

# The Impact of Medical Graduate Students' Research Burnout on Team Performance: A Mediated Moderation Model

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**Abstract:** ***Objective:** To explore the influencing mechanism and the mechanism of action of research burnout among medical graduate students and their team performance. **Methods:** From August 2025 to November 2025, a questionnaire survey was conducted on 472 medical graduate students from three medical universities in Zhejiang Province (Zhejiang University, Wenzhou Medical University, and Hangzhou Medical College) using the Mentor Support Scale, Research Burnout Scale, Psychological Empowerment Scale, and Team Performance Scale. **Results:** (1) Research burnout has a negative impact on predicting the team performance of medical graduate students ( $r = -0.367, P < 0.001$ ); (2) Psychological empowerment has a significant mediating effect between research burnout and team performance ( $\beta = -0.209, t = -4.739, P < 0.001$ ); (3) The relationship between research burnout and psychological empowerment (i.e., the first half of the mediating effect path) is regulated by mentor support ( $\beta = 0.123, t = 3.421, P < 0.01$ ). **Conclusion:** Research burnout can directly predict team performance, and it can also affect team performance through the mediating effect of psychological empowerment, and the mediating effect is regulated by mentor support.*

**Keywords:** Research Burnout, Psychological Empowerment, Team Performance, Mentor Support, Medical Graduate Students.

## 1. Introduction

In the contemporary medical education system, the cultivation of research capabilities has become an important aspect in the development of high-quality medical professionals. With the continuous advancement of higher education and the rapid development of medical scientific innovation, a strategic goal of "training physician-scientists" has been clearly proposed. This requires medical graduate students to not only master solid clinical skills but also possess independent research capabilities (Williams et al., 2022). However, this dual ability cultivation model often causes medical students to face unique time allocation pressure and role conflicts. Existing studies have shown that the incidence of academic burnout among medical graduate students is significantly higher than that of general college students and other professional graduate students (Almutairi et al., 2022). It is worth noting that when research pressure is combined with clinical workload, due to the characteristics of research activities such as being result-oriented, having a long cycle and weak support, this imbalance is more likely to cause medical students to experience emotional exhaustion towards research, thereby leading to the phenomenon of research burnout.

The negative consequences of research burnout extend beyond the individual level and also affect the team and organizational levels. In the contemporary medical research field, teamwork has become the mainstream paradigm for solving complex medical problems. Medical students, as important members of the research team, undertake key tasks such as basic experiments, data collection, and literature organization. Their work status directly influences the team's knowledge accumulation and project progress. However, current research on the performance of research teams mainly focuses on three levels: The first aspect is the characteristics of the team composition, such as the heterogeneity of members, the diversity of disciplinary backgrounds, and the impact of role configuration on collaboration efficiency (Modi et al., 2025); the second aspect is the team collaboration

process, such as knowledge sharing behavior, communication patterns, conflict management, and the role of leadership style in influencing innovation output (Strode et al., 2022); the third aspect is the contextual resource support, such as organizational atmosphere, academic reputation, and funds and equipment that promote team functions (Mathieu et al., 2019). These studies provide important references for optimizing the management of scientific research teams, but most of the research is based on enterprises or regular academic teams, and do not fully consider the unique burnout patterns and cross-level influence paths of medical graduate students due to the dual pressure of clinical and research work. How scientific research burnout affects team performance through individual psychological mechanisms has not been fully revealed in the medical education context. Therefore, this study aims to reveal how medical students' scientific research burnout affects team performance, and provide theoretical basis and practical guidance for optimizing the management of medical scientific research teams and improving the training mechanism for medical students.

## 2. Research Hypotheses

### 2.1 Research Burnout and Team Performance

Research burnout, as a negative state where individuals experience emotional exhaustion, de-personalization, and low personal satisfaction under long-term research pressure, will directly reduce the effective contributions of medical students in the research team, thereby having a negative impact on team performance. According to the resource conservation theory, when individuals face depletion threats, they tend to acquire and maintain more resources and exhibit defensive responses (Hobfoll et al., 2023). Turhan tracked the temporal development trajectory of burnout symptoms among college students and confirmed that continuous depletion of resources led to the gradual intensification of burnout and its impact on academic performance (Turhan et al., 2023). Medical students experiencing burnout were more likely to exhibit avoidance

behaviors in teams. By reducing knowledge sharing and collaborative interaction within the team, they also lowered the quality of task completion. Wu et al. further confirmed through meta-analysis that burnout was significantly positively correlated with accidents, work errors, and overall performance decline (Wu et al., 2024). As the basic execution layer of the research team, medical graduate students' burnout would lead to an increase in error rates and a decline in data quality, directly damaging the reliability and academic reputation of the team's research. Therefore, medical students with a higher degree of research burnout would have a more significant negative impact on team performance.

