### RESEARCH



# Exploring gender differences in workload and job performance: insights from junior high school teachers



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### Abstract

**Background** Notable gender disparities exist in the workload and performance of junior high school teachers, although the specific ways in which these disparities manifest have not been fully elucidated. This study examines how specific aspects of teachers' workload are related to gender differences in aspects of work performance.

**Methods** The study used survey data from 1135 junior high school educators. Teacher workload was assessed using the NASA Task Load Index. Teachers' work performance was evaluated in terms of task performance and contextual performance. Demographic data included gender, teaching experience, teaching grade, titles, school ownership, rural school designation, marital status, whether they had children, were internal teachers, were multidisciplinary teachers, and whether they were the main subject teachers. Oaxaca–Blinder decomposition was used to analyze the specific contribution and mechanism of workload to the gender gap in work performance.

**Results** The findings revealed distinct gender differences in work performance, with male teachers demonstrating higher task performance and female teachers reporting higher contextual performance, which mediated the observed disparity. Further analysis indicated that marital status also plays a role, with single teachers experiencing a more pronounced gender gap.

**Conclusions** These insights signify that gender is a pivotal factor in junior high school teachers' workload and performance. The study advocates for a deeper investigation within the "gender-workload-capacity development" framework to assist educators in making informed decisions and to foster a more equitable work environment.

Keywords Work performance, Workload, Junior high school teachers, Gender differences

### Background

In the contemporary milieu of escalating global economic development and intensifying competition, education has emerged as a pivotal cornerstone of national competitiveness. Despite its unequivocal importance, the educational landscape in China grapples with multifaceted

\*Correspondence: Yongtao Gan ganyt@foxmail.com <sup>1</sup>Institute of Higher Education, Shantou University, Shantou, China challenges. A prominent issue is the entrenched examoriented education system, which frequently eclipses the personalized development of students [1]. This system imposes a substantial workload on students, adversely affecting their physical and mental health, and engendering additional burdens on familial education.

With the advancement of China's "Double Reduction" policy and against the backdrop of college entrance examination reform, teachers, as implementers of education, face a dual task [2]. On the one hand, teachers must actively respond to the requirements of the national



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education and teaching reform, and on the other hand, they must prepare students for the examination requirements for further study. In this context, teachers' workload and ability become key success factors, directly affecting the quality of education and students' learning experience [3].

The gender-differentiated nature of professional responsibilities, coupled with physiological disparities between male and female teachers, could potentially lead to distinct workloads and performance metrics [4]. The escalating workload necessitates an inquiry into the persistence of these sex differences, thereby illuminating the mechanisms and implications of any observed effects. This not only provides an important perspective for evaluating education policies, but also offers an empirical basis for understanding the adaptability and coping strategies of female teachers in the education workforce.

Teacher workload refers to the aggregate of various pressures and demands that teachers experience in completing teaching tasks and related work. It encompasses psychological load (e.g., the consumption of psychological and cognitive abilities in lesson preparation, homework grading, and teaching reflection), physical load (e.g., the physical burden of standing for extended periods during classes and grading homework), temporal load (e.g., the time investment required for teaching, educational research, and home visits), and environmental load (e.g., the impact of school management requirements, parental expectations, and societal opinions on teachers) [5]. The level of workload directly affects teachers' work efficiency, physical and mental health, and job satisfaction.

Teacher work performance refers to the capabilities and achievements demonstrated by teachers in their work. According to the two-factor model proposed by Motowidlo and Van Scotter, work performance can be divided into task performance and contextual performance. Task performance pertains to teachers' ability in completing teaching tasks, such as instructional design, classroom management, and teaching effectiveness, which are directly related to students' learning outcomes and teachers' professional levels [6]. Contextual performance (also known as peripheral performance) refers to the extra-role behaviors exhibited by teachers in the work environment that are related to their job, such as cooperation with colleagues, care for students, and loyalty to the school. Although these behaviors do not directly produce teaching results, they play a crucial role in creating a favorable working atmosphere, enhancing team cohesion, and improving organizational performance.

Traditional research has often focused on broader gender disparities without delving into the specific context of junior high school teachers. Previous studies provide a foundation for understanding the broader context but leave room for further exploration in the specific area of junior high school teachers. This study aims to explore gender differences in workload and job performance among junior high school teachers by focusing on identifying specific aspects of workload that contribute to these disparities and examine how demographic variables and contextual factors may influence the observed differences. This study applied the Oaxaca-Blinder method to achieve the aim of exploring gender differences in workload and job performance among junior high school teachers, with a focus on identifying specific aspects of workload that contribute to these disparities and examine how demographic variables and contextual factors may influence the observed differences. The decomposition of gender differences facilitated by this method enables the disentanglement of diverse elements that can potentially influence disparities [7, 8]. It further contributes to understanding the intricate relationship between efficiency, the nature of work, and gender by facilitating comparative analyses of means and characteristics among different groups [9].

Overall, this study expands the existing body of research on gender disparities in the education sector by specifically addressing the context of junior high school teachers and the role of workload, and uses the Oaxaca– Blinder method, which ensures that the findings are robust and valid, making the conclusions more credible and reliable.

### Literature review

The discourse surrounding teachers' workload has gained significant traction in recent years, particularly as educational policies have undergone transformation. Nations such as Britain, Canada, Australia, and New Zealand have spearheaded research initiatives, with educational authorities commissioning specialized institutions to conduct comprehensive surveys on the subject [10]. This international emphasis underscores the complex nature of teacher workload, encompassing not only the sheer volume of tasks but also contextual factors that influence the work environment [2, 11]. These studies have revealed that teacher workload is not only a matter of hours spent, but also involves the quality of work and the emotional labor required, which can vary significantly among individuals and settings.

