

Original

Challenge or hindrance: Does job stress affect presenteeism among Chinese healthcare workers?

Tianan Yang^{1,2}, Mingxu Ma^{1,2}, Mingjing Zhu³, Yuanling Liu⁴, Qian Chen⁵,
Shiyang Zhang⁶ and Jianwei Deng^{1,2}

¹School of Management and Economics, Beijing Institute of Technology, Beijing, China, ²Sustainable Development Research Institute for Economy and Society of Beijing, Beijing, China, ³CAS Key Laboratory of Behavioral Science, Institute of Psychology, Chinese Academy of Sciences, Beijing, China, ⁴Human Resources Department, Guangdong Women's and Children Hospital, Guangzhou, China, ⁵Medical Affairs Department, Peking Union Medical College Hospital, Chinese Academy of Medical Sciences, Beijing, China and ⁶Hospital Infection Management Department, the First Affiliated Hospital of Xiamen University, Xiamen, China

Abstract: Background: We examined the effects of challenge stress and hindrance stress on general health and presenteeism among Chinese healthcare workers. **Methods:** Structural equation modeling was used to evaluate data from a national hospital survey in China ($n = 1392$). Job stress, general health, and presenteeism were measured by the Perceived Ability to Work Scale, the 8-item Short-Form Health Survey, and the Challenge- and Hindrance-Related Self-reported Stress Scale. **Results:** Challenge stress and hindrance stress were significantly positively correlated ($\beta = 0.62$, $SE = 0.021$; $p < 0.001$). Challenge stress was directly negatively associated with presenteeism ($\beta = -0.05$, $SE = 0.037$; $p < 0.001$), while hindrance stress was positively associated with presenteeism ($\beta = 0.25$, $SE = 0.040$; $p < 0.001$). These associations with presenteeism were partially mediated by health. **Conclusions:** Hospital managers should provide healthcare workers with an appropriate level of challenge, but employee health is the most important consideration. Further efforts targeting job stress and health of junior healthcare workers are required.

(J Occup Health 2018; 60: 163-171)

doi: 10.1539/joh.17-0195-OA

Key words: Challenge stress, Health, Hindrance stress, Presenteeism, Quality of public services

Received July 21, 2017; Accepted November 21, 2017

Published online in J-STAGE December 19, 2017

Correspondence to: Dr J. Deng, School of Management and Economics Beijing Institute of Technology, 5 South Zhongguancun Street Haidian District, Beijing, 100081, China (e-mail: 111605@bit.edu.cn)

Background

Presenteeism in workplaces is a much costlier problem than other direct or indirect social and economic burdens. Presenteeism has been defined as productivity loss due to health problems or other events that adversely affect employees¹⁻³. Chinese workers reported higher levels of strain and presenteeism than did their British counterparts⁴. The situation is much worse for Chinese healthcare workers, because of the substantial workplace stress they face. Public health problems in China, especially a number of recent murders of Chinese healthcare workers, including doctors, nurses, pharmacists, medical technicians, and administrative personnel in hospitals and clinics, have attracted global attention^{5,6}. These Chinese healthcare workers suffer from extremely high job demands that cause very high stress at work⁷. Moreover, research and human-resource policies in the Chinese healthcare sector continue to focus on evaluation of healthcare workers' job performance but ignore the considerable economic and social burdens caused by the substantial adverse psychosocial effects on these healthcare workers.

Job stress among healthcare workers decreases productivity and adversely affects their health, which causes a negative feedback cycle of increased costs and burdens^{2,8-10}. Health includes the entire range of physical, mental, and social functioning and is usually measured by assessing physical functioning, role limitations because of physical health problems, bodily pain, social functioning, general mental health, role limitations because of emotional problems, vitality, and general health perceptions¹¹.

