conditions with fewer stressors, employees can devote more energy and emotions to life because of reduced spillover from work to life (Carlson et al., 2011; Sparks et al., 2001). Some studies found that work-life balance or conflict could explain the impact of work stress on physical discomfort to a certain extent, that was, it played a mediating role in the impact of work stress on outcome variables (Peeters et al., 2005). Winefield et al. (2014) also validated this result that work-life conflict mediated the effects of work stress on anxiety and physical health based on the evidence from faculty. Accordingly, hypothesis 7 and hypothesis 8 are proposed:

**H7** Job demands, including a) total working hours, b) teaching hours, and c) research hours, indirectly negatively influence SWB through work stress and then work-life balance.

**H8** Job resources, including (a) extensive training, (b) job security, and (c) participation, indirectly positively influence SWB through work stress and then work-life balance.



**Fig. 1** Proposed conceptual framework

Based on the JDR model, the Conservation of Resources Theory, the Spillover Theory and a series of related study, we developed a theoretical framework to be empirically tested as shown in Fig. 1 for exploring the mechanism of the influence of job demands and job resources of faculty on their SWB.

## Methodology

### Participants and Procedures

The faculty we studied were from public higher education institutions offering degree programs in mainland China. Compared with vocational colleges, this type of university has typically higher demanding and supportive work contexts. On one hand, universities function as research centers rather than just learning institutions, in which faculty face higher job demands from teaching and research; on the other hand, nearly 65% of the universities in China are public, and their better funding enables them to provide more job resources for faculty members.

The survey was conducted from September 2019 to May 2020. At the beginning, paper questionnaires were used to collect well-being and related background information from faculty in universities located in three districts of China, using stratified sampling based on gender, age, discipline and the level of universities. During the COVID-19 pandemic in China, due to the home isolation policy, field surveys of faculty were discontinued, so we adopted an online questionnaire platform to collect data through convenient sampling methods. According to the logged-in WeChat account, one account and one IP was only allowed to submit reply once. Each participant can receive a time compensation of RMB 2–8 after completing the online questionnaire. All participants remained anonymous. Finally, a total of 2713 questionnaires were returned. After removing invalid questionnaires, the final sample consisted of 2302 faculty from 302 universities, yielding a useful response rate of 84.9%. Among the sample, 57.7% were male, and 42.3% were female. Approximately 35.7% were teaching assistants or lecturers, 39.8% were associate professors, and 24.5% were professors. Regarding disciplinary background, 17.5% were from the liberal arts, 39% were from social science, and 43.6% were from science, technology, agriculture or medical science. Since China’s official statistics issued the demographic

characteristics of full-time teachers in all colleges and universities, rather than higher education institutes offering degree programs, we compared the sample with the former. The results show that our sample have a slightly higher proportion of male faculty, professors than official statistics. Because male faculty are more advantaged and the faculty quality is higher at our target universities, we believe this difference is acceptable.

## Measures

The questionnaire consists of two parts. The first part comprised 4 items related to SWB and job demands and 3 scales measuring job resources, work stress and work-life balance. The second part is used to collect background information about faculty.

### Subjective Well-Being

SWB was measured by a 11-point question adapted from the measurement of Happiness score or SWB in *World Happiness Report* (Helliwell et al., 2018), which was usually used in some large-scale surveys. The English wording of the question is “Which level of well-being do you personally feel now? 1 represents the lowest level of well-being and 11 represents the highest level of well-being.”

### Job Demands

Related studies often use work hours to measure job demands (Schaufeli & Taris, 2014; Skaalvik & Skaalvik, 2018). Referring to the measurement of previous studies, this study included three indicators: (a) the total work hours, (b) teaching hours, and (c) research hours per week as the overall and specific work content demands. The longer the working hours, the higher the job demands. We excluded individuals responding more than 120 h.

### Job Resources

Prior literature believed that job resources at the organizational level include professional development opportunities, democratic decision-making and other aspects (Bakker & Demerouti, 2007; Yin et al., 2018). According to the practice of personnel management in China’s Higher education, we argue that job security is also an important job resource for Chinese faculty. We included three measures of job resources in the study: (a) extensive training, (b) job security, and (c) decision participation. These variables were previously tested by four, two and four items (Sun et al., 2007), which were adapted according to the job characteristics of China’s university faculty. All items were scored on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), and relevant questions were encoded in reverse. The Cronbach’s alpha coefficients of extensive training, job security and decision participation were 0.678, 0.861 and 0.910, respectively, and confirmatory factor analysis showed that CFI, TLI and RMSEA were 0.979, 0.970 and 0.060, respectively.

