



# Occupational stress and mental health among civil servants during COVID-19 in China: The mediation effect of social support and work-family conflict

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## ABSTRACT

Mental health problems of various populations during the COVID-19 pandemic have received high attention, but there is little research on the mental health of Chinese civil servants. The present study investigated occupational stress, mental health problems (i.e., anxiety, depression, and insomnia), social support, and work-family conflict in Chinese civil servants during the COVID-19 pandemic. A total of 327 civil servants in Wenzhou city, China, participated in an online survey, which collected data on socio-demographic characteristics, occupational stress, mental health problems (i.e., anxiety, depression, and insomnia), social support, and work-family conflict. Data were analyzed using non-parametric tests and a multiple mediation model. Self-reported risk at work and support from mental health workers were relatively low. Anxiety, depression, and insomnia prevalence were 49.24 %, 47.1 %, and 20.48 %, respectively. Those who held higher ranks at work had lower levels of anxiety and depression. In addition, those who felt bad about their health status had more mental health problems. Social support and work-family conflict mediated the relationship between occupational stress and mental health problems significantly. Stress management training, organizational-level improvement in work arrangements, and professional mental health services are warranted for Chinese civil servants during the pandemic.

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### 1. Introduction

Occupational stress is characterized by a combination of high job demands and low decision latitude [1]. It has been widely demonstrated to be a risk factor for poorer physical and mental health, such as cardiovascular disease, anxiety, depression, and insomnia [2–5]. Zhang et al. [2] and Kploanyi et al. [3] found that, occupational stress has a positive relationship with anxiety, depression and insomnia, and Zou et al. [4] verified this by the mediation model. Evidence from the meta-analysis suggested that occupational stress is a predisposing factor for depression among employees [5].

The COVID-19 pandemic has had a lot of impact on people’s lives, especially those who need to continue working. Previous studies focus on work stress and mental health in various social groups during the pandemic, such as teachers and healthcare professionals [2, 4,6]. However, research on civil servants is still lacking. According to the Civil Servant Law [7], in China, civil servants are employees who perform official duties in accordance with the law, whose job is a part of the government’s organizational set-up and whose salary and benefits are paid by the government. Civil servants are the essential elements of government operation.

During the pandemic, civil servants played important roles in epidemic prevention and control in China. In turn, the pandemic may have changed civil servants’ work and personal life, and brought new challenges to their daily routine [8]. Since April 29, 2020, normalized prevention and control of COVID-19 have become a normal part of life for Chinese people, and civil servants have been assigned more tasks compared to the pre-epidemic period, including helping the government with health communication with citizens and implementing disease control measures [9]. They may have experienced increased stress and mental health problems, such as anxiety, depression, and insomnia, but this has been neglected in past research and by healthcare services [10]. During the pandemic, anxiety, depression, and insomnia have been prevalent mental health problems for Chinese civil servants [11], which is comparable with findings in healthcare professionals [6]. Such occupational stress is correlated with mental health problems in government employees [2,12]. However, it’s still unclear that how occupational stress would affect civil servants’ mental health. Thus, we hypothesized that.

**H1.** Occupational stress during the pandemic would be positively associated with mental health problems in Chinese civil servants.

Work-family conflict occurs when people cannot meet the simultaneous demands of both work and family [13] and has been found to be associated with occupational stress, and physiological and psychological health [14–16]. Work-related stress can reduce one’s attention to and time spent with their family, work-life balance, and communication and interactions with family members. This could in turn increase work-family conflicts and thus mental health problems. Sugawara et al. [14] demonstrated that work-family conflict is a mediator of the relationship between occupational stress and mental health issues in mental health nurses in Japan. Moreover, Juvanhol et al. [16] found that the relationship between occupational stress (job demands and decision authority) and binge eating was mediated by work-family conflict. Therefore, we hypothesized that.

**H2.** Work-family conflict would mediate the relationship between occupational stress and mental health problems in Chinese civil servants.

