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Association between burnout and working motivation among rehabilitation doctors: a multicentre cross-sectional study in China

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Burnout and working motivation are two interconnected concepts that significantly influence doctors' working performance and overall well-being. However, the relationship between burnout and working motivation among rehabilitation doctors remain unclear. Therefore, the purpose of this study was to explore the association between burnout and working motivation among rehabilitation doctors in China. A multistage sampling scheme was employed to select rehabilitation doctors as study participants. A total of 220 participants from 21 medical institutions in 7 cities in China were included in the final analysis. The measurement included working motivation, burnout, and general characteristics (such as age, sex, educational level, title, working experience, etc.). Structural equation modelling (SEM) was used to analyse the association between burnout and working motivation among rehabilitation doctors. Among 220 rehabilitation doctors, the mean age of participants was 37.0 years (SD: 7.7), and 43.6% were male. The prevalence of emotional exhaustion, depersonalisation, and lack of personal accomplishment was 20.9, 16.4, and 24.1%. The average total score of working motivation was 47.7 (SD: 8.0). SEM results indicate that burnout had a negatively correlation with working motivation ($\beta = -0.63$, 95% CI $-0.77, -0.50$) after controlling confounders. Burnout decreases the working motivation among rehabilitation doctors. The strategies to balance burnout and enhance working motivation should be strengthened.

Keywords Burnout, Working motivation, Rehabilitation, Multicentre, China

Abbreviations

MBI-HSS (MP)	Maslach burnout inventory human services survey for medical personnel
SEM	Structural equation modelling
NFI	Normed fit index
GFI	Goodness-of-fit index
CFI	Comparative fit index
RMSEA	Root mean square error of approximation

Working motivation refers to a set of internal and external forces that initiate work-related behaviours and determine their form, direction, intensity, and duration¹. Higher levels of working motivation not only

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significantly improve an individual's job performance and quality but also foster teamwork, enhance interpersonal relationships, and effectively reduce the occurrence of burnout^{1–3}. Burnout, defined as a syndrome comprising emotional exhaustion, depersonalisation, and a diminished sense of personal accomplishment, is a widespread issue among healthcare workers⁴. A substantial body of research highlights the negative impact of burnout on the working motivation, performance, and overall well-being of various healthcare professionals⁵. For instance, physicians with higher levels of burnout are more prone to committing medical errors, and their job satisfaction and professional commitment are significantly lower^{6–8}. For rehabilitation doctors, the nature of their work, characterised by long-term patient management, multidisciplinary collaboration, and high emotional investment, leads to a particularly high rate of burnout^{2,9,10}. A study in 2018 conducted among rehabilitation doctors in the United States found that over 40% of them had experienced burnout, highlighting the significant impact of this issue on rehabilitation doctors¹¹. There is evidence to suggest that burnout and working motivation are two interconnected concepts that significantly affect an individual's working performance and overall health^{4,12}.

However, existing research has primarily focused on general practitioners, nurses, and psychiatrists, while limited attention given to rehabilitation doctors, a unique group within the healthcare system. The specific nature of their work means that the relationship between burnout and working motivation in this group has yet to be fully explored¹³. In China, relevant studies remain scarce, limiting our understanding of the occupational health challenges faced by this group. This research aims to investigate the association between burnout and working motivation among rehabilitation doctors in China. The study not only provides important insights into how burnout affects working motivation but also helps in developing targeted interventions to reduce burnout and enhance working motivation. Ultimately, these measures will contribute to improving the well-being of rehabilitation professionals and the quality of patient care, aligning with the broader goals of healthcare reform in China.

In the present study, we use the multicentre survey data to explore the association between burnout and working motivation. In particular, the aim of this study was to explore (1) the prevalence of burnout and the level of working motivation among rehabilitation doctors in China; and (2) the association between their burnout and working motivation. We hypothesized that burnout decrease the level of working motivation.

Methods

Design

We conducted a multicentre, cross-sectional, population-based study from September 12 to December 20, 2023, in 7 cities from 7 provinces in China. The inclusion criteria of participants were (1) had licensed physician's certification; (2) had clinical experience in rehabilitation; (3) serve for the rehabilitation outpatients; (4) agree to participate in this study. The exclusion criteria of participants were that they were in holiday during the entire study period.

Sampling

As detailed in Fig. 1, a three-step multistage method was used to select the study's sample. First, seven cities in China were selected as sample cities. Second, we randomly selected one primary healthcare, one secondary hospital, and one tertiary hospital within each sampled city. A total of 21 medical institutions were enrolled from 7 cities. Third, a total of 225 rehabilitation doctors who met the inclusion criteria were invited to participate. Out of 225 participants, 5 (2.22%) participants were removed since they did not complete the scales of burnout and working motivation. Therefore, the final analytical sample included 220 participants.