### Work Stress

The work stress items developed by Shen (2016) was used to assess Chinese faculty’s work stress. These three items measured faculty’s perception of stress in teaching, research and overall work. We have added an item measuring work stress from tutoring



postgraduate to ensure that faculty's work stress can be reflected in more ways, and finally the 4-item work stress scale were used in this study. All items were scored on a 4-point Likert scale ranging from 1 (no stress) to 4 (heavy stress). The Cronbach's alpha coefficients of work stress was 0.828, and confirmatory factor analysis showed that CFI, TLI and RMSEA were 0.998, 0.989 and 0.047, respectively.

## Work-Life Balance

The work-life balance was measured by a 4-item unidimensional scale which was developed by Brough et al. (2014). Sample items included the following: "I currently have a good balance between the time I spend at work and the time I have available for non-work activities." All items were scored on a 4-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The Cronbach's alpha coefficients of work stress was 0.855.

## Control Variables

In a recent study, Diener et al. (2018) reviewed the determinants of SWB, including demographic factors (e.g., age, gender), psychological characteristics (e.g., personality, goals) and social relationships (e.g., religion, marriage). Considering the work characteristics of China's faculty, faculty's demographic characteristics (gender, age and health status), human capital characteristics (academic title and overseas experience), family characteristics (marriage, number of children, and the mortgage) and organizational characteristics (discipline, university type-whether it is a "double first-class" university, and the region where the university is located) were include as control variables.

## Data Analysis

First, as an initial exploratory procedure, the software Stata 17 was used to conduct descriptive statistics and correlational analysis. Second, we were interested in establishing whether all of indicators of the job demands and job resources influence faculty's SWB, and whether work stress and work-life balance exert the equal effects in the relationships between job demands or job resources and SWB. To accurately test this and avoid the issue of multi-collinearity (see Figure S1 in supplementary information for more details), we conducted 6 path analysis models separately using Stata 17 for Bootstrap analysis. In each sequential mediation model, we estimated the impact of specific job demands indicators on faculty's SWB, and the sequential mediating effects of work stress and work-life balance in the relationship between the job demands indicators and SWB, finally compared the indirect effects of work stress and work-life balance within each model. Then we similarly estimated the impact of each job resources indicator on faculty's SWB, and the sequential mediating effects of work stress and work-life balance in the relationship between each indicator and SWB, finally compared the indirect effects of work stress and work-life balance within each model. Each path analysis model provided estimates of standardized path coefficients ( $\beta$ ) and bootstrapped 95% confidence intervals (95% CI) for standardized effects based on 5000 resamples.

## Results

### Descriptive Statistics and Correlations

Table 1 presents descriptive statistics and correlations among the focal variables. Regarding job demands, the total work hours reported the sample faculty was 54 h per week, in which the teaching hours ( $M=18.07$ ) was roughly equivalent to the research hours ( $M=19.7$ ). In terms of job resources, the sample faculty reported a higher level of extensive training ( $M=3.14$ ) and job security ( $M=3.31$ ) than decision participation ( $M=2.93$ ), indicating they were less involved in decision-making in universities. And they reported high levels of work stress ( $M=3.05$ ) and medium levels of work-life balance ( $M=3$ ). In addition, the sample faculty's SWB was above the general level ( $M=6.55$ ).

Overall, the correlations among the focal variables were basically consistent with our expectations. All correlations between the three job demands and work stress were positive and ranged from  $r=0.055$  to  $r=0.148$ . Also, the two indicators of job demands were correlated negatively with work-life balance and SWB, and the correlations ranged from  $r=-0.090$  to  $r=-0.129$  and from  $r=-0.105$  to  $r=-0.117$ , respectively. Additionally, the three job resources correlated negatively with work stress, with correlations ranging from  $r=-0.159$  to  $r=-0.206$ , and correlated positively with work-life balance and SWB, with the correlations ranging from  $r=0.293$  to  $r=0.364$  and from  $r=0.318$  to  $r=0.359$ , respectively.