Based on this, the following hypothesis is proposed: Hypothesis H1: Research burnout has a significant negative impact on team performance.

## 2.2 Mediating Role of Psychological Empowerment

Psychological empowerment refers to the positive cognitive evaluation that individuals have of the significance of their job roles, their competence, their autonomy, and their influence (Spreitzer, 1995). Unlike structural empowerment, psychological empowerment emphasizes the individual's subjective cognitive interpretation of the objective empowerment conditions and is an internal, positive psychological state that can stimulate the individual's intrinsic motivation and proactive behavior. The emotional events theory suggests that work environment characteristics induce specific emotional responses and cognitive evaluations, thereby shaping the individual's behavioral outcomes (Weiss & Cropanzano, 1996). Malik et al.'s research confirmed that psychological empowerment is a key mediating mechanism between work context characteristics and individual behavioral outcomes. When the work design consumes the individual's psychological resources, it indirectly reduces innovative behavior and task performance by weakening the four cognitive dimensions of psychological empowerment (Malik et al., 2021). Afsar's research also found that psychological empowerment, as an overall cognitive evaluation, connects external situational factors with individual behavioral outputs (Afsar & Badir, 2016). Medical graduate students face frequent situational switches and role conflicts due to their dual roles of clinical practice and research. Research burnout caused by emotions leads to emotional exhaustion, making it difficult for them to engage in positive self-affirmation. The team's mobility requires them to quickly adapt to new environments. A low psychological empowerment state hinders this adaptation process, thereby affecting the overall improvement of team effectiveness.

Based on this, the following hypothesis H2 is proposed: Psychological empowerment plays a mediating role between research burnout and team performance.

## 2.3 Moderating Role of Mentor Support

For medical graduate students, they need to rotate in different departments and frequently participate in research team collaborations, making it difficult to establish a stable social support network. The supervisor often becomes their most

important and even the sole continuous available external support source. This support not only provides specific academic guidance and material resources, but also encompasses multiple functions such as emotional connection and career development guidance. In the context of medical student training, it has an irreplaceable unique value. A longitudinal study found that supervisory support directly reduced the level of burnout, indicating that supervisory support has a universal protective effect in high-pressure professional situations (Fukui et al., 2019). Yanbei et al. based on a sample of 479 ICU nurses in China pointed out that as the level of organizational support increases, the negative impact of job frustration on burnout significantly decreases (Yanbei et al., 2023). Additionally, the buffering hypothesis of the Work Requirements-Resources Theory proposes that work resources can weaken the negative impact of stressors on individuals (Bakker & Demerouti, 2007). Mentor support, as a key external work resource, can help medical graduate students rebuild their competence beliefs and restore positive emotional experiences of scientific research work through academic guidance and emotional support. These supportive behaviors enable medical students to maintain a positive cognition of scientific research work and clinical practice even in high burnout situations, thereby blocking the negative path of scientific research burnout from transmitting to psychological authorization.

Based on this, Hypothesis 3 is proposed: Mentor support moderates the relationship between scientific research burnout and psychological authorization.

In summary, this study aims to explore the relationship between research burnout among medical graduate students and team performance, the mediating role of psychological empowerment, and the moderating effect of mentor support. Based on the previous research hypotheses, a moderated mediation model was constructed, as shown in Figure 1.

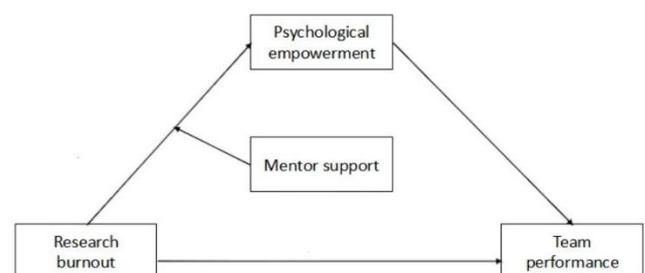


Figure 1: A moderated mediated effects model

## 3. Research Subjects and Methods

### 3.1 Participants

This study adopted the convenience sampling method, selecting 472 medical graduate students from 3 medical universities in Zhejiang Province (Zhejiang University, Wenzhou Medical University, and Hangzhou Medical College) for questionnaire surveys. The survey period was from August 2025 to November 2025. After eliminating invalid questionnaires due to missing information, irregular responses, and contradictions in the attention detection questions, 472 valid questionnaires were obtained, with an effective recovery rate of 90.4%.