The qualitative insights provided by Jin et al. [12], who conducted semi-structured interviews with 14 teachers across China, validated the perception that factors such as lesson preparation, homework design, after-school services, and professional development activities significantly contribute to teachers' workload. These findings resonate with those of international studies that have identified similar workload determinants [13, 14]. This qualitative approach provided an in-depth understanding of teachers' personal experiences and challenges in their daily work.

Building upon this foundation, Zhou et al. delved into the social theoretical aspects of the issue by examining workload, work-family interference, emotional commitment, and quitting tendencies among female primary school teachers [15]. Their study enriched the theoretical understanding of teachers' workloads through the lens of time sociology by elucidating the multifaceted dimensions of workloads. The intersection of personal and professional demands on teachers, especially women, is a critical area of inquiry as it can influence job satisfaction, performance, and well-being [16, 17].

While educational policies, such as China's "Double Reduction" policy, have been noted to influence teachers' workload [18]. The "Double Reduction" policy, jointly issued by the General Office of the Central Committee of the Communist Party of China and the State Council in July 2021, aims to reduce the burden of excessive homework and extracurricular tutoring on students. According to the "Double Reduction" policy, teachers working in China's compulsory education system must devote more time and effort to improving their teaching quality, managing students' homework, and improving extracurricular services, which has paradoxically increased teachers' working hours and workload [19]. Zhong et al. [20] found that under China's "Double Reduction" policy, an incredible 66.6% of primary school teachers suffer from burnout, indicating an exceptionally high prevalence of burnout among this group of educators in China, which may affect their professional efficiency and work performance. Recognizing that the impact of such policies is only one piece of a larger puzzle is important, although the policy's effects may vary based on school context, teacher experience, and gender, the core issue extends beyond these factors to include the overall structure and culture of educational institutions [21].

The literature consistently indicates the pivotal role of gender differences and occupational anxiety in shaping teachers' workload and performance [21]. This suggests that the policy's impact on workload is multifaceted, involving not only the quantity of work, but also its quality and the emotional demands it places on educators [22, 23]. This underscores the importance of considering gender in the analysis of teachers' workload and performance.

Despite frequent discussions in the field of human factor engineering, no consensus exists on a unified definition of workload. For instance, mental workload is often conceptualized as the ratio of external demand to an individual's capacity [24], whereas Weiner viewed it as a measure of the various stressors that affect job performance [25]. Wickens emphasized the relationship between work demand and capacity, suggesting that a larger gap indicates a higher workload [26]. These varying perspectives illustrate the highly subjective nature of workload perception.

Teacher performance is evaluated based on dedication, student success rates, teaching effectiveness, and the quality of teacher-student communication. Studies have also demonstrated the influence of leadership style and job satisfaction on teacher performance [27–30]. A study on the Effort-Reward Imbalance model noted that gender differences in workload can directly affect performance, indicating that gender is a significant variable in the analysis of teachers' workload and performance [31]. Song et al. and Yu et al. further suggested that teaching workload may be closely related to students' perceptions of body image and learning anxiety [32, 33].

Despite the wealth of research, differences remain in understanding the specific ways in which gender differences manifest in junior high school teachers' workload and performance. In the context of the "Double Reduction" policy, research on teachers has focused on the excessive workload resulting from increased work difficulty, complexity, and hours [34]. The literature has found a significant correlation between workload and teacher burnout and job performance [35]. However, there are also contradictory results. For example, some studies suggest that workload does not have a significant impact on teachers' work performance. Furthermore, there is growing interest in the specifics of female teachers' work, with a particular focus on workload [36]. Nevertheless, there is a notable research gap in relation to the imbalanced work distribution between male and female teachers in the same educational setting, as few studies have addressed this issue. In other words, male and female teachers with the same educational policy background may face different workloads, which may affect their job performance and lead to gender differences in teachers' job performance.

The Job Demands-Resources (JD-R) model is a leading model for work stress. It divides job characteristics into demands and resources. Demerouti et al. [37] defined job demands as aspects that require sustained effort and are associated with physiological and psychological costs. High demands lead to stress and health impairments [38]. Workload, one of the most important demands, depletes individual energy. According to the loss pathway of the JD-R model, if high demands are not compensated by resources, employees can experience energy depletion, which has a negative impact on health and job performance.

Gender differences are an important area of research in the application of the JD-R model. As women's participation in the labor market increases, traditional gender roles are challenged. Some research shows significant gender differences in the effects of job demands and resources on stress. Heub et al. found that extended working hours only increase subjective stress in women, possibly because they often have additional care responsibilities outside of work [39]. Fukuzaki et al. observed no gender difference in motivation but found that women perform better at jobs than men due to gender equality and a supportive work environment [40]. Therefore, this study investigates the gender differences in workload and job performance of junior high school teachers, which can further complement the JD-R model.

Despite the wealth of research, a gap remains in understanding the specific ways in which gender differences manifest in junior high school teachers' workload and performance. This study seeks to address this difference through an empirical investigation of gender differences in workload and work performance among junior high school teachers in China with the following hypotheses:

This study seeks to address these differences through an empirical investigation of gender differences in workload and work performance among junior high school teachers in China, with the following hypotheses:

**H1** There are gender differences in the work performance of junior high school teachers.

**H2** Gender differences in workload explain the differences in job performance among junior high school teachers.

### Methods

### Participants

The participants in this study were frontline teachers in junior high schools in 17 counties and cities in the Guangdong, Hainan, Guizhou, and Guangxi provinces. This study used the electronic questionnaire-making function of the questionnaire network to generate questionnaire links or QR codes. To enhance the representativeness of the sample, the questionnaire was distributed to schools located in both urban and rural areas within each county or city. This strategy ensured the participation of teachers from diverse teaching environments. The questionnaires were distributed online to identified sample areas. To ensure sample diversity and minimize selection bias, targeted efforts were made to encourage participation from teachers across various age groups, teaching experiences, and school types (e.g., public and private institutions, tenured and non-tenured teachers).