Occupational stress may reduce perceived social support, which in turn affects mental health. Perceived social support is associated with one’s subjective feelings about others’ attention, love, esteem, assistance, and support [17]. Based on the stress-buffering model, social support is a protective factor for mental health [18,19]. Empirical evidence has also shown perceived social support to be positively correlated with life satisfaction and mental health [20]. And family and work colleagues are important sources of social support [21]. Thus, occupational burdens and busy work schedules could damage one’s support systems. Jesse et al. [22] demonstrated the mediation effect of social support in the relationship between stress and antepartum depressive symptoms among rural pregnant women. Liu and Aunguroch [23] confirmed that social support was a mediator between occupational stress and burnout in nurses. Thus, we hypothesized that.

**H3.** Social support would mediate the relationship between occupational stress and mental health problems in Chinese civil servants.

To sum up, there has been little research on occupational stress and mental health in civil servants, especially during the COVID-19 pandemic. Based on related research and the stress-buffering model, the present study proposed a mediation model to clarify the relationship between occupational stress and mental health problems and underlying mechanism in a population of Chinese civil servants. We hypothesized that occupational stress would have significant and positive associations with mental health problems directly (H1) and indirectly via increased work-family conflict (H2) and decreased perceived social support (H3), see Fig. 1.

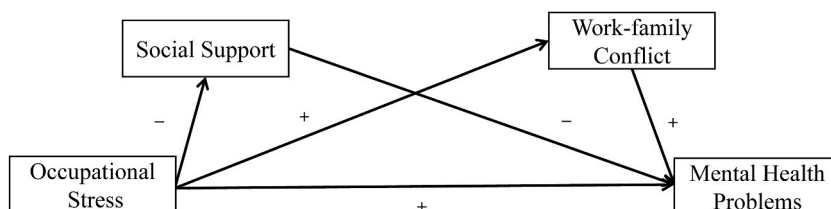


Fig. 1. The hypothesized mediation model. Note: Solid lines indicate significant regression.

## 2. Methods

### 2.1. Data and sample

We collected data from civil servants in Wenzhou, China from April 27, 2022 to May 21, 2022 during the normalization of epidemic prevention and control. Participants were recruited through convenient sampling. After obtaining permission from the supervisor, the participants who agree to participate in the survey will receive a link to an anonymous questionnaire via Wenjuanxing ([www.wjx.cn](http://www.wjx.cn)), an online survey platform in China. No personal information (e.g., names, and contact information) was collected in this survey. The inclusion criteria included that civil servants who could finish the questionnaire and submit voluntarily, and the exclusion criteria included that those who were not civil servants and did not want to participate into this study. Finally, a total of 327 civil servants completed the questionnaire. This study was approved by the Ethics Committee of Wenzhou Medical University.

### 2.2. Measurements

#### 2.2.1. Socio-demographic data

Data on gender, age, the education level, rank, the length of service, and health status were self-reported by participants.

#### 2.2.2. Occupational stress

The four-item occupational stress scale [2] was used to assess occupational stress during the time of regular epidemic prevention and control. Items measured occupational stress in terms of (1) intensity; (2) time; (3) difficulty and (4) risk. Items were scored on a 5-point scale ranging from 1 = “very low” to 5 = “very high”. Example statement items include “Work intensity during COVID-19” and “The hazard in my work during COVID-19”. The higher score indicated a higher level of occupational stress during the epidemic. This scale showed good reliability (Cronbach’s  $\alpha$ : 0.74) in the previous study [2]. Cronbach’s  $\alpha$  was 0.82, average variance extracted (AVE) was 0.68 and construct reliability (CR) was 0.89 in this study.

#### 2.2.3. Social support

The five-item social support scale was used to assess sources of social support during COVID-19 [4], including social support from (1) family; (2) friends; (3) supervisors; (4) colleagues and (5) mental health workers. Each item was scored on a 5-point scale ranging from 1 = “barely” to 5 = “a lot of”. Example items include “I get help and support from my family” and “I get help and support from mental health workers”. The higher score indicated more perceived social support during COVID-19. The Cronbach’s  $\alpha$  was 0.86 in the previous study [4]. Cronbach’s  $\alpha$  was 0.82, AVE was 0.61 and CR was 0.88 in this research.