Measurement

Outcome

Working motivation was the outcome. Eight items were used to measured working motivation scale, including "I care about the benefits my work brings to others", "I like my work itself and enjoy this profession", "I want to help others through my work", "My job is fun", "I want to have a positive impact on other people", "I am interested in my work", "I think it's important to do good things to help others through my job", "I enjoy doing my job". All items were rated on a scale from 1 "totally disagree" to 7 "totally agree". The total score of eight items was calculated. A higher score indicated greater working motivation.

Independent variables

Burnout was the independent variable. Maslach burnout inventory human services survey for medical personnel ('MBI-HSS (MP)') was applied to evaluate the burnout of doctors. We have obtained a licence to use MBI-HSS (MP) (please find the proof of permission in additional file). MBI-HSS (MP) included three dimensions on emotional exhaustion, depersonalisation, and lack of personal accomplishment. Emotional exhaustion was measured by nine items, such as "I feel I am involved in excessive emotion in my job", "I feel exhausted after working", etc., Depersonalisation was measured by five items, such as "I feel I am indifferent with others", "I feel I am unfeeling with people after I doing this job", etc., Lack of personal accomplishment was measured by eight items, "I am empathy with patients or colleagues", "I can solve problems effectively", etc., All items were rated from 0 ('never') to 6 ('everyday'). Regarding emotional exhaustion, a total score of 19–26 indicated moderate emotional exhaustion, a total score higher than 26 indicated severe emotional exhaustion. Regarding depersonalisation, a total score of 6–9 indicated moderated depersonalisation, a total score higher than 9 indicated severe depersonalisation. Regarding lack of personal accomplishment, a total score of 34–39 indicated a moderated lack of personal accomplishment, the total score lower than 34 indicated a severe lack of personal accomplishment. Dummy variables were generated for each dimension, including severe emotional exhaustion (0 = no, 1 = yes), severe depersonalisation (0 = no, 1 = yes), and severe lack of personal accomplishment (0 = no, 1 = yes).