### The Impact of Job Demands on SWB and the Sequential Mediation Model

The path analysis models were conducted to examine the effect of job demands on SWB through work stress and then work-life balance. Figures 2, 3, and 4 reported the results. As the result in Fig. 2 showed, total work hours were positively associated with work stress ( $B=0.172^{***}$ ), and negatively associated with work-life balance ( $B=-0.052^*$ ). Work stress was also found to have a negative effect on work-life balance ( $B=-0.265^{***}$ ). Both work stress and work-life balance had a significant impact on SWB:  $B=-0.230^{***}$  for work stress;  $B=0.291^{***}$  for work-life balance. Moreover, total work hours negatively predicted SWB ( $B=-0.093^{***}$ ), supporting hypothesis 1a. Furthermore, a 5000 bootstrap samples analysis was conducted to estimate the indirect impact. As the results in Table 2 showed, the direct effect of total work hours on SWB was no longer significant ( $B=-0.025$ , 95% CI=[-0.069, 0.024]) after controlling the impact of work stress and work-life balance, that is work stress and work-life balance totally mediated the link between total work hours and SWB. Work stress was found to mediate the association between total work hours and SWB ( $B=-0.040$ , 95% CI=[-0.056, -0.027]), supporting hypothesis 3a. Work-life balance was not found to mediate the association between total work hours and SWB ( $B=-0.015$ , 95% CI=[-0.031, 0.001]), not supporting hypothesis 5a. It was also found that total work hours negatively predicted SWB through work stress and then work-life balance ( $B=-0.013$ , 95% CI=[-0.019, -0.009]), supporting hypothesis 7a.

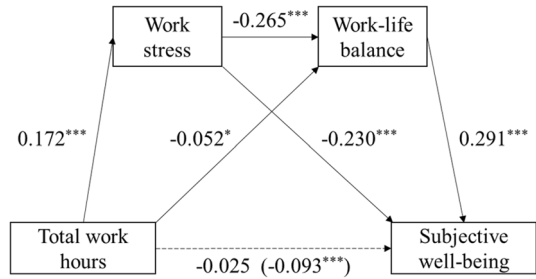
As the results in Fig. 3 and Table 2 showed, teaching work hours negatively predicted SWB ( $B=-0.100^{***}$ ), supporting hypothesis 1b. Even after controlling the impact of work stress and work-life balance, the direct effect of total work hours on SWB continued to emerge ( $B=-0.045^*$ ), that is work stress and work-life balance only partially

**Table 1** Means, standard deviations, and correlations

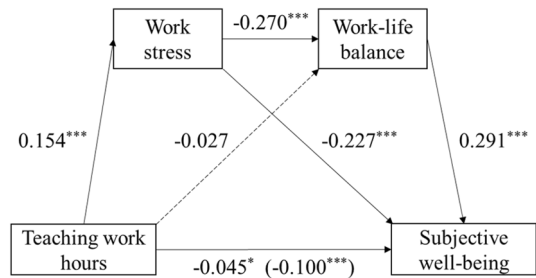
	1	2	3	4	5	6	7	8	9
1. Total work hours	1								
2. Teaching hours	0.377***	1							
3. Research hours	0.552***	-0.203***	1						
4. Extensive training	-0.017	-0.051**	0.015	1					
5. Job security	-0.090***	-0.089***	-0.032	0.366***	1				
6. Participation	-0.061***	-0.102***	-0.009	0.600***	0.337***	1			
7. Work stress	0.177***	0.148***	0.055**	-0.159***	-0.195***	-0.206***	1		
8. Work-life balance	-0.129***	-0.090***	0.018	0.327***	0.293***	0.364***	-0.334***	1	
9. SWB	-0.105***	-0.117***	-0.010	0.318***	0.322***	0.359***	-0.362***	0.427***	1
Mean	53.68	18.07	19.7	3.14	3.31	2.93	3.05	3	6.55
SD	20.04	12.61	15	0.82	0.76	0.79	0.62	0.54	2.15

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

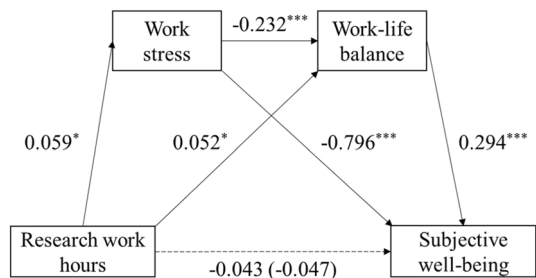
**Fig. 2** Serial mediation model shows effects of total work hours, work stress, and work-life balance on subjective well-being



**Fig. 3** Serial mediation model shows effects of teaching work hours, work stress, and work-life balance on subjective well-being



**Fig. 4** Serial mediation model shows effects of research work hours, work stress, and work-life balance on subjective well-being



mediated the link between teaching work hours and SWB. On the basis of a Bootstrap analysis, work stress was found to mediate the association between teaching work hours and SWB ( $B = -0.035$ , 95% CI =  $[-0.050, -0.023]$ ), supporting hypothesis 3b. Work-life balance was not found to mediate the association between teaching work hours and SWB ( $B = -0.008$ , 95% CI =  $[-0.023, 0.006]$ ), not supporting hypothesis 5b. In addition, teaching work hours undermined SWB through work stress and then work-life balance ( $B = -0.012$ , 95% CI =  $[-0.018, -0.008]$ ), supporting hypothesis 7b.