#### 2.2.4. Work-family conflict

Referring to previous research [24,25], one item was used to assess the level of conflict between work and family, as follows: “How often do you perceive the conflict between work and family during COVID-19?” The possible response ranged from 1 = “no” to 5 = “yes, always”. A higher score indicated a stronger conflict between work and family during the epidemic.

#### 2.2.5. Self-reported mental health problems

Anxiety and Depression: We used the Depression Anxiety Stress Scale-21, which was developed by Lovibond and Lovibond [26] and translated into Chinese by Gong et al. [27], to assess the levels of anxiety and depression. Every subscale had seven items and every item was scored on a 4-point Likert scale (from 0 = “does not apply to me at all” to 3 = “applies to me most of time”). The summation of each subscale, multiplied by two, was used as the score for data analysis. Hence, each subscale’s score ranged from 0 to 42. Anxiety subscale scores of 0–7 were considered to indicate “no anxiety”, scores of 8–9 “mild anxiety”, 10–14 “moderate anxiety”, 15–19 “severe anxiety”, and 20–42 “extremely severe anxiety”. Depression subscale scores of 0–9 indicated “no depression”, 10–13 “mild depression”, 14–20 “moderate depression”, 21–27 “severe depression”, and 28–42 “extremely severe depression” [28]. The Depression Anxiety Stress Scale-21 is suitable for Chinese samples (the overall Cronbach’s  $\alpha$ : 0.91) [29]. For the anxiety subscale, Cronbach’s  $\alpha$ , AVE and CR were 0.91, 0.66 and 0.93, respectively. For the depression subscale, Cronbach’s  $\alpha$ , AVE and CR were 0.92, 0.67 and 0.93, respectively. For the overall scale, Cronbach’s  $\alpha$  was 0.95 in this study.

Insomnia: The Insomnia Severity Index, which was developed by Morin [30] and translated into Chinese by Yu [31], was used to assess the level of insomnia. The Insomnia Severity Index has seven items scored on a 5-point Likert scale (e.g., 0 = “no problem”; 4 = “extremely severe”), yielding a total score ranging from 0 to 28. The total score was divided as follows: 0–7 indicated the “absence of insomnia”, 8–14 indicated “sub-threshold insomnia”, 15–21 indicated “moderate insomnia” and 22–28 indicated “severe insomnia” [32]. A previous study has shown the index to have good psychometric characteristics (Cronbach’s  $\alpha$ : 0.94) [2], and Cronbach’s  $\alpha$  was 0.93, AVE was 0.71 and CR was 0.94 in this data.

### 2.3. Statistical analysis

All reported  $p$ -values were two-tailed with statistical significance set at 0.05. Continuous variables (i.e., occupational stress, social support, work-family conflict, anxiety, depression and insomnia) were not distributed normally (the Shapiro–Wilk tests:  $p < 0.001$ ), and so non-parametric tests and Spearman’s correlation analyses were applied using the SPSS statistics package (version 26.0). Categorical variables are presented as numbers (percentages) and continuous variables as the mean (M)  $\pm$  standard deviation (SD), the

parameters median (Median), minimum (min) and maximum (max). AMOS (version 24.0) was used to test the common method variance and the mediation model. Although variables were non-normally distributed, their skewness values ranged from -2 to 2, and kurtosis values ranged from -7 to 7. Therefore, the maximum likelihood estimate could be used [33]. We constructed a parallel multiple mediation model using an independent variable (occupational stress), two mediators (social support and work-family conflict), and a dependent variable (mental health problems). Occupational stress, social support, and mental health problems were labeled as latent variables, and work-family conflict was labeled as a manifest variable. The model fit was assessed using the Chi-square/degrees of freedom ( $\chi^2/df$ ) ratio, the comparative fit index (CFI), the standardized root means square residual (SRMR), and the root mean square error of approximation (RMSEA), whereby  $\chi^2/df \leq 3$ ,  $CFI \geq 0.95$ ,  $SRMR \leq 0.08$ , and  $RMSEA \leq 0.08$  would indicate acceptable model fit [34]. R (version 4.2.2) was used to perform the prior test using the *semPower* package (version 1.2.0) [35]. The results showed that we needed at least 86 samples for the mediation model ( $\alpha$  error = 0.05, power = 0.8,  $df = 61$ ,  $RMSEA = 0.08$ ).