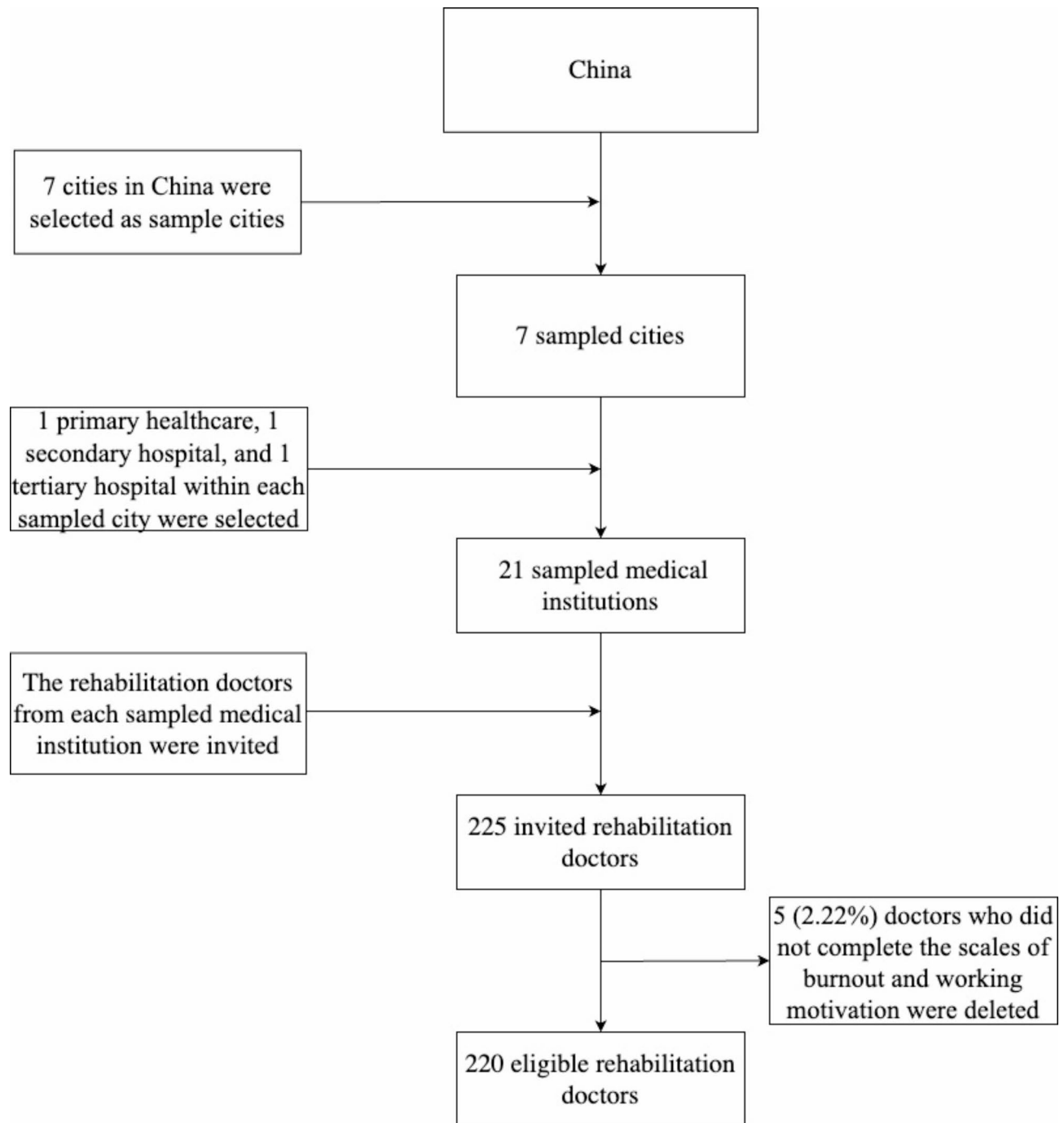


Fig. 1. Flowchart of sampling in the study ($N=220$).

Confounders

Regarding the confounders, we included basic characteristics of doctors on age, sex, educational level, title (none, primary title, intermediate title, senior title), working experience, monthly income, and resident area (western, middle, eastern China). We also included the workload characteristics, including weekly working hours, number of patients serviced per week, and institution characteristics, including the type of health care institution (general hospitals, specialized hospitals, Chinese medicine hospitals, primary healthcare), the level of health care institution (undefined, primary healthcare, secondary hospitals, tertiary hospitals), and the character of healthcare institution (private hospitals, public hospitals).

Statistical analyses

The empirical strategy included three parts. First, descriptive analyses were used to assess the statistical values of the variables measuring general characteristics (basic, workload, and institution characteristics). Continuous

variables were expressed as mean and SD, and categorical variables as frequencies and percentages. Second, to examine the reliability of the scales of burnout and working motivation, Cronbach's alpha was calculated to indicate the internal consistency reliability, where Cronbach's alpha ≥ 0.70 was considered satisfactory^{14,15}. Third, structural equation modelling (SEM) was used to analyse the association between burnout and working motivation. In this study, SEM was performed using latent variables (not directly observed but estimated from directly measured variables) and measured variables (directly observed variables). The burnout and working motivation were latent variables, the measured variables included severe emotional exhaustion, severe depersonalisation, severe lack of personal accomplishment, motivation1, motivation2, etc., Results were presented as standardized β coefficients. The association is considered to be statistically significant if the value of 2-sided p is smaller than 0.05. Multiple tests were used to evaluate the fitness of the model, including normed fit index (NFI), goodness-of-fit index (GFI), comparative fit index (CFI), root mean square error of approximation (RMSEA), and Chi squared/degrees of freedom (χ^2/df). The CFI and TLI values ranged from 0 to 1 and a value of >0.90 represented a satisfactory model fit^{16–18}. RMSEA and SRMR of <0.05 were suggested as an indicator of close fit^{17–19}. Statistical significance was set at $P < 0.05$. Data analyses were performed with Stata statistical software (version 14.1, StataCorp, College Station, TX, USA).

Ethic approval

Our studies were approved by the Second People's Hospital of Shenzhen Ethical Review Board (approval number of studies: 2023-226-02PJ). All methods were performed in accordance with the relevant guidelines and regulations. Participants were informed of the nature and purpose of the study before providing written consent. All participants provided informed consent to participate in the study.

Results

General characteristics of participants

Among 220 participants, the mean age was 37.0 years (SD: 7.7), 159 (43.6%) were male, and 112 (96.4%) had a bachelor's degree or higher educational level. Nearly three-quarters (69.5%) of participants had intermediate or senior titles, such as associate professor and professor. Participants had an average of 13.5 years (SD: 8.3) of working experience in the clinic, with an average monthly income of 9244.6 RMB (SD: 5395.7). More than half (59.5%) of the participants were residents of eastern China. Regarding the workload, participants reported that weekly working hours were 74.8 h (SD: 42.9) on average, they would serve an average of 47.5 (SD: 53.3) patients per week. Regarding the institution, most participants were from general hospitals (40.4%), tertiary hospitals (45.0%), and public hospitals (77.3%) (Table 1).