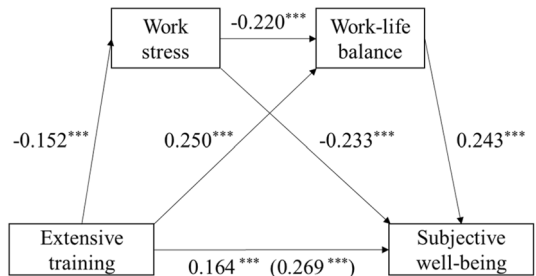
As the results in Fig. 4 and Table 2 showed, the total effect of research work hours on SWB is not significant ( $B = -0.047$ ), indicating that hypothesis 1c, hypothesis 3c, hypothesis 5c and hypothesis 7c were not supported.

As work stress and work-life balance mediate the relationship between job demands and SWB independently and jointly, it is interesting to know whether the variables or indirect effects exert equal impact on SWB. Comparatively, the significance of pathways of the above mediation models showed that teaching work hours rather than research work hours is the main risk factor for SWB, in which hypothesis 1d was supported. The proportions of direct effects and indirect effects in total effects suggested that the indirect effects of total work hours

**Table 2** The bootstrapping analysis of the effects of job demands on SWB

Path	<i>b</i>	<i>se</i>	Boot 95% CI	
			Lower	Upper
<b>Total work hours</b>				
Direct effect	- 0.025	0.024	- 0.069	0.024
Total indirect effect	- 0.068	0.012	- 0.092	- 0.046
Total work hours → work stress → SWB	- 0.040	0.007	- 0.056	- 0.027
Total work hours → work-life balance → SWB	- 0.015	0.008	- 0.031	0.001
Total work hours → work stress → work-life balance → SWB	- 0.013	0.003	- 0.019	- 0.009
<b>Teaching work hours</b>				
Direct effect	- 0.045	0.023	- 0.091	0.001
Total indirect effect	- 0.055	0.011	- 0.078	- 0.034
Teaching work hours → work stress → SWB	- 0.035	0.007	- 0.050	- 0.023
Teaching work hours → work-life balance → SWB	- 0.008	0.008	- 0.023	0.006
Teaching work hours → work stress → work-life balance → SWB	- 0.012	0.003	- 0.018	- 0.008
<b>Research work hours</b>				
Direct effect	- 0.043	0.024	- 0.088	0.004
Total indirect effect	- 0.003	0.011	- 0.026	0.019
Research work hours → work stress → SWB	- 0.014	0.006	- 0.027	- 0.002
Research work hours → work-life balance → SWB	0.015	0.008	0.001	0.031
Research work hours → work stress → work-life balance → SWB	- 0.005	0.002	- 0.010	- 0.001

**Fig. 5** Serial mediation model shows effects of extensive training, work stress, and work-life balance on subjective well-being

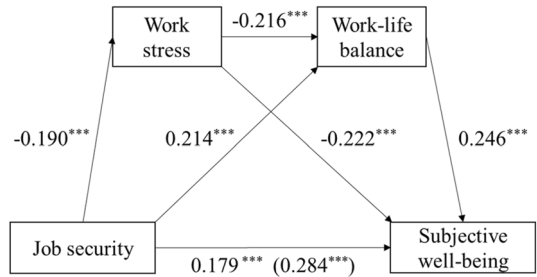


and teaching work hours on SWB (proportions were 73.2% and 45%, respectively) are greater than their direct effects (proportions were 26.9% and 55%, respectively). The pairwise comparison among the indirect effects indicated that the indirect effects of total work hours, teaching work hours and research hours on SWB through work stress were significantly greater than through work-life balance:  $B = - 0.025$ , 95% CI =  $[- 0.045, - 0.004]$ ;  $B = - 0.027$ , 95% CI =  $[- 0.047, - 0.007]$ ;  $B = - 0.029$ , 95% CI =  $[- 0.049, - 0.009]$ , respectively. The sequential mediation effects are the smallest of the three indirect effects in every path model.