In this study, data were based on self-reports in a sample, so the problem of common method variance should be addressed. First, Harman's single-factor test was applied [36]. The results showed that there were five factors with an eigenvalue greater than 1, and the first factor to explain the variance accounted for 41.49 %, which exceeded the critical threshold (40 %). To confirm this result, we added analysis following the procedure recommended by Podsakoff et al. [36]. Based on the approach, we conducted a multifactor measurement model and this model with an additional common method variance. Prior studies have found there to be relationships of error in the model of the Depression Anxiety Stress Scale-21 [37–39]]. Thus, the error associated with an item was permitted to correlate with the error in another item within the Depression Anxiety Stress Scale-21 in this study. The results (see Table 1) showed that adding common methods variance didn't improve the model fit [40]. Thus, the results suggested that common method variance was not an obvious problem in the data.

### 3. Results

#### 3.1. Descriptive statistics

Of the 327 participants, 204 (62.39 %) were male; ages ranged from 22 to 59 years ( $M \pm SD$ :  $39.78 \pm 8.29$ ); 244 (74.62 %) were at college or below in terms of education level; 176 (53.82 %) were clerks; 218 (66.66 %) had more than 10 years of work experience, and 268 (81.96 %) thought they had good or very good health status. Table 2 shows participants' socio-demographic characteristics.

Table 3 shows the results of independent sample Kruskal–Wallis tests. Mean scores of occupational stress, social support, and work-family conflict were  $15.01 \pm 2.31$ ,  $16.82 \pm 3.58$ , and  $3.45 \pm 1.06$ , respectively. During the period of regular epidemic prevention and control, levels of work intensity, time, and difficulty were higher than the level of work risk (Intensity–Risk:  $\chi^2 = 135.17$ , adj.  $p < 0.001$ ; Time–Risk:  $\chi^2 = 102.15$ , adj.  $p = 0.001$ ; Difficulty–Risk:  $\chi^2 = 88.67$ , adj.  $p = 0.006$ ; Others: adj.  $p > 0.05$ ). Concerning social support, civil servants received the most support from family, and the least from mental health workers (Family–Friends:  $\chi^2 = 194.90$ , adj.  $p < 0.001$ ; Family–Supervisors:  $\chi^2 = 125.65$ , adj.  $p = 0.004$ ; Family–Mental health workers:  $\chi^2 = 588.84$ , adj.  $p < 0.001$ ; Friends–Colleagues:  $\chi^2 = 103.20$ , adj.  $p = 0.033$ ; Friends–Mental health workers:  $\chi^2 = 393.93$ , adj.  $p < 0.001$ ; Supervisors–Mental health workers:  $\chi^2 = 463.19$ , adj.  $p < 0.001$ ; Colleagues–Mental health workers:  $\chi^2 = 497.13$ , adj.  $p < 0.001$ ; Others: adj.  $p > 0.05$ ).

In this study, 161 subjects (49.24 %) had symptoms of anxiety, 154 subjects (47.10 %) had symptoms of depression, and 67 subjects (20.48 %) had symptoms of insomnia (see Table 4).

The results of the correlation analyses and independent-samples Mann–Whitney U and Kruskal–Wallis tests are shown in Table 5. Civil servants with a higher rank had lower levels of anxiety ( $Z = -3.20$ ,  $p = 0.001$ ) and depression ( $Z = -4.05$ ,  $p < 0.001$ ). Civil servants who did not feel good about their health status had higher levels of anxiety (Very good–Fair or Poor:  $Z = -5.10$ , adj.  $p < 0.001$ ; Good–Fair or Poor:  $Z = -4.82$ , adj.  $p < 0.001$ ), depression (Very good–Fair or Poor:  $Z = -5.61$ , adj.  $p < 0.001$ ; Good–Fair or Poor:  $Z = -5.17$ , adj.  $p < 0.001$ ), and insomnia (Very good–Fair or Poor:  $Z = -5.79$ , adj.  $p < 0.001$ ; Good–Fair or Poor:  $Z = -5.05$ , adj.  $p < 0.001$ ).