Prevalence of burnout and score of working motivation

Regarding burnout, the scale reliability coefficient was 0.90, the Bartlett's test of sphericity and KMO test indicated that the $p < 0.001$ and KMO = 0.89. The prevalence of emotional exhaustion, depersonalisation, and reduced personal accomplishment was 20.9, 16.4, and 24.1%, respectively. Regarding working motivation, the scale reliability coefficient was 0.96, the Bartlett's test of sphericity and KMO test indicated that the $p < 0.001$ and KMO = 0.93. The average total score was 47.7 (8.0) (Table 2).

Structural equation model of association between burnout and working motivation

Results from the SEM analyses are presented in (Table 3; Fig. 2). Regarding associations between latent variables and measured variables, the measured variables were adequate indicators of respective latent variables. For example, emotional exhaustion ($\beta = 0.63$, $p < 0.001$), depersonalisation ($\beta = 0.86$, $p < 0.001$), and lack of personal accomplishment ($\beta = 0.34$, $p < 0.001$) were adequate indicators of burnout. All items of motivation scale ($\beta = 0.34$ – 0.96 , all $p < 0.001$) were adequate indicators of motivation. Furthermore, SEM results indicate that burnout had a negatively correlation with working motivation ($\beta = -0.63$, 95% CI -0.77 , -0.50), after controlling age, sex, education level, title, working experience, monthly income, resident area, weekly working hour, number of patients serviced per week, the type, level, and character of the health care institution. The modified CFA model exhibited a satisfactory model fit (RMSEA = 0.05; CFI = 0.96; TLI = 0.95; SRMR = 0.04). We visualized the unmodified and modified models in (Fig. 2).

Discussion

Both increased burnout and decreased working motivation remain a problem, but the association between burnout and working motivation among rehabilitation doctors is an under-recognized and under-reported problem. Our study examined the association between burnout and working motivation among rehabilitation doctors in China. The study showed that several doctors reported burnout on emotional exhaustion, depersonalisation, and lack of personal accomplishment. After controlling confounders (age, sex, education level, title, working experience, monthly income, resident area, weekly working hour, number of patients serviced per week, the type, level, and character of health care institution), the more burnout, the less working motivation among rehabilitation doctors.

The negative association between burnout and working motivation can be explained by three factors: diminished engagement, energy depletion, and a reduced sense of personal accomplishment^{2,19,20}. Firstly, as burnout sets in, individuals start to lose interest and enthusiasm for their work. The once-motivating aspects of the job fade, replaced by feelings of cynicism and detachment²¹. This disengagement erodes the intrinsic motivation to perform well²². Secondly, a key symptom of burnout is chronic fatigue, which saps the energy needed to engage in tasks or seek out new challenges¹⁰. This lack of energy directly impacts motivation, making it difficult for individuals to summon the drive to initiate or complete work tasks¹⁰. Thirdly, burnout often

Factor	Value
Age, mean (SD)	37.0 (7.7)
Sex (male = 1)	96 (43.6%)
Education level (bachelor or higher degree = 1), N(%)	112 (96.4%)
Title, N(%)	
None	7 (3.2%)
Primary title	60 (27.3%)
Intermediate title	101 (45.9%)
Senior title	52 (23.6%)
Working experience (year), mean (SD)	13.5 (8.3)
Monthly income (RMB), mean (SD)	9244.6 (5395.7)
Resident area, N(%)	
Western China	76 (34.5%)
Middle China	13 (5.9%)
Eastern China	131 (59.5%)
Weekly working hours, mean (SD)	74.8 (42.9)
Number of patients serviced per week, mean (SD)	47.5 (53.3)
The type of health care institution, N(%)	
General hospitals	88 (40.0%)
Specialized hospitals	48 (21.8%)
Chinese medicine hospitals	47 (21.4%)
Primary healthcare	37 (16.8%)
The level of health care institution, N(%)	
Undefined	32 (14.5%)
Primary healthcare	10 (4.5%)
Secondary hospitals	79 (35.9%)
Tertiary hospitals	99 (45.0%)
The character of health care institution, N(%)	
Private hospitals	50 (22.7%)
Public hospitals	170 (77.3%)

Table 1. General characteristics of participants ($N = 220$).

Factor	Value
Burnout, N(%)	
Severe emotional exhaustion (yes = 1)	46 (20.9%)
Severe depersonalisation (yes = 1)	36 (16.4%)
Severe lack of personal accomplishment (yes = 1)	53 (24.1%)
Working motivation, mean (SD)	
Motivation1 (I care about the benefits my work brings to others)	5.8 (1.3)
Motivation2 (I like my work itself and enjoy this profession)	5.9 (1.2)
Motivation3 (I want to help others through my work)	6.2 (1.0)
Motivation4 (My job is fun)	5.7 (1.3)
Motivation5 (I want to have a positive impact on other people)	6.1 (1.1)
Motivation6 (I am interested in my work)	5.9 (1.1)
Motivation7 (I think it's important to do good things to help others through my job)	6.1 (1.1)
Motivation8 (I enjoy doing my job)	6.0 (1.2)
The total score of working motivation scale	47.7 (8.0)

Table 2. Prevalence of burnout and score of working motivation ($N = 220$).

involves a feeling of ineffectiveness and a diminished sense of personal achievement. When people no longer feel that their efforts are making a difference or are recognized, their extrinsic motivation driven by rewards, recognition, and a sense of accomplishment also decreases^{6,22}.