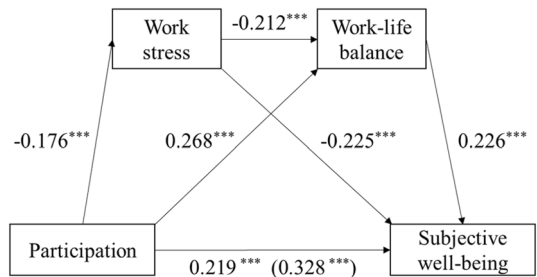
**The Impact of Job Resources on SWB and the Sequential Mediation Model**

The path analysis models were also conducted to examine the effect of job resources on SWB through work stress and then work-life balance. Figures 5, 6, and 7 reported

**Fig. 6** Serial mediation model shows effects of job security, work stress, and work-life balance on subjective well-being



**Fig. 7** Serial mediation model shows effects of participation, work stress, and work-life balance on subjective well-being



the results. As the result in Fig. 5 showed, extensive training was negatively associated with work stress ( $B = -0.152^{***}$ ), and positively associated with work-life balance ( $B = 0.250^{***}$ ). Work stress was also found to have a negative effect on work-life balance ( $B = -0.220^{***}$ ). Both work stress and work-life balance had a significant impact on SWB:  $B = -0.233^{***}$  for work stress;  $B = 0.243^{***}$  for work-life balance. Moreover, extensive training positively predicted SWB ( $B = 0.269^{***}$ ), indicating that hypothesis 2a was supported. Furthermore, a 5000 bootstrap samples analysis was conducted to estimate the indirect impact. As the results in Table 3 showed, the direct effect of extensive training on SWB was still significant ( $B = 0.104$ , 95% CI = [0.081, 0.129]) after controlling the impact of work stress and work-life balance, that is work stress and work-life balance partially mediated the link between extensive training and SWB. Both work stress and work-life balance were found to mediate the association between extensive training and SWB,  $B = 0.035$ , 95% CI = [0.024, 0.051] for work stress;  $B = 0.061$ , 95% CI = [0.044, 0.081] for work-life balance, indicating that both hypothesis 4a and hypothesis 6a were supported. It was also found that extensive training facilitated SWB through work stress and then work-life balance ( $B = 0.008$ , 95% CI = [0.005, 0.013]), indicating that hypothesis 8a was supported.

As the results in Fig. 6 and Table 3 showed, job security positively predicted SWB ( $B = 0.284^{***}$ ), indicating that hypothesis 2b was supported. Even after controlling the impact of work stress and work-life balance, the direct effect of job security on SWB continued to emerge ( $B = 0.179$ , 95% CI = [0.133, 0.225]), that is work stress and work-life balance only partially mediated the link between job security and SWB. Both work stress and work-life balance were found to mediate the association between job security and SWB,  $B = 0.042$ , 95% CI = [0.029, 0.057] for work stress;  $B = 0.053$ , 95% CI = [0.037, 0.071] for work-life balance, indicating that both hypothesis 4b and hypothesis 6b were supported. It was also found that job security boosted SWB through work stress and then work-life balance ( $B = 0.010$ , 95% CI = [0.007, 0.015]), indicating that hypothesis 8b was supported.

**Table 3** The bootstrapping analysis of the effects of job resources on SWB

Path	<i>b</i>	<i>se</i>	Boot 95% CI	
			Lower	Upper
<b>Extensive training</b>				
Direct effect	0.164	0.025	0.115	0.212
Total indirect effect	0.104	0.012	0.081	0.129
Extensive training → work stress → SWB	0.035	0.007	0.024	0.051
Extensive training → work-life balance → SWB	0.061	0.009	0.044	0.081
Extensive training → work stress → work-life balance → SWB	0.008	0.002	0.005	0.013
<b>Job security</b>				
Direct effect	0.179	0.023	0.133	0.225
Total indirect effect	0.105	0.012	0.083	0.129
Job security → work stress → SWB	0.042	0.007	0.029	0.057
Job security → work-life balance → SWB	0.053	0.009	0.037	0.071
Job security → work stress → work-life balance → SWB	0.010	0.002	0.007	0.015
<b>Participation</b>				
Direct effect	0.219	0.024	0.172	0.266
Total indirect effect	0.108	0.012	0.085	0.134
Participation → work stress → SWB	0.039	0.007	0.027	0.055
Participation → work-life balance → SWB	0.060	0.009	0.044	0.081
Participation → work stress → work-life balance → SWB	0.008	0.002	0.005	0.013