#### 3.2. Correlation analysis

As shown in Table 6, anxiety, depression, and insomnia were significantly and positively correlated with each other ( $r_s = 0.55\text{--}0.78$ ,  $p_s < 0.001$ ). And they all had significant and positive correlations with occupational stress and work-family conflict ( $r_s = 0.25\text{--}0.39$ ,  $p_s < 0.001$ ), and had negative correlation with social support ( $r_s = -0.22\text{--}-0.39$ ,  $p_s < 0.001$ ). Furthermore, work-family conflict had no significant correlation with social support ( $r = -0.10$ ,  $p = 0.084$ ). Thus, H1 was supported.

**Table 1**  
Controlling for the effects of an unmeasured latent methods factor.

Model <sup>a</sup>	$\chi^b/df$	$p$	CFI <sup>b</sup>	SRMR	RMSEA
Multifactor measurement model	2.962	<0.001	0.888	0.058	0.078
Multifactor measurement model with an additional common method variance	2.946	<0.001	0.889	0.060	0.077

<sup>a</sup>  $\chi^b/df \leq 3$ ,  $CFI \geq 0.95$ ,  $SRMR \leq 0.08$  and  $RMSEA \leq 0.08$  were suggested values.

<sup>b</sup>  $\Delta CFI \leq 0.01$  meant that adding common methods variance didn't improve the model fit.

**Table 2**  
Socio-demographic characteristics of participants (N = 327).

Variable		N (%)
Gender	Male	204 (62.39 %)
	Female	123 (37.61 %)
Age	M ± SD	39.78 ± 8.29
Education level	College or below	244 (74.62 %)
	Master	82 (25.08 %)
	Doctor	1 (0.30 %)
Rank	Clerk	176 (53.82 %)
	Officials on bureau or director level	124 (37.92 %)
	Officials on county level or above	27 (8.26 %)
Length of service	<3 years	31 (9.48 %)
	<5 years	25 (7.65 %)
	<10 years	53 (16.21 %)
Health status	≥10 years	218 (66.66 %)
	Very good	77 (23.55 %)
	Good	191 (58.41 %)
	Fair	51 (15.60 %)
	Poor	8 (2.44 %)

**Table 3**  
Descriptive statistics of the variables (N = 327).

Variables	M ± SD	Median (Min/Max)	Kruskal–Wallis Test <sup>a</sup>
Occupational stress	15.01 ± 2.31	15 (9/20)	$\chi^2 = 27.33$ , adj. $p < 0.001$ ; Intensity, Time, Difficulty > Risk
Intensity	3.87 ± 0.66	4 (2/5)	
Time	3.80 ± 0.69	4 (2/5)	
Difficulty	3.77 ± 0.65	4 (2/5)	
Risk	3.57 ± 0.83	4 (1/5)	
Social support	16.82 ± 3.58	17 (5/25)	$\chi^2 = 336.97$ , adj. $p < 0.001$ ; Family > Friends, Supervisors > Mental health workers; Colleagues > Friends > Mental health workers
Family	3.84 ± 0.87	4 (1/5)	
Friends	3.43 ± 0.90	3 (1/5)	
Supervisors	3.57 ± 0.92	4 (1/5)	
Colleagues	3.65 ± 0.82	4 (1/5)	
Mental health workers	2.33 ± 1.16	2 (1/5)	
Work-family conflict	3.45 ± 1.06	4 (1/5)	

<sup>a</sup> The post-hoc test: the Kruskal-Wallis one-way ANOVA.

**Table 4**  
The prevalence of mental health problems (N = 327).

Symptoms		N (%)	M ± SD	Median (Min/Max)
Anxiety	No anxiety	166 (50.76 %)	9.09 ± 9.01	6 (0/42)
	Mild anxiety	33 (10.09 %)		
	Moderate anxiety	74 (22.63 %)		
	Severe anxiety	20 (6.12 %)		
	Extremely severe anxiety	34 (10.40 %)		
Depression	No depression	173 (52.90 %)	10.28 ± 9.69	8 (0/42)
	Mild depression	53 (16.21 %)		
	Moderate depression	61 (18.65 %)		
	Severe depression	13 (3.98 %)		
	Extremely severe depression	27 (8.26 %)		
Insomnia	Absence of insomnia	130 (39.76 %)	9.86 ± 6.45	9 (0/28)
	Sub-threshold insomnia	130 (39.76 %)		
	Moderate insomnia	49 (14.98 %)		
	Severe insomnia	18 (5.50 %)		