This study employed a stratified random sampling method. Stratified random sampling divides the population into distinct strata based on key variables such as urban-rural distribution and school type (public vs. private), and then randomly selects samples from each stratum to ensure the sample is representative and maintains external validity. The specific procedure was as follows: First, the sampling frame was constructed based on the distribution characteristics of the target population, and the proportion of each stratum was determined. Next, teachers were randomly selected within each stratum using appropriate sampling tools to perform the stratified random sampling. Finally, the questionnaires were distributed online (e.g., through WeChat groups, QR code links) with the support of local education departments to facilitate data collection. This process aimed to enhance the external validity of the study, ensuring that the findings could be generalized to a broader population of junior high school teachers.

Finally, 1135 valid questionnaires were obtained. In total, 728 participants (64.1%) were women, 407 (35.9%) were men, 120 (10.6%) were from rural schools, and 1015 (89.4%) were from urban schools; 1009 (88.9%) were from public schools, and 126 (11.1%) were from private schools. A total of 1034 (91.1%) were tenured (internal) teachers, while 101 (8.9%) were not internal teachers; In terms of marital status, 1006 (88.6%) were married, and 129 (11.4%) were single. Regarding the question "Do you have kids?" 996 (87.7%) answered "yes," and 139 (12.2%) answered "no." Regarding the question "Are you a multidisciplinary teacher?" 249 (21.9%) answered "yes," and 886 (78.1%) answered "no." Regarding the question "Are vou a main subject teacher?" 804 (70.9%) answered "yes," and 331 (29.2%) answered "no." Regarding the question "Are you a main subject teacher?" 804 (70.9%) answered "yes," and 331 (29.2%) answered "no." Table 1 presents the basic information on the sample.

Table 1 Gender differences for main variables

Dimension	variable	Male (N=	= 407)	Female (	N=728)	D-value	
		mean	standard deviation	mean	standard deviation	(Male-female)	
Work performance	Task performance	4.330	0.760	3.950	0.863	0.380***	
	contextual performance	4.130	0.576	4.250	0.471	-0.120***	
workload	mental demands	66.519	15.744	64.618	18.292	1.901*	
	physical demands	63.222	15.521	59.499	18.930	3.722 **	
	temporal demands	64.289	15.563	59.882	19.615	4.407***	
	Effort	64.814	16.055	62.461	19.950	2.353 *	
	Frustration	50.780	19.167	50.888	22.788	-0.107	

\*\*\* *P*<0.001, \*\* *P*<0.01, \* *P*<0.05 (two-tail)

### Measures

Teacher Workload: This study utilized the NASA Task Load Index (NASA-TLX) to assess teacher workload across five dimensions. The official NASA-TLX is a self-report measure that allows users to evaluate the subjective workload involved in working with various human-machine interface systems [41]. Originally developed as a paper-and-pencil questionnaire by Sandra Hart at the NASA Ames Research Center in the 1980s, the NASA-TLX has since become the standard for measuring subjective workload across a broad range of applications [42]. However, for the purpose of this particular study, the scale was adapted to better fit the context of junior high school teachers' workload. The adapted version includes five subscales: psychological pressure, physical pressure, temporal constraints, effort, and level of frustration.

The decision to reduce the number of dimensions from six to five was made due to the overlap between the "performance" dimension of the NASA-TLX and the teacher work performance scale used in this study. The "performance" dimension in the NASA-TLX assesses the level of success in completing the task, which is inherently linked to teachers' actual job performance. By excluding this dimension, the study avoids redundancy and ensures that the workload assessment is more focused on the factors that contribute to the perceived workload rather than the outcomes of the work itself [43]. The marks given for the said issue are determined and highlight the participants' acceptance of that feeling. The scale reliability for the NASA-TLX is  $\alpha$  = 0.95.

Teachers' work performance was evaluated using the binary structure model proposed by Motowidlo and Scotter [7]. This scale divides work performance into task performance and contextual performance (also known as peripheral performance), including 8 questions on task performance and 15 questions on contextual performance; a 7-point Likert scale is used. For both the task and contextual performance subscales, the average score of the items is used as the scale score, and the total average score of task and contextual performance is used as the overall work performance score.

Demographic Variables: The survey aimed to collect information about junior high school teachers' demographic characteristics to understand population characteristics in relation to workload and performance. The demographic data included gender, teaching experience, teaching grade, titles, school ownership, rural school designation, marital status, whether they had children, whether they were internal teachers, whether they were multidisciplinary teachers, and whether they were the main subject teachers.

### Model design

First, to test H1, this study estimated the following models to identify gender differences in junior high school teachers' work performance while controlling for the influence of individual characteristics:

$$Performance_i = a_o + a_1 female_i + \beta x'_i + \varepsilon_i \quad (1)$$

In this equation, Performance<sub>i</sub> represents a specific work performance indicator for teacher i, and x'\_i is a vector of control variables. The variable female<sub>i</sub> represents gender (0 = female, 1 = male), and the coefficient  $\alpha$ 1 reflects the gender difference in work performance. If  $\alpha$ 1 is significantly negative, it supports H1, indicating that female work performance lags significantly behind that of male.

Second, to test hypothesis H2, referring to the existing literature we estimate the following model with the following equation:

$$Workload'_{i} = a_{o} + a_{2}female_{i} + \beta x'_{i} + \varepsilon_{i}$$
(2)

$$Perfomance' i = a_o + a_3 female_i + Workload'_i + \beta x'_i + \varepsilon_i$$
(3)

Specifically, Workload<sub>i</sub> represents the vector of workload variables obtained for teacher i, and  $\lambda$  represents the effect of workload on work performance. To test whether workload plays a mediating role in the gender difference in work performance, this study followed specific steps: if the coefficient  $\alpha 1$  in Eq. (1) is significantly positive and the coefficient  $\alpha 2$  in Eq. (2) is significant, it indicates a mediation effect. Furthermore, if the coefficient  $\alpha 3$  in Eq. (3) remains significant and  $|\alpha 3| < |\alpha 1|$ , it shows that workload plays a mediating role in the difference in work performance between females and males. On the other hand, if the coefficient  $\alpha 3$  is not significant, it indicates full mediation of workload in this process.