This study reveals a significant correlation between burnout and working motivation among rehabilitation doctors, a finding that aligns with existing literature. Although research specifically targeting rehabilitation doctors remains scarce, studies in other doctor groups have confirmed similar relationships between burnout

	Standardized Coefficients	SE	z	P-value	95% CI	
Structural paths						
Burnout -> motivation	-0.63	0.07	-9.33	<0.001	-0.77	-0.50
Measurement paths						
Severe emotional exhaustion -> Burnout	0.63	0.05	12.18	<0.001	0.53	0.73
Severe depersonalisation -> Burnout	0.86	0.05	16.91	<0.001	0.76	0.96
Severe lack of personal accomplishment -> Burnout	0.34	0.07	4.96	<0.001	0.20	0.47
Motivation1 -> Motivation	0.62	0.04	14.33	<0.001	0.53	0.70
Motivation2 -> Motivation	0.90	0.01	63.63	<0.001	0.87	0.93
Motivation3 -> Motivation	0.79	0.03	30.65	<0.001	0.74	0.85
Motivation4 -> Motivation	0.90	0.01	62.94	<0.001	0.87	0.92
Motivation5 -> Motivation	0.90	0.01	63.36	<0.001	0.87	0.93
Motivation6 -> Motivation	0.96	0.01	141.03	<0.001	0.95	0.97
Motivation7 -> Motivation	0.86	0.02	47.66	<0.001	0.83	0.90
Motivation8 -> Motivation	0.93	0.01	95.75	<0.001	0.92	0.95
Confounders						
Age (year)	0.40	0.19	2.14	0.03	0.03	0.77
Sex	0.02	0.06	0.34	0.73	-0.10	0.14
Educational level	0.01	0.07	0.16	0.87	-0.13	0.15
Monthly income (RMB)	0.08	0.07	1.25	0.21	-0.05	0.22
Title	-0.07	0.09	-0.78	0.43	-0.25	0.11
Working experience (year)	-0.26	0.20	-1.33	0.19	-0.64	0.12
Resident area	0.00	0.08	-0.03	0.98	-0.16	0.15
The type of health care institution	0.06	0.08	0.80	0.42	-0.09	0.22
The level of health care institution	0.06	0.08	0.69	0.49	-0.10	0.21
The character of health care institution	0.01	0.08	0.18	0.86	-0.14	0.17
Weekly working hours	0.10	0.06	1.62	0.11	-0.02	0.23
Number of patients serviced per week	-0.06	0.07	-0.89	0.37	-0.20	0.07

Table 3. Structural equation model of association between burnout and working motivation ($N = 220$).