**Table 5**  
Mental health problems with demographic characteristics (M ± SD).

Demographic Characteristics		Anxiety	Depression	Insomnia
Age (39.78 ± 8.29)				
Spearman's <i>r</i>		-0.08	-0.05	-0.09
<i>p</i>		0.137	0.416	0.090
Gender				
	Male, N = 204	8.91 ± 8.65	10.01 ± 9.34	9.79 ± 6.49
	Female, N = 123	9.38 ± 9.61	10.72 ± 10.26	9.98 ± 6.41
<i>Z</i>		0.02	0.28	0.45
<i>p</i>		0.981	0.779	0.656
Education level				
	College or below, N = 244	9.43 ± 9.24	10.74 ± 9.81	10.02 ± 6.54
	Master or doctor, N = 83	8.07 ± 8.27	8.92 ± 9.24	9.40 ± 6.20
<i>Z</i>		-1.26	-1.74	-0.68
<i>p</i>		0.209	0.082	0.494
Rank				
	Clerk, N = 176	10.74 ± 10.16	12.41 ± 10.70	10.64 ± 7.06
	Officials on bureau level or above, N = 151	7.17 ± 7.01	7.79 ± 7.68	8.95 ± 5.54
<i>Z</i>		-3.20	-4.05	-1.90
<i>p</i>		0.001	<0.001	0.057
Length of service				
	<5 years, N = 56	9.96 ± 10.07	11.39 ± 11.04	10.62 ± 6.44
	≥5 years, N = 53	10.11 ± 9.96	11.02 ± 10.40	10.30 ± 6.02
	≥10 years, N = 218	8.61 ± 8.47	9.81 ± 9.14	9.56 ± 6.56
$\chi^2$		1.03	0.67	1.99
<i>p</i>		0.599	0.717	0.370
Health status				
	Very good, N = 77	7.71 ± 9.46	8.05 ± 9.54	8.04 ± 6.79
	Good, N = 191	7.60 ± 6.46	8.93 ± 7.91	9.08 ± 5.13
	Fair or poor, N = 59	15.69 ± 12.16	17.53 ± 11.73	14.78 ± 7.49
$\chi^2$		29.79	35.33	36.22
<i>p</i>		<0.001	<0.001	<0.001

Gender, education level, rank, length of service, and health status were dummy coded as 1 = male, 2 = female; 1 = college or below, 2 = master or doctorate; 1 = clerk, 2 = officials on bureau level or above; 1 = < 5 years, 2 = ≥ 5 years, 3 = ≥ 10 years and 1 = very good, 2 = good, 3 = fair or poor.

**Table 6**  
Spearman's correlations among variables.

Variables	1	2	3	4	5	6
1 Occupational stress	1					
2 Social support	-0.16 **	1				
3 Work-family conflict	0.38 ***	-0.10	1			
4 Anxiety	0.39 ***	-0.32 ***	0.26 ***	1		
5 Depression	0.37 ***	-0.39 ***	0.25 ***	0.78 ***	1	
6 Insomnia	0.35 ***	-0.22 ***	0.36 ***	0.61 ***	0.55 ***	1

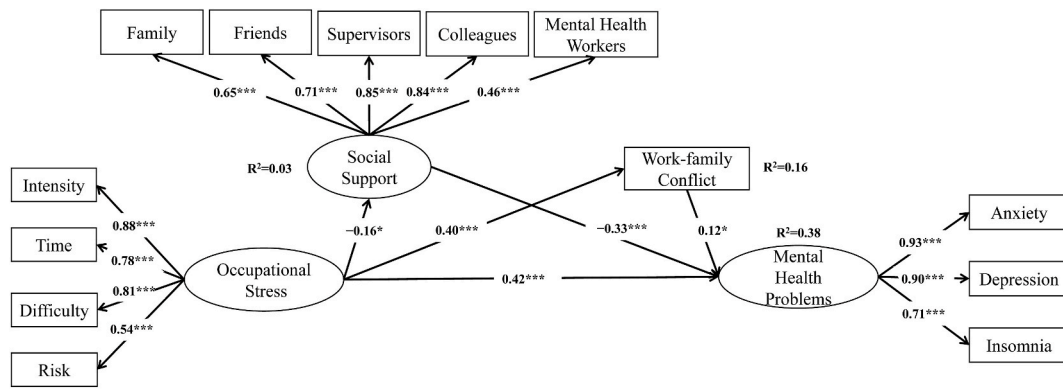
\*\**p* < 0.01, \*\*\**p* < 0.001.