The results in Fig. 7 and Table 3 showed that participation positively predicted SWB ( $B=0.328^{***}$ ), indicating that hypothesis 2c was supported. After controlling the impact of work stress and work-life balance, the direct effect of participation on SWB was still significant ( $B=0.219^{***}$ ), which indicated work stress and work-life balance partially mediated the relationship between participation and SWB. Both work stress and work-life balance were found to mediate the association between participation and SWB,  $B=0.039$ , 95% CI=[0.027, 0.055] for work stress;  $B=0.060$ , 95% CI=[0.044, 0.081] for work-life balance, indicating that both hypothesis 4c and hypothesis 6c were supported. Moreover, the sequential indirect effect of participation on SWB through work stress and then work-life balance was significant ( $B=0.008$ , 95% CI=[0.005, 0.013]), indicating that hypothesis 8c was supported.

By comparison, the standardized total effect of the above mediation models showed that the job resources having the greatest influence on SWB were participation ( $B=0.328^{***}$ ), job security ( $B=0.284^{***}$ ) and extensive training ( $B=0.269^{***}$ ). The proportions of direct effects and indirect effects in total effects suggested that the direct effects of the three indicators of job resources on SWB (61.2% for extensive training, 63.0% for job security, and 67.0% for participation) are greater than their indirect effects (38.8% for extensive training, 37.0% for job security, and 33.0% for participation).

The pairwise comparison among the indirect effects indicated that the indirect effect of extensive training on SWB through work stress was significantly smaller than the indirect effect through work-life balance,  $B=-0.025$ , 95% CI=[-0.050, -0.002]. And the indirect effects of the three indicators of job resources on SWB through work stress or work-life balance were significantly greater than the sequential mediating effects.

## Conclusions and Discussion

In the increasingly competitive academic profession in China, it remains to be answered is which job demands and job resources at organizational level play a major role in contributing to faculty's subjective well-being, and how these job characteristics contribute to subjective well-being. Thus, the Based on the theoretical model constructed, this study conducted 6 path analysis models to examine the effects of different job demands and job resources on SWB of Chinese university faculty, and the indirect effects of work stress and work-life balance in the links. The main conclusions were as follows:

Consistent with our hypotheses, our study found that job demands negatively predicted SWB, while job resources positively predicted SWB. This finding coincides with lots of previous studies. On one hand, consistent with health impairment process, work overload finally contributed to ill health (Rothmann & Essenko, 2007), and emotional job demands from teaching were negatively correlated with faculty's well-being (Han et al., 2020). On the other hand, in line with motivational process, Mudrak et al. (2018) took job satisfaction and work engagement as indicators of occupational well-being, and found that job resources positively predicted faculty's occupational well-being; and Han et al. (2020) also argued that job resources (teaching support) benefited university teachers' well-being.

Our results demonstrated that various aspects of job demands and job resources have different influences on faculty's SWB. Regarding job demands, we found that teaching hours were negatively correlated with faculty's SWB, and its total effect size was even slightly greater than that of total work hours, while research hours had no effect on SWB, indicating that the negative effect of job demands on SWB was mainly from teaching tasks. Based on Effort-Reward Imbalance model, lack of reciprocity between costs and gains (i.e., high-cost/low-gain conditions) tends to lead to sustained emotional distress (Siegrist, 1996). Bozeman and Gaughan (2011) believed that research effort was more closely related to faculty's rewards than teaching effort, so devoting time to teaching is more likely to harm teachers' positive emotions (French et al., 2020). However, with disproportionately more time allocated towards research, faculty may have negative feelings due to the exhaustion of physical and mental resources, but also positive emotions because of higher effort-rewards, in which the different feelings may cancel out each other so as not to lead to obvious changes in overall well-being.

In terms of three job resources provided by organizations, specifically, we found that participation was the most positive predictor of faculty's SWB. For each standard deviation increase in participation, faculty's SWB increased by 0.382 standard deviation, which was 1.22 times and 1.15 times that of extensive training and job security, respectively. This finding is consistent with previous research showing that making job decisions autonomously benefited employees' well-being (Boxall & Macky, 2014; Vandenberg et al., 1999), especially for faculty as a profession valuing respect and autonomy (Carvalho & Videira, 2019). However, decision-making in Chinese universities is generally dominated by administrative power and lacks deep participation of academic staffs (Huang et al., 2018). The samples of faculty also reported lower level of participation in decision-making, so participation had a greater impact on their SWB than the two job resources. In addition, the study replicated past findings that job security had a positive effect on SWB (Carlson et al., 2011; Horowitz, 2016; Pervin & Dumludag, 2019). Although more studies used job insecurity as an indicator of job demands (Mudrak et al., 2018), Bakker and Demerouti (2007) also argued that job security was one of job resources. As the personnel management institution in China's higher education is transforming from "steel bowl" model to "up or out" tenure