Finally, to explore H2 more thoroughly, this paper used Oaxaca–Blinder decomposition technology to analyze the specific contribution and mechanism of workload to the gender difference in work performance among junior high school teachers. This study used Eqs. (4) and (5) to estimate work performance as the effect of workload in the male and female samples, respectively. Additionally, this study expressed the gender difference in work performance at the mean level using Eq. (6).

$$Perfomance_{i}^{female} = a_{0}^{female} + \lambda_{female} Workload_{i,female} + \beta x_{i,female}' + \varepsilon_{i}$$

$$(4)$$

$$\begin{aligned} Perfomance_{i}^{female} &= a_{0}^{female} + \lambda_{female} Workload_{i,female}' \\ &+ \beta x_{i,female}' + \varepsilon_{i} \end{aligned} \tag{5}$$

$$\Delta = E\left(performance_{i}^{male}\right) - E\left(performance_{i}^{female}\right)$$

$$= \left\{ \hat{\lambda}_{female} \left( \overline{workload'}_{i,male} - \overline{workload}_{i,female} \right) \right\}$$

$$+ \left\{ \hat{\beta}_{female} \left( \overline{x'}_{i,male} - \overline{x}_{i,female} \right) \right\}$$

$$+ \left\{ \overline{workload'}_{i,male} \left( \hat{\lambda}_{male} - \dot{\lambda}_{female} \right) \right\}$$

$$+ \left\{ \overline{x'}_{i,male} \left( \hat{\beta}_{male} - \hat{\beta}_{female} \right) \right\}$$

$$\hat{\lambda}_{female} \left( \overline{workload'}_{i,male} - \overline{workload'}_{i,female} \right)$$

$$\hat{\beta}_{female} \left( \overline{x'}_{i,male} - \overline{x'}_{i,female} \right)$$

$$(6)$$

in Eq. (6), the gender difference in work performance is decomposed into two components: the endowment effect and coefficient effect. The endowment effect, denoted as  $\varepsilon$ , quantifies the group (gender) difference in work performance explained by differences in workload and the absolute level of individual characteristics.

$$\overline{workload}'_{i,male}\left(\hat{\lambda}_{male} - \dot{\lambda}_{female}\right) \bar{x}'_{i,male}\left(\hat{\beta}_{male} - \hat{\beta}_{female}\right)$$

The coefficient effects, denoted as  $\gamma$ , measure the difference between groups in work performance attributed to variations in workload and the impact of individual characteristics on the outcome variable.

### Results

### Gender differences across variables

Table 1 shows the results of the analysis of gender differences for each variable. The findings indicate that male teachers outperform female teachers in terms of task performance, while female teachers demonstrate greater strength in contextual performance. Regarding workload, the workload levels in the other four categories were higher for male than for female teachers, except for "frustration."

## Gender differences in the work performance of junior high school teachers

Table 2 presents the estimated results of Eq. (1), which introduces individual characteristics as control variables and uses contextual and task performance as dependent variables.

In the benchmark models (1) and (3), where only gender variables were included, the coefficient  $\alpha$ 1 represents the absolute difference between male and female teachers. The results indicate that male teachers outperformed female teachers in task performance by 0.387 (p < 0.001) but lagged in contextual performance by 0.126 (p < 0.001).

To further examine the gender differences among junior high school teachers, models (2) and (4) were estimated after controlling for individual characteristics. The results demonstrated that the coefficients of the gender variables remained significant and consistent across all models.

These findings partially support H1, which suggests that male teachers excel in task performance but fall behind female teachers in terms of relational or contextual performance.

### Interpretation of the gender differences in the work performance of junior high school teachers *Test of mediation effect*

After establishing gender differences in work performance, our next objective was to investigate whether workload acts as a mediator in this relationship. To achieve this, this study examined the coefficient  $\alpha 2$  of the gender variable, as estimated by Eq. (2), while using each workload variable as the dependent variable. The findings presented in Table 3 demonstrate that when individual characteristics are considered, the coefficients of the gender variable are consistently significant and negative.

	C 1	1.00			c	c				
Table 2	(appder	differences	In	the work	nerformance	ot.	linn	high	school	teachers
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Variable	Task perfor	mance			Contextual	Contextual performance				
	(1)		(2)	(2)			(4)	(4)		
	β	t	β	t	β	t	β	t		
Gender	-0.387***	-7.555	-0.474***	-9.220	0.126***	3.976	0.117***	3.830		
Private school			-0.189**	-2.860			-0.107*	-2.460		
Urban schools			0.963***	8.100			0.347***	6.190		
Marital status			0.735***	4.630			0.303*	2.520		
Have you got kids			-0.925***	-6.120			-0.461***	-3.940		
Are you a multidisciplinary teacher			-0.166**	-3.030			-0.282***	-7.610		
Are you a main subject teacher			0.075	1.590			-0.031	-1.070		
Are you an internal teacher			0.045***	9.930			0.036***	10.280		
constant	3.945***	128.569	2.287***	12.270	4.253***	224.387	3.567***	32.890		
R <sup>2</sup>	$R^2 = 0.048$		$R^2 = 0.3223$		$R^2 = 0.013$		$R^2 = 0.3025$			