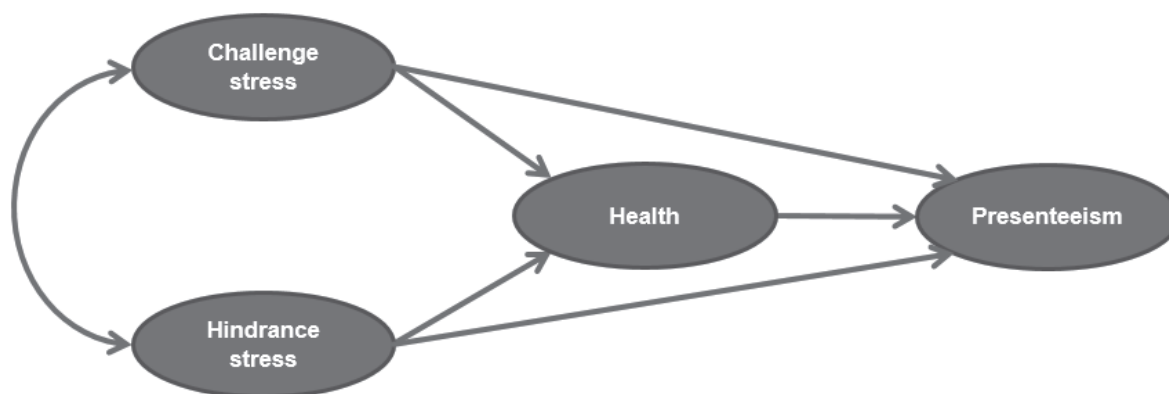


Fig. 1. Schematic representation of the initial model.

Conditions for healthcare workers are worse in China than in western countries. Low well-being and high job stress have been reported for decades among Chinese healthcare workers¹². However, few studies have investigated the adverse effects of job stress and other psychological factors¹³, and Chinese healthcare workers have not been a central concern of policymakers and Chinese scholars since the Chinese national health reform in 2008 aimed to target equity between rich and poor, and between rural and urban residents^{14,15}.

Job stress can be classified as challenge stress and hindrance stress. Challenge stress refers to job stress perceived as surmountable and that benefits career development, such as job load, job responsibility, and time urgency. Hindrance stress refers to stress that individuals feel they cannot overcome and that prevents their future development, such as role conflict, organizational politics, and work insecurity¹⁶. In most cases, challenge stress has a positive effect on a person, as it stimulates desirable emotions and encourages people to solve problems in a positive way¹⁷. In contrast, hindrance stress has adverse effects. Differences in the effects of these stresses on performance and productivity have been explored in theoretical and quantitative studies¹⁸ but seldom in empirical studies^{19,20}. Although public health problems in China have increased global awareness of healthcare workers in China, it remains to be determined whether presenteeism is related to cultural context. Moreover, conceptualization of presenteeism has been extended to include other conditions and events that limit productivity^{8,21-23}. Whether stress and health significantly affect presenteeism remains to be determined.

Using the previously described Stress-Health-Presenteeism (SHEAP) model^{21,24}, we collected information on presenteeism among Chinese healthcare workers and then attempted to differentiate the effects of challenge stress and hindrance stress on health and presenteeism in this population. Fig. 1 shows a schematic integrating these components.

Methods

Sample

To investigate psychosocial conditions among healthcare workers in eastern, central, and western China, we conducted a national hospital survey (NHS) in 2015, after receiving ethics approval (No. KYX2016007). Each study participant provided informed consent. The NHS was funded by the National Science Fund of China and measured challenge stress, hindrance stress, health, psychosocial factors, and productivity of healthcare workers in Chinese Class A tertiary hospitals. According to the Chinese classification system, hospitals are designated as primary, secondary, or tertiary centers. Tertiary hospitals are comprehensive or general hospitals at the city, provincial, or national level and have more than 500 beds. They provide specialist health care, are important in medical education and scientific research, and serve as medical hubs providing care to multiple regions. On the basis of the level of service provision, size, medical technology, medical equipment, management, and medical quality, these three grades are further subdivided into three subsidiary levels: A, B, and C. This results in a total of nine levels²⁵. Most medical services are provided by tertiary and secondary hospitals²⁶, and workers at Class A tertiary hospitals are more likely to report high job stress. We thus selected Class A tertiary hospitals as the focus of our research.