model (Huang et al., 2018), job security has gradually become the scarce job resource for novice faculty. Finally, the current study found that extensive training contributed to SWB, indicating extensive training was also one of job resources for Chinese faculty (Bakker et al., 2010). However, extensive training had a lower explanatory power on SWB than the first two job resources. One possible reason was that the measure of extensive training in this study focused only on faculty's access to training rather than their need for it. The training provided by universities may not match faculty's demands for training content and quality (Zhang & Kuang, 2017), which may weaken the positive role of training to some extent. Moreover, although university teacher is an occupation that requires lifelong learning, Chinese faculty prefer an individual-based mode of autonomous development rather than large-scale group training (Yu & Wei, 2009).

Congruent with past studies, work stress mediated the association of job demands or job resources and SWB. As for the relationship between job demands and SWB, every 1 standard deviation increase of total work hours and teaching hours is associated with a reduction in subjective well-being by 0.04 and 0.035 standard deviations through work stress, which are 2.9 and 2.5 times greater than the indirect effect of research hours, respectively. This is primarily due to the increase in total work hours and teaching hours resulting in more work stress compared to research hours. According to previous studies, extended work hours and work overloads were the important stressors for faculty in numerous countries (Barkhuizen & Rothmann, 2008; Kinman, 2001; Taris et al., 2001). Moreover, in recent China, the contradiction between the expansion of university enrollment and the disproportionate increase in the number of faculty imposed a heavy teaching burden on faculty (Sun et al., 2011). Additionally, the teaching schedule and workload assigned to faculty by universities are less flexible compared to research, while universities tend to prioritize research over teaching performance (Taris et al., 2001). Consequently, working hours, particularly teaching hours, further adversely affect faculty's SWB through work stress (Gröpel & Kuhl, 2009; Schiffrin & Nelson, 2010). Concerning the mediating role of work stress in the link of job resources and SWB, our focal three job resources can alleviate work stress and then enhance SWB. Their indirect effects are similar to but slightly greater than job demands, ranging from 0.035 to 0.042. Several studies also support our findings: job security helped protect employees from sustained negative emotions related to the potential risk of unemployment (Carlson et al., 2011; Loi et al., 2011); participation in decision-making reduced work related psychological ill health and sickness (Michie & Williams, 2003; Spector, 1986); and the trainings with specific contents improved teachers' capacity to cope with work stress (Embse et al., 2019; Klassen & Chiu, 2010).

The research also found that work-life balance mediated the relationships between job resources and SWB. Each standard deviation increase in three job resources enhance subjective well-being by 0.053–0.061 standard deviations through work-life balance. The result offered additional evidence to the notion that individuals with higher job resources were more likely to have the feelings of work-life balance (Wood et al., 2020), which contributed to their SWB. Although more studies emphasized the positive effects of job resources such as social support and work-related autonomy on work-life balance (Haar et al., 2019; Wood et al., 2020), our study argued that the three indicators of job resources provided organization were strongly tied to Chinese faculty's work-life balance. Specifically, participation in decision-making helped improve faculty's autonomy of work; extensive training benefited the ability to cope with work tasks; job security enabled faculty to have more energy to deal with life (Carlson et al., 2011). In summary, faculty with the above job resources tended to reconcile multiple roles in their work and life, felt more balanced between work and life (Guest, 2002), and therefore had better SWB.

The impact of job demands and job resources on SWB was sequentially mediated through work stress and work-life balance, although the magnitude of these associations were relatively small compared to other indirect effects. This finding is in line with spillover theory, in which the more stress employees feel at work, the more likely work-life imbalance is to occur (Aruldoss et al., 2021). In contrast, in a less-stress work environment, there is less interference from work with family life, and individuals can devote more energy and emotion to life (Carlson et al., 2011; Sparks et al., 2001). Therefore, for Chinese faculty, long working hours will lead to high work stress, which will further spill over to life, reduce the sense of work-life balance, and finally damage SWB; as job resources, participation, job security and extensive training benefit the ability to handle various tasks, reduce perceived work stress and its negative impact on work-life balance, and further facilitate SWB. From this perspective, job resources play an important role in protecting faculty from work stress and improving their work-life balance and SWB.