### 3.3. Mediation model testing

The mediation model fitted the data acceptably ( $\chi^2/df = 2.978, p < 0.001, CFI = 0.942, SRMR = 0.055, \text{ and } RMSEA = 0.078$ ). Due to that work-family conflict had no significant correlation with social support (*p* = 0.084), the path was not added between them. Fig. 2 showed that, after 5000 bootstrap samples, which were conducted to test the mediation effect, the relationship between occupational stress and mental health problems was significantly mediated by social support [Effect = 0.052, 95 % confidence interval (95 % CI): (0.003, 0.129), *p* = 0.034], and via work-family conflict [Effect = 0.046, 95 % CI: (0.011, 0.092), *p* = 0.012], in bias-corrected CIs. Moreover, total indirect effect was notable [Effect = 0.098, 95 % CI: (0.032, 0.183), *p* = 0.005], and direct effect of occupational stress on mental health problems was notable [Effect = 0.417, 95 % CI: (0.304, 0.528)]. And total effect was 0.515 [95 % CI: (0.402, 0.611)]. Hence, social support and work-family conflict were mediators between occupational stress and mental health problems. H2 and H3 was supported.

## 4. Discussion

In the study, a multiple mediation model was used to explore the mechanisms underlying the relationship between occupational stress and mental health problems in civil servants during the normalization of epidemic prevention and control in Wenzhou, China.



**Fig. 2.** The parallel multiple mediation model (N = 327). Note: Data shown by one-way arrows are normalized regression coefficients; \* $p < 0.05$ , \*\*\* $p < 0.001$ .

The results showed that the study sample was at a high risk of mental health problems (i.e., anxiety, depression, and insomnia). As many as 49.24 % of participants had different symptoms of anxiety, 47.10 % had different symptoms of depression, and 20.48 % had different symptoms of insomnia. The prevalence of anxiety and depression was higher than that in the previous study of civil servants in 2020 [11] and higher than that in different populations reported in a meta-analysis [10]. The possible reason for this result is that years of heavy work during the pandemic may exacerbate the mental health problems of Chinese civil servants. However, there is a lack of follow-up studies. Besides, the discrepancies of occupational stress and mental health between civil servants and other occupations are also unclear.

The participants with lower ranks in professional status or poorer health status had higher levels of anxiety, depression, and insomnia. These groups may have lower coping resources and suffer from additional stress due to poor health status. Thus, Chinese civil servants, especially those with lower ranks and poor health status, should receive more attention from mental healthcare professionals. Inconsistent with a previous study, we did not find differences in other demographic variables related to mental health. Hu et al. [11] found that during COVID-19, being female, younger, with higher education levels and a shorter length of service had positive relationship with mental health problems in civil servants. Since studies in this population are lacking, this result is inconclusive. More empirical studies are warranted to clarify the influence of demographic variables, such as region, age, and gender on civil servants' mental health. We found that civil servants' occupational stress mostly came from the intensity, time, and difficulty of work, and least from the risk. This is in keeping with the results of Salgado de Snyder et al. [41], who found that work intensity and time were the main stressors for medical staff. Zhang et al. [2] reported that work risk was the main stressor for medical staff; however, we did not find the same pattern in civil servants. This may be because, unlike medical staff, civil servants were not required to be in direct contact with the virus.