To avoid confounding effects due to the huge gaps in social development in China, the NHS recruited healthcare workers from Class A tertiary hospitals, after randomization at the area level and hospital level. At the area level, we divided China into eastern, central, and western regions by using the definitions provided by the Chinese national government. The ratio of Class A tertiary hospitals in eastern, central, and western China is 5.2:3.6:2.6²⁶. We therefore randomly selected five (Beijing, Guangzhou, Haikou, Shanghai, Xiamen), three (Wuhan, Changchun, Zhengzhou), and three (Chongqing, Kashi, Xi'an)

hospitals, respectively, from these regions. At the hospital level, we randomly selected 2.5% to 10% of healthcare workers at each target hospital by using their work identification numbers. In the NHS, we ultimately analyzed data from 1392 questionnaires from 1470 voluntary participants (response rate: 94.7%).

Measures

Presenteeism was measured by using the Perceived Ability to Work Scale (PAWS). The PAWS is a reliable and valid instrument for measuring perceived productivity loss and had acceptable psychometric properties in previous empirical studies and in the Health and Retirement Survey in the United States^{1,21,22,27-29}. It comprises four subjective items and asks participants to rate their perceived ability on a scale from 0 to 10 (0 = cannot currently work at all; 10 = work ability is currently at its lifetime best; Cronbach α = 0.924). Challenge stress and hindrance stress were measured with the 11-item Challenge and Hindrance-Related Self-Reported Stress Scale¹³ (five-point Likert scale, 1 = no stress; 5 = great stress; Cronbach α = 0.928 and 0.830). The 8-item Short-Form Health Survey (SF-8 general health: six-point Likert scale, 1 = excellent; 6 = very poor; the remaining items: five-point Likert scale, 1 = not at all; 5 = could not do daily activities; Cronbach α = 0.910; a shorter version of the Short-Form Health Survey 36, SF-36) is a new, robust eight-item assessment to measure health. It measures the same eight health domains (physical functioning, role limitations because of physical health problems, bodily pain, social functioning, general mental health, role limitations because of emotional problems, vitality, and general health perceptions) as the SF-36 and works best for monitoring population health and for large-scale outcome studies of the eight dimensions^{11,30-32}. To ensure that scores reflected the magnitude of presenteeism and health, we changed score directionality by subtracting the original PAWS scores and SF-8 from 10 (PAWS), 5 or 6 (SF-8), respectively. Hence, higher values for the new presenteeism score and health indicate greater presenteeism and better health status. Pearson correlation analysis was used to determine the significance of correlations between presenteeism, challenge stress, hindrance stress, and health. All the instruments, administered in Chinese, have shown good validation after back-translation between English and Chinese.

Statistical analysis

We then examined our initial model by using structural equation modeling (SEM). Data preparation and all statistical analyses were done with SPSS 21.0 (IBM Corp.: Armonk, NY, USA) and AMOS 21.0 (IBM Corp.: Armonk, NY, USA) unless otherwise stated. The criteria used to evaluate good global fit were those of Ullman³³ and included a root mean square error of approximation less

than 0.08, and goodness of fit index, normed fit index, comparative fit index, and Tucker-Lewis index values of 0.90 or higher. SEM analysis was used to disentangle the complex relationships between challenge stress, hindrance stress, health, and presenteeism. To determine if standardized regression coefficients (β) differed by subgroup, we conducted multigroup analyses of demographic variables such as age, sex, education level, work department, years of work experience, work title, and job seniority.