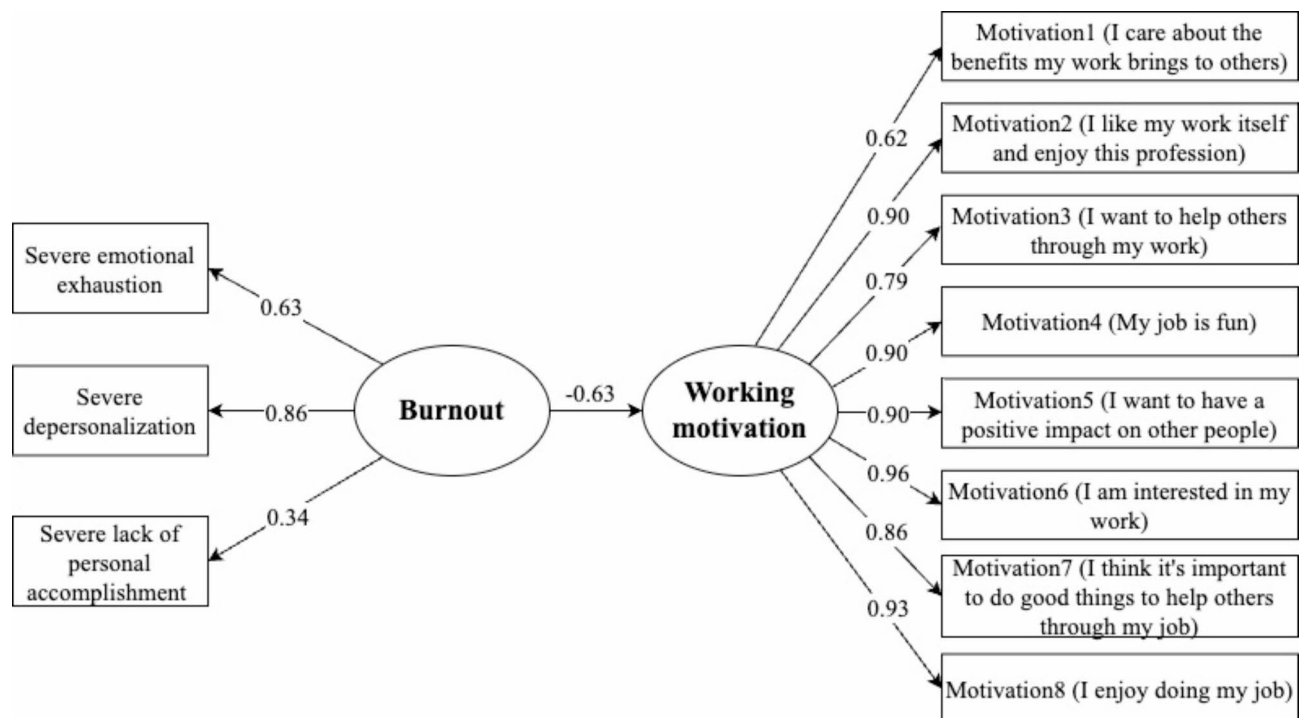


Fig. 2. Structural equation model of association between burnout and working motivation ($N = 220$).

and working motivation. For instance, a study of doctors in tertiary hospitals in China found that working motivation plays a significant mediating role between burnout and working engagement, suggesting that burnout indirectly reduces working engagement by lowering working motivation²³. Additionally, neurobiological research indicates that a reduction in the self-regulation capacity of the prefrontal cortex may exacerbate doctor burnout, leading to a decline in work motivation²⁴. These findings collectively support the negative correlation between burnout and working motivation among doctors. It is important to note that intrinsic motivation and autonomous motivation play crucial roles in mitigating the negative effects of burnout. For example, a survey conducted in Taiwan found that higher intrinsic motivation and personal reward time were significantly associated with lower levels of burnout and job dissatisfaction²⁵. Similarly, a doctor's working motivation, particularly autonomous motivation, is closely linked to their overall health status, including burnout and job satisfaction²⁶. These findings further emphasize that enhancing autonomous and intrinsic motivation among rehabilitation doctors may be an effective strategy for alleviating burnout.

Several studies have explored strategies to reduce burnout or improve working motivation. For instance, a controlled intervention study conducted in a large university hospital in France demonstrated that empowering leadership can effectively prevent the increase of emotional exhaustion²⁷. A meta-analysis found that doctors can significantly benefit from interventions aimed at reducing burnout by optimizing work environments and organizational culture¹⁹. Furthermore, a review indicated that working motivation is enhanced when professionals' personal goals align with organizational objectives, with clear goal direction and a non-hierarchical collaborative culture being key prerequisites for motivation enhancement². To enhance the working motivation of rehabilitation doctors, healthcare institutions should implement multi-level intervention strategies. At the organizational level, recognizing and rewarding achievements can strengthen both extrinsic and intrinsic motivation, while providing training, mentorship, and career development opportunities fosters a sense of growth and progress^{2,19}. At the individual level, encouraging doctors to take breaks, arrange flexible working hours, and set boundaries to prevent overwork, alongside facilitating open discussions to address workload, stress, and mental health issues, can effectively prevent burnout^{22,28,29}. Therefore, combining both organizational and individual interventions, such as optimizing the work environment and managing stress, represents an effective strategy for reducing burnout among doctors^{6,9,20}.

Strengthens and limitations

To the best of our knowledge, this is the first study to examine the association between burnout and working motivation among rehabilitation doctors. The results of this study could better provide empirical evidence for the development of a healthier work environment. However, this study was subjected to several limitations. Firstly, the self-developed tool of working motivation may be limited to applied in our research participants. The expert consultation to confirm the content validity of the tool is necessary in the future. Secondly, this study used cross-sectional measurements. Therefore, burnout and working motivation were only administered on a single occasion. We were unable to evaluate some of the potential changes. To improve working motivation, there is a need to address bullying and hostile behaviors in the workplace. Thirdly, the root of the working motivation maybe complex, the qualitative study should be carried out in the future to explore more factors in depth.