Note: Gender is a dummy variable, woman = 1, man = 0; Rural school is a dummy variable, yes = 1, no = 0; "Are you an internal teacher" is a dummy variable, yes = 1, no = 0; Marital Status is a dummy variable, married = 1, unmarried = 0; "Have you got kinds" is a dummy variable, yes = 1, no = 0; "Are you a multidisciplinary teacher?" is a dummy variable, yes = 1, no = 0; "Are you a main subject teacher?" is a dummy variable, yes = 1, no = 0; "Are you a main subject teacher?" is a dummy variable, yes = 1, no = 0; "Are you a main subject teacher?" is a dummy variable, yes = 1, no = 0; "Are you a main subject teacher?" is a dummy variable, yes = 1, no = 0; "Mare you a main subject teacher?" is a dummy variable, yes = 1, no = 0; "Are you a main subject teacher?" is a dummy variable, yes = 1, no = 0; "Are you a main subject teacher?" is a dummy variable, yes = 1, no = 0; "Mare you a main subject teacher?" is a dummy variable, yes = 1, no = 0; "Mare you a main subject teacher?" is a dummy variable, yes = 1, no = 0; "Are you a main subject teacher?" is a dummy variable, yes = 1, no = 0; "Mare you a main subject teacher?" is a dummy variable, yes = 1, no = 0; "Mare you a main subject teacher?" is a dummy variable, yes = 1, no = 0; "mental demands, temporal demands, Effort Frustration"

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

Variable	mental demands		physical o	physical demands		Time demand		Effort		Frustration	
	β	t	β	t	β	t	β	t	β	t	
Gender	-0.053*	-1.97	-0.113***	-3.731	-0.098**	-3.040	-0.063*	-2.022	-0.096**	-3.013	
Marital status	0.429***	4.3	-0.039	-0.402	0.385***	3.848	0.408***	4.068	0.064	0.626	
Have you got kids	-0.318***	-3.2	0.119	1.233	-0.264**	-2.655	-0.259***	-2.594	-0.036	-0.353	
Are you an internal teacher	0.12***	3.621	-0.132***	-4.111	0.137***	4.117	0.116***	3.495	0.073*	2.163	
Are you a multidisciplinary teacher	0.075*	2.508	-0.011	-0.383	0.027	0.908	0.022	0.751	0.008	0.269	
Are you a main subject teacher	0.219***	7.449	0.327***	11.45	0.215***	7.294	0.205***	6.919	0.248***	8.263	
Private school	-0.143***	-4.376	-0.047	-1.496	-0.089**	-2.725	-0.109**	-3.324	-0.027	-0.815	
Urban schools	-0.023	-0.751	-0.021	-0.709	-0.086	-2.873	-0.053	-1.756	-0.079	-2.578	
constant	317.612	21.830	331.468	17.790	174.832	8.880	208.216	10.780	292.785	18.920	
After the adjustment of R <sup>2</sup>	0.098		0.098		0.093		0.092		0.048		

Table 3 Gender difference in the workload of junior high school teachers

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

Table 4	Mediation	model e	stimation c	of the	gender	difference	in work	performance

/ariable	Task perforr	nance			contextual p	contextual performance				
	(1)		(2)	(2)		(3)		(4)		
	β	t	β	t	β	t	β	t		
Gender	-0.4979***	-9.65	-0.5005***	-9.74	0.1161***	3.82	0.1066***	3.64		
Mental demands			0.0046***	7.03			0.0006	1.68		
Physical demands			-0.0056***	-5.86			-0.0017***	-3.51		
Temporal demand			0.0044***	5.75			-0.0014***	-3.29		
Effort			-0.0023****	-4.38			0.0008**	2.83		
Frustration			-0.0004	-1.46			0.0003	1.52		
Individual characteristics (control variables)	yes	yes	yes	yes	yes	yes	yes	yes		
After the adjustment of R <sup>2</sup>	0.3498		0.4033		0.3026		0.3852			

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

This indicates that male junior high school teachers experience higher workload levels than their female counterparts.

Models (2) and (4) in Table 4 present the estimation results for Eq. (3), which examines the gender differences (coefficient  $\alpha$ 3) and the impact of workload (coefficient  $\lambda$ ) on work performance. In the aforementioned models, the coefficient  $\lambda$  for "frustration" was found to be statistically insignificant. In model (2), "mental demands" and "temporal demands" positively predicted task performance, indicating that higher mental and temporal demands were associated with higher task performance. In contrast, "physical demands" and "effort" negatively predicted task performance.

Turning to the coefficient  $\lambda$  of each workload indicator in model 4, "temporal demands," "physical demands," and "effort" were found to significantly predict contextual performance. This reinforces the notion that workload plays a crucial role in junior high school teachers' performance. Furthermore, after incorporating the workload variable, the coefficient  $\alpha$ 3 for the gender variable remained significant, although its absolute value was notably smaller compared to  $\alpha$ 1 (as observed in models 1 and 3). Specifically, after controlling for workload, the gender differences in task performance narrowed by approximately 0.26% and the gender differences in contextual performance narrowed by approximately 0.95%.

Thus, the results partially support H2. This study asserted that workload plays a partial mediating role in the gender differences formation in faculty tasks and contextual performance.

### Source breakdown of gender differences

Table 5 presents the results obtained using the Oaxaca-Blinder decomposition method. The decomposition results of the endowment effect reveal that, on average, men tend to have higher workloads than women. This difference in workload accounts for -333.7%% and 15% of the gender differences in task and contextual performance, respectively. These findings were statistically significant. In contrast, the individual characteristics of male and female teachers explained 309.9% and 17.5% of the gender differences in task and contextual performance, respectively. However, it is worth noting that the absolute coefficient of workload is higher than that of individual characteristics due to the presence of both positive and negative coefficients. This suggests that workload plays a more significant role in explaining the gender differences in work performance than individual characteristics.