Results

Demographic information was missing for a few participants (3.3%-5.9%). Percentages were calculated for the overall population. Of the 1392 participants (Table 1), 74.5% were women and 21.3% were men. Most participants (84.5%) were young healthcare workers: 52.2% were 21-30 years of age and 21.7% were 31-40 years of age. The means for the four presenteeism, challenge stress, and health items (Table 2) were moderate and very similar, while the means for the six hindrance stress items were moderate and varied substantially.

Correlation coefficients (r) showed positive correlations between items within the same construct (Table 3). Presenteeism was significantly positively correlated with challenge stress and hindrance stress (r = 0.20-0.32) and significantly inversely correlated with health (r = -0.35). Health was significantly inversely correlated with challenge stress and hindrance stress (r = -0.43 to -0.46). There was also a significant positive correlation between challenge stress and hindrance stress (r = 0.53).

SEM was then used to test the initial model. In the final model, the criteria for fitness indicated that the final model was appropriate (Fig. 2; χ^2 /degrees of freedom = 4.383, root mean square error of approximation = 0.048, goodness normed fit index = 0.946, comparative fit index = 0.968, Tucker-Lewis index = 0.962; *** p < 0.001; * p < 0.05). Health had a significant direct inverse effect on presenteeism (β = -0.29, SE = 0.032; p < 0.001). Hindrance stress had moderate direct positive effects on presenteeism (β = 0.25, SE = 0.040; p < 0.001) and direct inverse effects on health (β = -0.39, SE = 0.034; p < 0.001). Challenge stress had direct inverse effects on health (β = -0.24, SE = 0.034; p < 0.001) and presenteeism (β = -0.05, SE = 0.037; p < 0.001). Challenge stress and hindrance stress were significantly positively correlated (β = 0.62, SE = 0.021; p < 0.001). The total effects of challenge stress on health and presenteeism were -0.224 (SE = 0.034) and -0.021 (SE = 0.073), respectively, and the total effects of hindrance stress on health and presenteeism were -0.426 (SE = 0.041) and 0.808 (SE = 0.095), respectively. Challenge stress and hindrance stress explained 32% of variability in health. Challenge stress, hindrance stress, and health explained 19%

Table 1. Demographic characteristics of a sample of healthcare workers in the 2015 wave of the National Hospitals Survey, China.

Characteristics		This Study (n=1392)	
Sex	Male	297	(21.3%)
	Female	1037	(74.5%)
	Missing	58	(4.2%)
Age (years)	21-30	727	(52.2%)
	31-40	430	(30.9%)
	41-50	138	(9.9%)
	51-60	48	(3.5%)
	≥60	3	(0.2%)
	Missing	46	(3.3%)
Education	No college diploma	53	(3.8%)
	College diploma	295	(21.1%)
	Bachelor's degree	577	(41.5%)
	Master's degree	299	(21.5%)
	Ph.D. degree	110	(7.9%)
	Missing	58	(4.2%)
Work title	Physician	425	(30.5%)
	Nurse	589	(42.3%)
	Administration staff	119	(8.5%)
	Medical technician	158	(11.4%)
	Pharmacist	25	(1.8%)
	Missing	76	(5.5%)
Seniority	Intern	67	(4.8%)
	Junior	739	(53.1%)
	Intermediate	384	(27.6%)
	Senior	120	(8.6%)
	Missing	82	(5.9%)
Work experience (years)	≤3	341	(24.5%)
	3-5	355	(25.5%)
	6-10	307	(22.1%)
	11-20	193	(13.9%)
	≥20	140	(10.1%)
	Missing	56	(3.9%)
Work department	Internal medicine	229	(16.5%)
	Surgery	226	(16.2%)
	Obstetrics and gynecology	132	(9.5%)
	Pediatrics	260	(18.7%)
	Traditional Chinese medicine or rehabilitation	102	(7.3%)
	Emergency	3	(0.2%)
	Infectious disease or oncology	12	(0.9%)
	Medical technology	181	(13.0%)
	Other clinical departments	84	(6.0%)
	Administration	90	(6.5%)
	Missing	73	(5.2%)

Table 2. Means (SD) for presenteeism (P), challenge stress [CS], hindrance stress (HS), and health (H) items.