## 2.2 Methods

### 2.2.1 Mentor Support Scale

The mentor support questionnaire developed by Overall et al. (Overall et al., 2011) was adopted. It consists of 15 items and uses a Likert 5-point scale. The questionnaire includes three dimensions: academic support, emotional support, and autonomous support. The higher the total score of the scale, the greater the degree of mentor support received. This scale has been widely used in relevant studies both domestically and internationally and has good reliability and validity. In this study, the Cronbach's alpha coefficient of the mentor support scale was 0.953. The Cronbach's alpha coefficients for the academic support, emotional support, and autonomous support dimensions were 0.867, 0.891, and 0.878, respectively.

### 2.2.2 Psychological Empowerment Scale

The revised psychological empowerment scale by Li Chao-ping et al. (Li et al., 2006) was adopted. The psychological empowerment scale consists of four dimensions: work meaning, autonomy, self-efficacy, and work influence. The scale contains 12 questions and uses a 5-point scale, scoring from "strongly disagree" to "strongly agree" with scores ranging from 1 to 5. The higher the score, the higher the psychological empowerment. In this study, the Cronbach's coefficient of the psychological empowerment scale was 0.918. The Cronbach's coefficients for the dimensions of work meaning, autonomy, self-efficacy, and work influence were 0.853, 0.813, 0.820, and 0.801, respectively.

### 2.2.3 Research Burnout Scale

The Graduate Research Burnout Scale developed by Yang Chuanming and Zhang Lili (Yang & Zhang, 2018) was adopted. This scale consists of three dimensions: emotional exhaustion, low efficacy, and attitude deviation. The scale contains 14 questions and is scored on a 5-point scale, ranging from "strongly disagree" to "strongly agree", with 1-5 points assigned respectively. The higher the score, the more severe the research burnout is. In this study, the Cronbach's coefficient of the research burnout scale was 0.921. The Cronbach's coefficients for the dimensions of emotional exhaustion, low efficacy, and attitude deviation were 0.830, 0.856, and 0.848 respectively.

### 2.2.4 Team Performance Scale

The team performance questionnaire developed by Liu Yanqiao (Liu, 2012) for university research teams was adopted. Team performance is a single dimension, consisting of 6 questions, scored on a 5-point scale, ranging from "strongly disagree" to "strongly agree", with scores ranging from 1 to 5. The higher the score, the higher the team performance. In this study, the Cronbach's coefficient of the team performance scale was 0.853.

## 2.3 Data Processing

In this study, SPSS 26.0 was used to conduct descriptive statistical analysis and correlation analysis on the variables.

The PROCESS macro program 3.3 compiled by Hayes was employed for the tests of mediation and moderation. Model 4 analyzed the mediating effect of psychological authorization, and Model 7 examined the mediating effect of the moderation of mentor support. The bias-corrected Bootstrap method in PROCESS was used for parameter estimation, and the 95% confidence interval was reported.

## 2.4 Control Variables

In this study, the gender of the participants, the level of the current university they are attending, their grade, the gender of their supervisor, the supervisor's title, whether the supervisor holds an administrative position, and the number of (master's/doctoral) graduate students supervised by the supervisor were all included in the statistical model for certain degree of control.

## 4. Results

### 4.1 Common Method Bias

Since the research data were obtained from the self-reports of the respondents, there might be homogeneity errors. Therefore, this paper uses the Harman single-factor test to examine whether there is a problem of common method bias. Factor analysis was conducted on all the scale questions that required the respondents to answer. The results showed that the variance explained by the first factor was 32.315%, which was less than 40%. This indicates that there is no serious common method bias problem in this study.