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lable 5	Oaxaca-Blinder	decomposition of	aender differe	ence in work be	erformance of i	unior high	school teachers
					,	/	

	Task performance	5	Contextual perfo	rmance
Total gap	-0.387***	100%	0.126***	100%
A. The endowment effect	0.092*	-23.8%	0.041*	32.4%
(a1) workload	1.293***	-333.7%	0.019*	15.0%
(a2) Individual characteristics	-1.201***	309.9%	0.022**	17.5%
B. The coefficient effect	-0.480***	123.8%	0.085**	67.6%
(b1) workload	0.000	0.0%	0.656***	520.5%
(b2) Individual characteristics	-0.480***	123.8%	-0.570***	-452.9%

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

Table 6	Gender d	lifference	e in work	performance	ce of jun	nior high	school	teachers in	different	marital stat	tes (married	vs. single)
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Dimension	variable	Male (N=	407)	Female (N	D-value	
		м	SD	M	SD	(Male-female)
Married	Task performance	4.19	0.768	3.94	0.879	0.25***
	Contextual performance	4.01	0.565	4.25	0.479	-0.24***
Single	Task performance	4.88	0.389	4.07	0.552	0.81***
	Contextual performance	4.58	0.352	4.22	0.315	0.51***

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

Furthermore, the decomposition results of the coefficient effect indicate that at the task performance level, differences in workload alone cannot fully account for the gender differences in work performance. Instead, the gap primarily arises from variations in individual characteristics. However, at the contextual performance level, both workload factors and individual characteristics significantly contribute to explaining the gender differences in teacher work performance.

In conclusion, the Oaxaca–Blinder decomposition analysis provides compelling evidence supporting H2, which posits that female junior high school teachers generally experience lower workloads. As a result, they may exhibit weaker task performance but stronger contextual performance than their male counterparts. This finding could be attributed to the tendency of women to display more prosocial behavioral characteristics. However, it is crucial to acknowledge that individual characteristics also contribute significantly to work performance. Hence, school administrators should be attentive to both sex disparities in workload levels and the diversity of individual characteristics among teachers.

## Heterogeneity discussion: whether marriage affects teachers' workload and work performance

According to this study, changes in marital status affected teachers' work performance. Married teachers, due to the increased responsibilities and time commitments associated with their family lives, may experience higher workloads and lower work performance. This effect was particularly pronounced among female teachers.

Table 6 presents the gender differences in work performance among junior high school teachers based on marital status (married vs. single). The table displays the mean scores for task and contextual performance along with the standard deviations for both male and female teachers in each group. Additionally, the D-value represents the difference between male and female scores.

The results indicate that in the single group, the gender differences in work performance was the largest and statistically significant. However, in the married group, the gap in task performance between male and female teachers decreased significantly but remained significant. Interestingly, married women demonstrated a higher level of contextual performance than their male counterparts. To further explore the relationship between gender and marital status, an interaction term between teacher gender and the "married" variable was introduced.

The next step in investigation of the correlation of gender and marital status was the implementation of the interaction term including "gender" and "married" variables. The outcome shows that the estimated coefficient for the interaction term in task performance has a significantly negative value, implying that the gender differences in task performance narrows remarkably as the experience of married life increases (Seen in Table 7). Nevertheless, the parameter for the interaction term in contextual performance is positive, implying that the gender differences in contextual performance may increase with marriage.

These findings add to the concept that the gender differences in work performance among junior high school teachers are intricately associated with socio-marital life. In addition, it emphasizes the role of marital status in teachers' effectiveness. Further research is required to understand the main causes of these differences.

In Eq. (2), previously defined in the model design section, the classification variables for "married" reveals

variable	Task perfo	rmance			contextual performance				
	(1)		(2)	(2)		(3)		(4)	
	β	t	β	t	β	t	β	t	
Gender	-0.267***	-9.349	-0.455***	-5.509	0.107***	3.565	0.44***	5.108	
Marital status			0.321***	3.269			0.34***	3.328	
Gender *Marital status			-0.189*	-2.33			0.57***	6.737	
Have you got kids	-0.139***	-5.093	-0.366***	-4.021	-0.196***	-6.818	-0.285***	-3.013	
Are you an internal teacher	-0.224	-7.532	-0.223***	-7.493	-0.073*	-2.269	-0.53	-1.680	
Are you a multidisciplinary teacher	-0.029	-1.048	-0.032	-1.173	-0.152***	-5.26	-0.16***	-5.654	
Are you a main subject teacher	0.01	0.375	-0.008	-0.304	-0.078**	-2.744	-0.122***	-4.249	
Private school	0.398***	14.446	0.4***	14.531	0.278***	9.543	0.272***	9.497	
Urban schools	-0.067*	-2.553	-0.06*	-2.242	-0.071*	-2.546	-0.043	-1.544	
After the adjustment of R <sup>2</sup>	0.237***		0.243***		0.147***		0.178***		

**Table 7** Heterogeneity analysis of gender differences in work performance of junior high school teachers in different marital states (married vs. single)

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

 Table 8
 Heterogeneity analysis of gender differences in workload of junior high school teachers under different marital states (married vs. single)

Variable	mental demands		physical	physical demands		Time demand		Effort		Frustration	
	β	t	β	t	β	t	β	t	β	t	
Gender	-0.28***	-3.324	-0.513***	-5.925	-0.458***	-5.373	-0.511***	-5.998	-0.321***	-3.696	
Marital status	0.198*	1.979	0.367***	3.575	0.265**	2.62	0.358***	3.541	0.159	1.55	
Gender *Marital status	0.341***	4.107	0.524***	6.136	0.454***	5.404	0.538***	6.405	0.456***	5.33	
Have you got kids	-0.207*	-2.236	-0.236*	-2.476	-0.191*	-2.043	-0.177	-1.886	-0.123	-1.29	
Are you an internal teacher	0.108***	3.5	0.015	0.469	-0.039	-1.249	-0.008	-0.26	-0.116***	-3.638	
Are you a multidisciplinary teacher	0.034	1.221	0.033	1.161	0.103	3.667	-0.074**	-2.644	-0.017	-0.6	
Are you a main subject teacher	0.322***	11.437	0.299***	10.351	0.281***	9.85	0.291***	10.234	0.293***	10.107	
Private school	0.094***	3.371	0.011***	0.371	-0.016	-0.568	0.159***	5.602	-0.026	-0.913	
Urban schools	-0.193***	-6.318	-0.06*	-1.9	-0.108***	-3.504	-0.127***	-4.113	-0.032	-1.015	
After the adjustment of R <sup>2</sup>	0.217		0.172		0.197		0.199		0.186		

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

that, except the coefficient of "frustration," all other coefficients are statistically significant. By contrast, a positive and significant coefficient is obtained for the interaction between the "married" variable and teacher gender (Seen in Table 8). This implies that as much as being married affects the workload volume of teachers, it also contributes significantly to the widening of the gender differences in workload between female and male teachers.