Variables	Items	Mean	SD
Presenteeism (0-10)	P1: How many points would you give your current ability to work?	2.37	1.57
	P2: Thinking about the physical demands of your job, how do you rate your current ability to meet those demands?	2.58	1.65
	P3: Thinking about the mental demands of your job, how do you rate your current ability to meet those demands?	2.75	1.79
	P4: Thinking about the interpersonal demands of your job, how do you rate your current ability to meet those demands?	2.66	1.73
Challenge stress (1-5)	CS1: The number of projects and/or assignments I have.	3.48	0.87
	CS2: The amount of time I spend at work.	3.50	0.85
	CS3: The volume of work that must be accomplished in the allotted time.	3.36	0.88
	CS4: Time pressures I experience.	3.45	0.89
	CS5: The amount of responsibility I have.	3.56	0.87
	CS6: The scope of responsibility my position entails.	3.49	0.89
Hindrane stress (1-5)	HS1: The degree to which politics rather than performance affects organizational decisions.	2.85	1.04
	HS2: The inability to clearly understand what is expected of me on the job.	2.38	1.05
	HS3: The amount of red tape I need to go through to get my job done.	3.01	1.00
	HS4: The lack of job security I have.	2.98	1.08
	HS5: The degree to which my career seems “stalled”.	3.04	1.05
Health (1-5) Only H1 and H4 (1-6)	H1: Overall, how would you rate your health during the past 4 weeks?	3.32	0.92
	H2: During the past 4 weeks, how much did physical health problems limit your physical activities (such as walking or climbing stairs) ?	3.80	0.94
	H3: During the past 4 weeks, how much difficulty did you have doing your daily work, both at home and away from home, because of your physical health?	3.81	0.90
	H4: How much bodily pain have you had during the past 4 weeks?	4.16	1.13
	H5: During the past 4 weeks, how much energy did you have?	3.38	0.83
	H6: During the past 4 weeks, how much did your physical health or emotional problems limit your usual social activities with family or friends?	3.55	0.95
	H7: During the past 4 weeks, how much have you been bothered by emotional problems (such as feeling anxious, depressed, or irritable) ?	3.55	0.94
	H8: During the past 4 weeks, how much did personal or emotional problems keep you from doing your usual work, school or other daily activities?	3.55	0.85

Table 3. Intercorrelations between presenteeism (P), challenge stress [CS], hindrance stress (HS), and health (H) items (** $p < 0.01$).

Variables (M, SD)	Items			
	P	CS	HS	H
P (2.59, 1.5)	1			
CS (3.47, 0.75)	.20**	1		
HS (2.85, 0.81)	.32**	.53**	1	
H (2.55, 0.76)	-.35**	-.43**	-.46**	1

of variability in presenteeism.

Multigroup analyses (Table 4) showed differences in the effects of challenge stress on health and presenteeism only in relation to seniority and age: challenge stress significantly affected the health and presenteeism of workers

aged 21 to 30 years and those classified as interns or junior workers. Among workers aged 31-40 years and older than 40 years, challenge stress was not significantly associated with presenteeism but was significantly associated with health, among men and women classified as intermediate and senior workers. Among workers aged 31-40 years, hindrance stress was not associated with health. Interestingly, the effects of challenge stress on presenteeism among men approached statistical significance. The remaining results of multigroup analyses were unremarkable.