### 4.2 Descriptive Statistics and Correlation Analysis

Descriptive statistics and correlation analysis were conducted for the main variables as shown in Table 1. There was a significant correlation between all pairs. The scores for mentor support, research burnout, psychological empowerment, and team performance were  $59.26 \pm 10.96$ ,  $43.33 \pm 11.30$ ,  $44.25 \pm 8.52$ , and  $23.80 \pm 3.89$ , respectively. Among them, mentor support was significantly positively correlated with team performance ( $r = 0.370$ ,  $P < 0.001$ ), research burnout was significantly negatively correlated with team performance ( $r = -0.367$ ,  $P < 0.001$ ), psychological empowerment was significantly positively correlated with team performance ( $r = 0.466$ ,  $P < 0.001$ ), and research burnout was significantly negatively correlated with team performance ( $r = -0.435$ ,  $P < 0.001$ ). The hypothesis H1 was preliminarily verified to be true.

**Table 1:** Descriptive statistics and correlation analysis

Variable	M±SD	1	2	3	4
Mentor support	59.26±10.96	1			
Research burnout	43.33±11.30	-.279***	1		
Psychological Empowerment	44.25±8.52	.565***	-.435***	1	
Team Performance	23.80±3.89	.370***	-.367***	.466***	1

Note: The sample size  $n = 472$ , \* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ , the same as below.

### 3.3 Test of Mediating Effect of Psychological Empowerment

Taking gender, the current level of the university being attended, the grade of study, the gender of the supervisor, the

title of the supervisor, whether the supervisor holds an administrative position, and the number of (master's/doctoral) graduate students under the supervisor's guidance as control variables, with research burnout as the independent variable, psychological empowerment as the mediating variable, and team performance as the dependent variable, the PROCESS model 4 was used to test the mediating effect of psychological empowerment between research burnout and team performance. See Table 2. It can be concluded that research burnout has a significant negative predictive effect on team performance ( $\beta = -0.376$ ,  $t = -8.770$ ,  $P < 0.001$ ). When the mediating variable psychological empowerment is introduced, research burnout still has a significant negative predictive effect on team performance ( $\beta = -0.209$ ,  $t = -4.739$ ,  $P < 0.001$ ).

Research burnout has a significant negative predictive effect on psychological empowerment ( $\beta = -0.434$ ,  $t = -10.353$ ,  $P < 0.001$ ), and the positive predictive effect of psychological empowerment on team performance is also significant ( $\beta = 0.384$ ,  $t = 8.719$ ,  $P < 0.001$ ). In addition, the upper and lower limits of the 95% Bootstrap confidence interval of the mediating effect of psychological empowerment are (-0.236, -0.106), which do not include 0, indicating that research burnout not only directly predicts team performance but also significantly predicts team performance through the mediating effect of psychological empowerment, verifying the existence of the mediating effect, and the mediating effect accounts for 44.32% of the total effect. Therefore, Hypothesis 2 is recommended to be true.

**Table 2: Mediation Effect Analysis**

Regression equation		Overall fitting index			Regression coefficient				
Result variable	Predictor variable	R	R <sup>2</sup>	F	$\beta$	se	t	95% CI	
								LLCI	ULCI
Team Performance		0.398	0.159	10.908***					
	Gender				0.032	0.394	0.644	-0.521	1.029
	University level				-0.055	0.221	-1.252	-0.712	0.158
	Grade				-0.095	0.240	-1.936	-0.937	0.007
	Gender of the mentor				-0.084	0.369	-1.780	-1.382	0.068
	The academic title of the mentor				-0.055	0.283	-1.234	-0.906	0.207
	The mentor's administrative position				-0.037	0.337	-0.855	-0.951	0.374
	Number of students				0.041	0.203	0.868	-0.223	0.576
	Research burnout				-0.376***	0.015	-8.770	-0.158	-0.100
	Psychological empowerment		0.442	0.195	14.047***				
	Gender					0.021	0.845	0.421	-1.305
University level					0.048	0.474	1.122	-0.400	1.464
Grade					0.018	0.515	0.379	-0.817	1.206
Gender of the mentor					0.019	0.791	0.401	-1.237	1.871
The academic title of the mentor					-0.054	0.607	-1.239	-1.945	0.440
The mentor's administrative position					0.032	0.722	0.758	-0.872	1.967
Number of students					-0.007	0.436	-0.155	-0.924	0.789
Research burnout					-0.434***	0.032	-10.353	-0.389	-0.265
Team performance		0.527	0.277	19.714***					
	Gender				0.024	0.366	0.523	-0.528	0.910
	University level				-0.073	0.206	-1.802	-0.774	0.033
	Grade				-0.102*	0.223	-2.240	-0.937	-0.061
	Gender of the mentor				-0.091*	0.342	-2.081	-1.386	-0.040
	The academic title of the mentor				-0.034	0.263	-0.826	-0.734	0.300
	The mentor's administrative position				-0.049	0.313	-1.228	-0.999	0.231
	Number of students				0.043	0.189	0.998	-0.182	0.559
	Research burnout				-0.209***	0.015	-4.739	-0.102	-0.042
	Psychological empowerment				0.384***	0.020	8.719	0.136	0.215