### Discussion

### **Evaluation of conclusions**

Workload and performance are considered in terms of gender differences among junior high school teachers. Hypothesis H1 was supported because the present study revealed a strong gender bias in job performance among junior high school teachers. Moreover, H2 was partially confirmed, as workload was had a significant effect on both task and contextual performance, and different job demands had varying influences on performance. This result shows that a gap in the workload and working ability of junior high school teachers occurred after considering these factors.

## Gender differences in workload and work performance of junior high school teachers

Data regarding teachers' workloads revealed some interesting trends. Female teachers reported more work-related mental effort and strain than their male counterparts. This indicates that there may have been a pre-existing difference in the workloads of male and female teachers.

Nevertheless, the workload levels in the other four categories were higher for male teachers than their female counterparts, except for "frustration." This study can explain this finding from diverse perspectives, such as the introduction of new teaching approaches, the increase in administrative work, and the additional responsibilities of teachers. Nevertheless, it also indirectly overloads the teachers' workload both inside and outside the classroom, particularly in secondary schools [44]. Therefore, teachers must devote more time and energy to maintaining the quality of teaching and satisfying parents' expectations regarding their children's academic performance [45]. Our findings show that male teachers showed a higher level of task performance, whereas female teachers showed better contextual performance. Gender differences in work performance have also been reported in junior high school [46, 47]. These changes can be attributed to different traditional views and social roles that affect coping strategies and task methodologies [48].

Mabekoje analyzed job satisfaction from a gender perspective and found that female teachers were less satisfied with their jobs than male teachers because they had a heavier workload [49]. This is consistent with earlier findings showing that increased workload can adversely affect job satisfaction [46]. Nevertheless, the results of the current study show the opposite pattern concerning the contextual and task performance of male teachers. In particular, the results showed that female teachers had higher contextual performance and lower task performance than male teachers. This inconsistency creates a problem in understanding and debating the results with reference to previous literature. There are several potential explanations for this distinct pattern.

Research indicates that female teachers tend to perform better in classroom teaching and home-school communication, whereas male teachers excel in student tutoring and subject competitions [50]. Furthermore, task performance focuses on job-specific duties and responsibilities, such as delivering effective lessons, meeting curriculum requirements, and achieving academic goals. Lower task performance among female teachers could be attributed to various factors, including gender biases [43, 51, 52], differing teaching styles, and variations in instructional approaches [53].

## Impact of gender differences and workload on work performance of junior middle school teachers

Our findings underscore the significant influence of gender disparities and workload on teacher performance. Notably, workload substantially affects both task performance (e.g., delivering effective lessons and meeting curriculum requirements) and contextual performance, with job demands exerting variable effects. A previous systematic review by Maas and Houtman established a link between teachers' workload, work intensification, and time-poverty, noting their connection to emotional exhaustion and performance variability [54]. Additionally, Ingusci et al. found a positive significant correlation between workload and contextual performance, suggesting that job demands can influence satisfaction levels, which in turn affect performance [55].

Our decomposition analysis revealed a significant workload discrepancy between male and female teachers, with male teachers typically experiencing heavier workloads. This imbalance has a substantial impact on gender disparities in both task and contextual performance. The notably negative percentage (-333.7%) linked to workload in the context of task performance suggests that the elevated workload of male teachers may counteract their potential for superior performance and effectively narrow the observed gender differences.

However, the difference in workload made a minimal contribution (15%) to the gender differences in contextual performance when compared with individual characteristics. These findings are also supported by another study conducted by Spagnoli, et al, which focused on workload, workaholism, and job performance, and revealed how unequal workloads between male and female teachers affect their performance [56]. This study points to a multifactorial approach.

The individual characteristics of education and experience explained a staggering 309.9% of the disparity in the gender differences across tasks. This implies that these personal qualities have a greater impact on the execution process than on the load. While they do have an impact on contextual performance of 17.5%, which remains significant, it implies that other factors such as team atmosphere and employee support play a bigger role. Finally, Jiang and Yang studied personal and environmental attributes; another main point of these studies and our own emphasizes how there are many interrelated factors that affect disparities in performance [57]. As crucial as individual characteristics are, the interaction between contextual factors and workplace dynamics constitutes an integrative perspective on gender differences in task and contextual performance.

The workload coefficient is the main indicator of the complex impact of workload on performance and includes both positive and negative coefficients. The present study showed that a moderate workload can improve task performance, whereas excessive workload can result in stress and damage to task and contextual performance. An extensive body of research has consistently shown the complex interaction between workload, fatigue, and performance, and that an excessively heavy workload may cause fatigue and reduce performance levels [58]. In addition, another systematic review focused on the role of multitasking behavior in general work performance and its implications for work quality, productivity, and working memory [59]. These results demonstrate the complex characteristics of workload management and its vital role in maintaining high performance.

## The gender differences in work performance among junior high school teachers depending on marital status

Our study revealed the complex interplay between gender, marital status, and the performance of junior school teachers' jobs with two different forms of performance: task and contextual. In our study, the task performance domain showed a considerably negative coefficient for the interaction term, implying that marital status plays a significant role in reducing the gender differences. This indicates that marriage could help to even the playing field by improving personality traits in both sexes. Madden also showed that a negative correlation between task performance and perceived control in women [60]. Thus, task distribution control defines marital satisfaction more than decision control, decision making, or task accomplishment. In addition, the cause of this reduction could be multifactorial, with consequences of increased support, stability, or motivation associated with being married [61–63].