Finally, the pairwise comparison results indicated that work stress had a stronger impact than work-life balance on the linkage of job demands and SWB, while work-life balance had a greater effect than work stress in the relationship between job resources and SWB. This study compared the indirect effects of work stress and work-life balance in the link of job demands-resources and SWB, which extend the current literature focusing on faculty's SWB. The results demonstrated that the health impairment process driven by job demands and the motivational process driven by job resources were not independent of each other. Both job demands and job resources influence SWB through negative work experience and positive work experience. Meanwhile, the research tested some theoretical hypotheses of JD-R model. Bakker et al. (2010) indicated that job demands was the most predictor of negative work feelings such as work stress, while job resources was most strongly tied to positive work experience such as job motivation, commitment and work engagement. Therefore, as negative work experience, work stress had a stronger explanatory power in the mechanism of the impact of job demands on SWB, while work-life balance as positive feelings better explained the effect of job resources on SWB.

## Implications and Limitations

This study examined the impact and its differences of different job demands-resources on Chinese university faculty's SWB. It also explored the mediating role of work stress and work-life balance in this relationship. From the theoretical perspective, the current study constructed a theoretical model based on the JD-R model, the conservation of resources theory and the spillover theory, which was suitable to the higher education context in China. First, past studies based on JD-R model mainly focus on work-related outcome variables, while this paper focuses on SWB measuring faculty' overall feelings, which is more consistent with their work characteristics of work-life spillover. Second, we found the mediating role of work stress and work-life balance in the relationship between job demands-resources and SWB, which contributed to understanding the influence mechanisms of job demands-resources on SWB. Third, it was found that the dual processes caused by job demands-resources were intertwined rather than independent, which provides new empirical evidence for the relationship between the mediating variables in the JD-R model.

From the practical perspective, the present study measured job resources through items on the basis of human resource management strategies of Chinese universities, helping to draw more applicable conclusions and implications. First of all, Chinese

universities and colleges should promote teacher evaluation reform as teaching job demands will increase teachers' work stress and damage their well-being. In the context of breaking the "Five-only" in China, universities are supposed to adjust the standards of faculty evaluation and rewards, rectify the idea of valuing research but despising teaching, and decrease faculty's sense of effort-rewards imbalance in teaching, so as to promote faculty to have a deeper understanding of the value of teaching, reduce their work stress in the multi-tasking work environment, and then improve their SWB. Secondly, in consideration of the protective effects of job resources on faculty's work-life balance and well-being, and the heterogeneity of effect size of different job resources on SWB, Chinese universities should provide multiple job resources for faculty. University administrators are expected to provide opportunities for faculty to participate in important decision-making in the workplace, and gradually establish a democratic decision-making system to improve faculty's autonomy over their own work and department management. Universities are expected to change "up or out" system from a screening mechanism to a training and support system, reduce the negative impact of stressors such as unemployment on faculty's positive emotions, and help them balance their work and life. Universities should also conduct in-depth research on the professional development needs of faculty with different characteristics, provide faculty with targeted and high-quality learning opportunities, and improve their ability to cope with multiple work tasks.

The following limitations should be addressed. Firstly, the present study used the cross-section data to analyze the impact of job demands-resources on faculty's SWB and the related mediating mechanisms. Although JD-R theory, the Conservation of Resources Theory, the Spillover Theory and the empirical evidence lend the support to the causal direction assumed by the current study, further research is still needed to replicate the findings through causality inference. Secondly, consistent with the past studies, the study relied on self-report data, which may produce common method bias. The future research should consider objectively measuring of job demands-resources at the organizational level to form a set of hierarchical data with individual data. Additionally, this study revealed the differences in effects and its mechanisms of different indicators of job demands-resources on SWB. Future research needs to further study whether these effects and mechanisms differ across faculty or universities with different characteristics. Additionally, the current study focused on special job resources, namely extensive training, job security and participation, due to the challenge of incorporating all relevant confounding factors in the model, which could potentially introduce model specification bias. The results of the bound test approach by Oster (2019) presented in Table S1 of the online Supplementary Information indicate that the effects of these three job resources are unlikely to be driven by other factors. Nonetheless, there may be other crucial job resources that future research should continue to explore in Chinese academic contexts. Finally, the six separate path analysis models used in this study did not account for measurement errors as they did not include latent variables. Although structural equation model with reflective indicators can address this issue, it also has its limitations compared to the former method (Deng & Yuan, 2023). Future research could explore the applicability of these statistical analytic methods to further enhance the validity of quantitative findings.

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**Data Availability** The data that support the findings of this study are available on request from the corresponding author, [Yongmei Hu], upon reasonable request.

## Declarations

**Conflict of interest** The authors declare that they have no conflict of interests.

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