### 3.4 Test of the Moderating Effect of Mentor Support

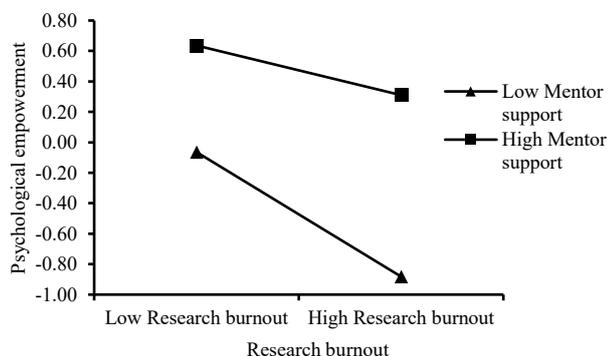
After controlling for gender, the current level of the university, the grade of study, the gender of the mentor, the title of the mentor, whether the mentor holds an administrative position, and the number of (master's/doctoral) graduate students under the mentor's guidance, a moderated mediation effect test was

conducted using Model 7 in PROCESS (this model assumes that the first half of the mediating model is moderated). The results are shown in Table 3. By including mentor support in the above mediating model, the interaction effect between research burnout and mentor support significantly predicted psychological empowerment ( $\beta = 0.123$ ,  $t = 3.421$ ,  $P < 0.01$ ), thus hypothesis 3 is confirmed.

**Table 3:** Analysis of Moderated Mediating Effect

Regression equation		Overall fitting index			Regression coefficient				
Result variable	Predictor variable	R	R2	F	$\beta$	se	t	95% CI	
								LLCI	ULCI
Psychological empowerment		0.656	0.431	34.865***					
	Gender				0.045	0.042	1.078	-0.037	0.126
	University level				0.057	0.036	1.574	-0.014	0.128
	Grade				0.035	0.040	0.871	-0.044	0.115
	Gender of the mentor				0.030	0.039	0.761	-0.047	0.106
	The academic title of the mentor				-0.093*	0.037	-2.533	-0.165	-0.021
	The mentor's administrative position				0.035	0.036	0.969	-0.036	0.105
	Number of students				0.010	0.039	0.267	-0.066	0.086
	Research burnout				-0.286***	0.037	-7.747	-0.359	-0.213
	Mentor support				0.473***	0.037	12.694	0.400	0.546
	Research burnout×Mentor support				0.123**	0.029	3.421	0.042	0.155

To better illustrate the moderating effect of the mentor's support, this paper conducts a simple slope analysis, as shown in Figure 2. When the mentor's support is at a lower level ( $M - 1$  SD), research burnout has a significant negative predictive effect on psychological empowerment (simple slope =  $-0.360$ ,  $t = -8.765$ ,  $P < 0.001$ ); when the mentor's support is at a higher level ( $M + 1$  SD), the negative predictive effect of research burnout on psychological empowerment becomes smaller (simple slope =  $-0.208$ ,  $t = -4.951$ ,  $P < 0.001$ ). This indicates that as the level of mentor support increases, the negative predictive effect of research burnout on psychological empowerment gradually decreases.



**Figure 2:** Mentor Support Moderates Research Burnout and Psychological Empowerment

## 5. Discussion

### 5.1 The Negative Impact of Research Burnout on Team Performance

This study investigated the impact of research burnout on the team performance of medical graduate students and the mechanism of its effect. The results showed that research burnout was significantly negatively correlated with team performance. That is, the higher the level of research burnout among medical graduate students, the worse the performance of the team they belong to. This is consistent with the previous research conclusions on the relationship between occupational burnout and work output (Newman et al., 2017), and further provides empirical support for the resource conservation theory in the medical education context. Different from previous studies that focused on individual