In contrast, the positive value for the interaction term in conjunction with marital status shows that an increased gender differences in this case. This variance in task performance indicates a significant difference in contextual performance by marital status. The discovery of the drivers of this expansion is of utmost importance; it can be, for example, shifts in family responsibilities, work-life balance, or societal expectations of married individuals [64, 65]. The work-life balance that teachers experience can have a great impact on their workload and, in general, their work performance. Previous studies have shown that female teachers often face more challenges in balancing their work and family obligations [66, 67]. This may be reflected in their workload estimation, which ultimately has a significant impact on their outcomes.

However, the research demonstrates a complex link between gender, marital status, and work efficiency among junior high school teachers. This study could advance our understanding of the complex processes within this relationship by including more issues such as increased support, commitment, and motivation derived from marriage; differences in family responsibilities and work–life balance; and gender differences in managing work and home life.

### Implications

### Theoretical implications

The findings of this study provide an important contribution to the existing theoretical knowledge on gender differences in workload and job performance, particularly in the context of junior high school teachers. Our research is consistent with gender role theory, which suggests that social expectations and norms shape the behavior and roles of both men and women. The observed gender differences in workload and job performance, where male teachers perform better in task performance and female teachers perform better in context performance, can be partially explained by traditional gender roles. Society often expects men to perform well in task-oriented roles, which may translate into higher expectations for male teachers in task performance. On the contrary, women have traditionally been seen as nurturing and supportive, which is consistent with the observed higher performance of female teachers in situational contexts. This study supports the view that these gender roles continue to influence professional environments, including the education field.

In addition, the results have also contributed to the theory of workload and performance. These theories suggest that workload is a key factor affecting job performance, and both low and high workloads are harmful. Our research confirms this by demonstrating that workload has a significant impact on both task performance and situational performance of middle school teachers. The partial mediating effect of workload on gender differences in job performance highlights the importance of considering workload when examining performance differences, further reinforcing the view that maintaining optimal workload levels is crucial for achieving optimal performance.

### Implications for Education Policy and Management

These findings have far-reaching implications for educational practices and policies, especially highlighting the urgent need to address gender disparities in workload among secondary school teachers. Strategy-based policies and goal-oriented initiatives are necessary for achieving gender equity. This study found that male teachers have a higher workload than female teachers, with this workload disparity accounting for -333.7% of the gender difference in task performance and 15% of the gender difference in contextual performance. Therefore, gender disparities in workload must be urgently addressed. Existing policies, such as the Opinions on Reducing the Workload of Primary and Secondary School Teachers, provide a foundation but often overlook gender-specific challenges. To address this issue, strategy-based policies should focus on task redistribution, such as reducing administrative responsibilities for female teachers or introducing mentorship programs to support their professional development.

The results demonstrate the importance of workload in narrowing both individual and contextual performance gaps among teachers of the opposite sex. The elevated workload of male teachers, among other factors, significantly affected this gender deficit. Furthermore, teacher's individual characteristics, irrespective of gender, to a smaller extent, can also be seen as a factor in these gaps.

Additionally, educational administrators and policymakers in different regions can draw on the findings of this study, focusing on the impact of teacher workload and gender differences on performance, and formulate corresponding teacher support policies and work allocation mechanisms tailored to local conditions. For instance, in areas with heavier workloads, providing teachers with more professional training and psychological counseling can help them better cope with work pressure and improve teaching performance.

In short, the research indicates that the workload and personal features of teachers are factors affecting how well male and female teachers work. This implies that initiatives to plug the gaps should go beyond the personal qualities of teachers but also include workload and work distribution issues. Educational institutions can achieve this goal through a comprehensive, equitable, and supportive approach. Consequently, this enables all teachers, regardless of gender, to perform at their best.

### Limitations and future directions

This study has certain limitations. The first issue could be related to skewed sample selection, as this research deliberately looked at exemplary teachers, who might not be typical of the entire teaching community. Additionally, the sample selection was geographically confined to specific provinces in China, which may not represent the broader spectrum of educational contexts globally. This regional focus limits the generalizability of the findings to other cultural and educational systems. Furthermore, the reliance on self-reported data through questionnaires could introduce biases related to participants' perceptions and honesty, potentially skewing the results. Finally, our use of questionnaires and interviews, although resulting in rich qualitative information, is not comparable to the measurement precision of quantitative methods, nor does it fully capture all teachers' experiences. In this case, the study touched upon gender differences mainly from a psychological perspective, leaving the impact of society and culture unexamined.

Future research should aim to expand the sample size and diversity, incorporating teachers from various regions, educational systems, and cultural backgrounds. This would enhance the external validity of the findings and allow for more nuanced comparisons across different settings. Furthermore, future studies should be conducted using both qualitative and quantitative methods to add depth to the analysis. Looking into gender differences and considering the idea that sociocultural context plays a role in shaping teachers' effectiveness is important. Longitudinal research may uncover the long-term impacts of workload differences on teacher careers and health, which have been overlooked thus far, by providing a wider and more thorough overview.

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#### Author contributions

GYT: Writing– Original Draft, Conceptualization, Funding acquisition, Resources DJ, LC, LSY: Methodology, Formal analysis, Investigation. All authors reviewed the manuscript.

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### Data availability

The datasets generated during or analysed during the current study are available from the corresponding author on reasonable request.

#### Declarations

### Ethics approval and consent to participate

Approval was obtained from the Human Subjects Ethics Sub-committee of the Shantou University (Project number: 11223003). The procedures used in this study adhere to the tenets of the Declaration of Helsinki. Informed consent was obtained from all individual participants included in the study. Participants were assured that their participation was voluntary and that they could withdraw from the study at any time without any consequences.

### **Consent for publication**

Not Applicable.

### **Competing interests**

The authors declare no competing interests.

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