Conclusion

This study was conducted in a relatively neglected population. It examined how was the burnout and working motivation, then identified their association among rehabilitation doctors in China. The results of this study underscore the severity of burnout among rehabilitation doctors, and indicate that burnout decreases working motivation. The findings align with previous studies, confirming that increased burnout leads to decreased motivation. Strategies such as strengthening working-life balance, meaningful recognition, professional development, and open communication, may mitigate burnout and enhance motivation among rehabilitation doctors. More broadly, by acknowledging and addressing the issue of burnout and working motivation among rehabilitation doctors, highlighting the pressing need for comprehensive interventions at both individual and systemic levels is necessary, healthcare systems can better support these vital professionals, ensuring sustainable, high-quality care for patients in need of rehabilitation services.

Data availability

The datasets analyzed for the current study are not publicly available due to ethical restrictions related to the consent given by participants at the time of study commencement. An ethically compliant dataset may be made available by the corresponding author on reasonable request and upon approval by the Shenzhen Second People's Hospital Medical Ethical Review Board. Requests to access the datasets should be directed to ylwang668@163.com.

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References

1. Pinder, C. C. 1. Work motivation in organizational behavior: Psychology press. <https://doi.org/10.4324/9781315734606> (2008).
2. Kjellström, S., Avby, G., Areskoug-Josefsson, K. & Andersson Gäre, B. Andersson bäck, M. Work motivation among healthcare professionals. *J. Health Organ. Manag.* **31**, 487–502. <https://doi.org/10.1108/JHOM-04-2017-0074> (2017).
3. Panari, C., Caricati, L., Pelosi, A. & Rossi, C. Emotional exhaustion among healthcare professionals: the effects of role ambiguity, work engagement and professional commitment. *Acta Bio-Med. Atenei Parm.* **90**, 60–67. <https://doi.org/10.23750/abm.v90i6-S.8481> (2019).