research output, this study positioned the outcome variable at the team level, revealing the social diffusion nature of the negative effects of burnout (Urien et al., 2021). When an individual is in a high burnout state, their behavioral withdrawal not only damages the quality of their own task completion but also reduces the overall output of the team through reducing knowledge sharing and lowering the willingness to collaborate. Therefore, in the training of graduate students, on the one hand, the training unit needs to optimize the time allocation for clinical rotations and research training, establish an elastic research participation mechanism to avoid graduate students being in a long-term high-load operation state; on the other hand, a team-level pressure warning and intervention system should be constructed. Through regular psychological assessments, high-risk groups of burnout can be identified, and timely psychological counseling and resource support can be provided to prevent the negative effects of burnout from spreading to the team level (Vonderheide, 2025).

### 5.2 The Mediating Role of Psychological Empowerment

This study found that research burnout can indirectly affect team performance through psychological empowerment. Research burnout, as a persistent state of physical and mental exhaustion, systematically undermines graduate students' perception of the value of their work and their belief in self-efficacy. When medical graduate students are constantly under high clinical rotation and research pressure for a long time, their limited psychological resources are largely consumed in emotional regulation and stress response, making it difficult for them to maintain a positive cognitive evaluation of research work. The decline in this level of psychological empowerment leads to behavioral characteristics such as passive coping, avoidance of responsibility, and low innovation willingness in team research activities, thereby directly affecting the quality of team output (Madigan et al., 2024). Moreover, in the medical professional master's training model, team performance is highly dependent on the knowledge complementarity and collaborative cooperation among members. The decline in interaction quality due to the lack of psychological resources will further exacerbate the dysfunction of team functions. Therefore, this article suggests that training institutions should implement interventions at the work design level. First,

mentors need to change their guidance methods to help medical graduate students establish a positive connection between research investment and professional competence; at the same time, grant graduate students substantive autonomy in research direction selection and method design, to meet their needs for autonomy and competence and activate their intrinsic motivation (Li & Rasiah, 2025).

### 5.3 The Moderating Effect of the Mentor Support

This study also found that mentor support plays a moderating role between research burnout and psychological empowerment. Specifically, when mentors provide high-level support, the negative impact of research burnout on psychological empowerment significantly weakens. Mentor support, as an important work resource, can provide emotional support and instrumental assistance to graduate students in a state of burnout, helping them rebuild a positive perception of their research work. In the medical graduate student training model, the mobility and dispersion caused by clinical rotations tend to make the teacher-student relationship become more distant (Nurunnabi et al., 2024). At this time, the timely guidance and emotional care from the mentors can be regarded as an effective supplement to their depleted psychological resources, and can effectively maintain the students' level of psychological empowerment. Regarding this moderating effect, efforts should be made to establish an institutionalized support supply mechanism. Firstly, clearly define the responsibilities of mentors, incorporate the frequency of regular communication and guidance records into the mentor assessment indicators, and avoid the randomness and selectivity of support behaviors (Rehman et al., 2026); secondly, establish cross-departmental support channels, through online group meetings, sharing of research logs, etc., to ensure the continuity of teacher-student interaction during the rotation period. Through the above institutional design, the buffering function of mentor support can be maximized, providing key protection for medical master's students to maintain psychological empowerment and ensure team performance in the high-pressure training environment.

### 5.4 Research Limitations

This study has certain limitations. Firstly, the cross-sectional design adopted in this research makes it difficult to determine the causal relationship between variables. In the future, longitudinal data or qualitative interviews can be added to conduct in-depth research. Secondly, the data collected through the questionnaire survey come from the self-reports of graduate students, which are subjectively influenced and the sample size is small. The universality of the research results cannot be fully reflected. In the future, the sample size can be expanded and data can be collected through various methods such as experiments. Finally, this study only verified the relationship between psychological empowerment and the relationship between research burnout and team performance. There may be other psychological factors influencing the two aspects, and further exploration of the mechanism of the relationship between medical graduate students' research burnout and team performance is needed.

### Data Availability Statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

### Ethics Statement

The study was approved by the Ethics Committee of Wenzhou Medical University, the study was conducted in accordance with local regulations and institutional requirements, and informed consent was obtained from all study participants.

### Author Contributions

DLC: Writing - Reviewing and editing, data organization, writing - Initial draft, concept conception, fund acquisition;

### Funding

The author declares that no funding was received for the research, writing and/or publication of this article.

### Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

### Generative AI Statement

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