Occupational stress was significantly associated with mental health problems (anxiety, depression, and insomnia). The result is consistent with other cross-sectional research [2,4,41], whereby positive associations were found between occupational stress and mental health problems in civil servants during COVID-19. Specifically, psychosocial stress would damage nervous system function, which can lead to mental health problems [42]. However, it is reversible. This result suggests that reducing the occupational stress of civil servants may reduce their mental health problems. Skill training to enhance their time management, stress management, and problem-solving abilities combined with organizational-level improvement in work arrangements may help to reduce stress and enhance work performance and well-being [43].

Furthermore, consistent with our hypotheses, work-family conflict and social support significantly mediated the relationships between civil servants' occupational stress and mental health problems. The results fit the stress-buffering model and were similar with previous studies that work-family conflict is a risk factor for mental health, while social support is a protective factor [20,44]. Participants reported mainly perceiving support from their family and colleagues, and less so from mental health workers. This may indicate their low usage of mental health services. Help-seeking behaviors for mental health and the promotion of related professional services could help this population. The results of the mediation model should, however, be interpreted cautiously, as the small indirect effect sizes were seen (0.10, accounting for 19.03 % of the total effect). And direct effect of occupational stress on mental health remained significant and large in the model (0.42, accounting for 80.97 % of the total effect), which implies that occupational stress has a strong impact on mental health for civil servants or there may exist other mediators. This could be studied further.

Interestingly, we found there was no significant correlation between social support and work-family conflict, which is inconsistent with previous findings [20]. Due to that, in this study, the model is just a parallel mediation model. Our single-item measure for work-family conflict may have affected this result. According to its definition, work-family conflict can mean failing to meet family demands due to work and/or failing to meet work demands due to family [45]. Our measure failed to measure different dimensions or contexts of work-family conflict. Future studies should validate the result using well-developed measures.

#### 4.1. Strengths and limitations

Our study is the first to examine the direct and indirect relationships between occupational stress and mental health problems (i.e., anxiety, depression, and insomnia) via social support and work-family conflict in Chinese civil servants during the pandemic. It further reveals the impact of the COVID-19 pandemic on the mental health of civil servants. And the adaptation of the stress-buffering model to the population is extended. Our results reveal more about the high-risk groups for mental health problems and potential risk and protective factors, which should be further examined in future research and practices.

This study also has several limitations that should be noted in future research. First, since this survey was a cross-sectional study, causal relationships between variables could not be demonstrated. The data for a pre-during pandemic comparison are not available and the changes in occupational stress and other psychosocial status in this population thus remain unknown. Longitudinal studies and surveillance data are, therefore, warranted. Second, participants were recruited from one city using convenience sampling, and the sample size was relatively small. Thus, considering the regional differences, caution should be exercised for the generalization of these findings. Third, this survey relied on self-report questionnaires. Objective evaluations, clinical diagnosis, and scales involving other informants (e.g., family, friends, colleagues, and doctors) would help to verify the results and could be included in future work. Moreover, we used fewer and unverified items to measure the levels of occupational stress, social support and work-family conflict, and this would affect its reliability and validity. Future research can proceed from this point for more detailed research, such as using a formative conceptual framework to explore [46].

#### 5. Conclusions

The study underlines the importance of occupational stress and mental health problems (anxiety, depression, and insomnia) of civil servants, and the mediation of social support and work-family conflict. Stress management training, organizational-level improvement in work arrangements, and professional mental health services could be effective in decreasing mental health problems. Moreover, civil servants need more concern from researchers and mental health professionals.

#### Ethics statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of the Wenzhou Medical University [Grant No. 2022–028].

#### Consent statement

Participants' informed consent has been obtained for this study.

#### Data availability statement

Data will be made available on request.

#### Additional information

No additional information is available for this paper.

#### CRedit authorship contribution statement

**Jiankang He:** Data curation, Formal analysis, Investigation, Methodology, Writing – original draft. **Yuxuan Chen:** Data curation, Writing – original draft. **Jie Lin:** Data curation, Investigation. **Xue Yang:** Writing – review & editing. **Ningning Ding:** Data curation, Investigation. **Xin Wang:** Writing – review & editing. **Xianjian Chen:** Project administration. **Mingxuan Du:** Project administration. **Guohua Zhang:** Conceptualization, Methodology, Supervision, Writing – review & editing. **Yuya Song:** Funding acquisition, Supervision, Writing – review & editing.

#### 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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