4. Lacy, B. E. & Chan, J. L. Physician burnout: the hidden health care crisis. *Clin. Gastroenterol. Hepatol. Off Clin. Pract. J. Am. Gastroenterol. Assoc.* **16**, 311–317. <https://doi.org/10.1016/j.cgh.2017.06.043> (2018).
5. Prins, J. T. et al. Burnout and engagement among resident doctors in the Netherlands: a National study. *Med. Educ.* **44**, 236–247. <https://doi.org/10.1111/j.1365-2923.2009.03590.x> (2010).
6. Romani, M. & Ashkar, K. Burnout among physicians. *Libyan J. Med.* **9**, 23556. <https://doi.org/10.3402/ljm.v9.23556> (2014).
7. Motluk, A. Do Doctors experiencing burnout make more errors? *CMAJ Can. Med. Assoc. J. J. Assoc. Med. Can.* **190**, E1216–E1217. <https://doi.org/10.1503/cmaj.109-5663> (2018).
8. National Academies of Sciences, Engineering, and Medicine; National Academy of Medicine; Committee on systems approaches to improve patient care by supporting clinician well-being. *Taking Action against Clinician Burnout: A Systems Approach To Professional Well-Being* (National Academies Press, 2019).
9. Pereira, T. A., Innis, J. & Berta, W. Work motivation in health care: a scoping literature review. *Int. J. Evid. Based Healthc.* **14**, 175–182. <https://doi.org/10.1097/XEB.0000000000000093> (2016).
10. Tegegne, E., Deml, Y. A., Yirdaw, G. & Bewket, Y. Work motivation and factors associated with it among health professionals in Debre Markos comprehensive specialized hospital. *Sci. Rep.* **14**, 2381. <https://doi.org/10.1038/s41598-024-52409-5> (2024).
11. Makowski, M. S. et al. Occupational characteristics associated with professional fulfillment and burnout among US physiatrists. *Am. J. Phys. Med. Rehabil.* **102**, 379–388. <https://doi.org/10.1097/PHM.0000000000002216> (2023).
12. Patel, B. M., Boyd, L. D., Vineyard, J. & LaSpina, L. Job satisfaction, burnout, and intention to leave among dental hygienists in clinical practice. *J. Dent. Hyg. JDH* **95**, 28–35 (2021).
13. Carroll, A., Collins, C. & McKenzie, J. Physician wellbeing in a National rehabilitation hospital, a qualitative study utilizing Maslow's hierarchy of needs as a framework for analysis. *BMC Health Serv. Res.* **25**, 175. <https://doi.org/10.1186/s12913-025-12310-x> (2025).
14. Nunnally, J. *Psychometric Theory* 2nd edn (McGraw-Hill, 1978).
15. Santos, J. R. A. et al. Cronbach's alpha: A tool for assessing the reliability of scales. *Exten J.* <https://doi.org/10.5958/0976-2442.2016.00019.7> (1999).
16. Hoyle, R. H. 16 - Confirmatory factor analysis. in *Handbook of Applied Multivariate Statistics and Mathematical Modeling* (eds Tinsley, H. E. A. & Brown, S. D.) 465–497 <https://doi.org/10.1016/B978-012691360-6/50017-3> (Academic, 2000).
17. Prudon, P. Confirmatory factor analysis as a tool in research using questionnaires: A critique. *Compr. Psychol.* **4**, 03 (2015).
18. Xia, Y., Yang, Y. R. M. S. E. A., CFI & TLI. Structural equation modeling with ordered categorical data: the story they tell depends on the Estimation methods. *Behav. Res. Methods* **51**, 409–428. <https://doi.org/10.3758/s13428-018-1055-2> (2019).
19. De Simone, S., Vargas, M. & Servillo, G. Organizational strategies to reduce physician burnout: a systematic review and meta-analysis. *Aging Clin. Exp. Res.* **33**, 883–894. <https://doi.org/10.1007/s40520-019-01368-3> (2021).
20. Gao, J., Du, X. & Gao, Q. Analysis of burnout and its influencing factors among prison police. *Front. Public. Health* **10**, 891745. <https://doi.org/10.3389/fpubh.2022.891745> (2022).
21. Mohr, D. C., Eaton, J. L., Meterko, M., Stolzmann, K. L. & Restuccia, J. D. Factors associated with internal medicine physician job attitudes in the veterans health administration. *BMC Health Serv. Res.* **18**, 244. <https://doi.org/10.1186/s12913-018-3015-z> (2018).
22. West, C. P. et al. Intervention to promote physician well-being, job satisfaction, and professionalism: a randomized clinical trial. *JAMA Intern. Med.* **174**, 527–533. <https://doi.org/10.1001/jamainternmed.2013.14387> (2014).
23. Xu, L. et al. Mediation role of work motivation and job satisfaction between work-related basic need satisfaction and work engagement among Doctors in China: a cross-sectional study. *BMJ Open* **12**, e060599. <https://doi.org/10.1136/bmjopen-2021-060599> (2022).
24. Arnsten, A. F. T. & Shanafelt, T. Physician distress and burnout: the Neurobiological perspective. *MAYO Clin. Proc.* **96**, 763–769. <https://doi.org/10.1016/j.mayocp.2020.12.027> (2021).
25. Tung, Y. C., Chou, Y. Y., Chang, Y. H. & Chung, K. P. Association of intrinsic and extrinsic motivating factors with physician burnout and job satisfaction: a nationwide cross-sectional survey in Taiwan. *BMJ Open* **10**, e035948. <https://doi.org/10.1136/bmjopen-2019-035948> (2020).
26. Moller, A. C., Jager, A. J., Williams, G. C. & Kao, A. C. US physicians' work motivation and their occupational health a National survey of practicing physicians. *Med. CARE* **57**, 334–340. <https://doi.org/10.1097/MLR.0000000000001101> (2019).
27. Cougot, B. et al. Impact of empowering leadership on emotional exhaustion: A controlled interventional study in a large French university hospital complex. *J. Nurs. Manag.* **30**, 4234–4250. <https://doi.org/10.1111/jonm.13829> (2022).
28. Raisi, M., Eskandari, N., Abbasi, M. & Rahbar, A. Customers' satisfaction with the Iranian health system reform plan. *J. Educ. Health Promot.* **8**, 170. https://doi.org/10.4103/jehp.jehp_33_19 (2019).
29. Rahnfeld, M., Wendsche, J. & Wegge, J. Job demands and resources as drivers of exhaustion and leaving intentions: a prospective analysis with geriatric nurses. *BMC Geriatr.* **23**, 167. <https://doi.org/10.1186/s12877-023-03829-x> (2023).

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Author contributions

XYZ and RXY conceived and designed the study. XYZ, YQW, QFZ, MHK and YQH were involved in the acquisition of primary data. XYZ, RXY, LZ and YZH analyzed the data. XYZ and RXY wrote the initial draft of the manuscript. YLW acquired funding for the study. XYZ, RXY, LZ, YZH, YQW, XXL, QFZ, MHK and YQH were involved in the investigation. RXY contributed to the methodology and developed the software used in the study. YJJ, JLL, YLW, and JF conceived and supervised the study and contributed to the revision and preparation of the manuscript. All authors provided comments on the manuscript and all authors accepted the final version.

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Declarations

Competing interests

The authors declare no competing interests.

Ethics approval and consent to participate

Our studies were approved by Shenzhen Second People's Hospital Medical Ethical Review Board, approval number of studies was 2023-226-02PJ. Participants were informed of the nature and purpose of the study before providing written consent. All participants provided informed consent to participate in the study.

Additional information

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