Discussion

This study of Class A tertiary hospitals in China attempted to differentiate the effects of challenge stress and hindrance stress on health and presenteeism among Chi-

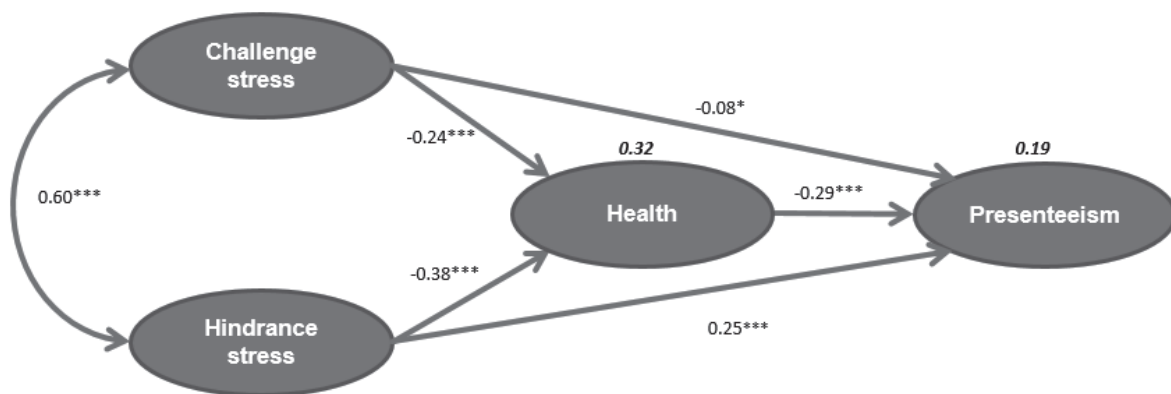


Fig. 2. Final model of how challenge stress and hindrance stress affect health and presenteeism. (Numbers not in bold are the standardized regression coefficients and numbers in bold are explained variability, $\chi^2/$ degrees of freedom = 4.383, root mean square error of approximation = 0.048, goodness normed fit index = 0.946, comparative fit index = 0.968, Tucker-Lewis index = 0.962; *** $p < 0.001$; ** $p < 0.05$).

nese healthcare workers. Although challenge stress had a slight direct effect on presenteeism, its total effects significantly reduced presenteeism. As expected in the initial model, both challenge stress and hindrance stress impaired the health of Chinese healthcare workers. Hindrance stress was associated with a significant adverse impact on presenteeism. These associations were partially mediated by health.

The present study was able to differentiate the effects of challenge stress and hindrance stress on health and presenteeism. Both had adverse effects on health; hindrance stress directly and indirectly increased presenteeism, while challenge stress directly and indirectly decreased the productivity loss of healthcare workers. Although the relationship between stress, health, and presenteeism has been carefully studied, few studies have investigated the effects of different types of stress, especially among nurses and physicians^{21,34-36}. The current study first confirmed that the effects of challenge and hindrance stress on health were almost the same in China. They both impaired the health of Chinese healthcare workers because this employee group is extraordinarily overworked and anxious about violence at the workplace. Under such conditions, challenge stress is unlikely to inspire healthcare workers to pursue a problem-oriented strategy. Both challenge and hindrance stress can lead to negative consequences and, ultimately, to suboptimal health, illness, or lower performance. The present findings also provide empirical evidence for practice: management of Chinese tertiary hospitals should address challenge stress to improve the performance of healthcare workers. The Job Demands-Resources Model (JD-R model)³⁷ suggests that modest challenge stress improves performance and decreases employee productivity loss attributable to job demands. However, our findings indicate that challenge stress is not always favorable, because the effect of challenge stress on presenteeism might be diminished when

challenge stress overly impairs the health of healthcare workers. This finding highlights the important mediating effects of health on associations between challenge stress, hindrance stress, and presenteeism. Challenge stress does not have a positive role in reducing presenteeism, as it might adversely affect the health of healthcare workers, especially when healthcare workers cannot tolerate it. Thus, future empirical studies should investigate how healthcare workers act when challenge stress and hindrance stress are intolerable. For managers of hospitals and health policymakers, the productivity of healthcare workers can be increased by optimally calibrated challenge stress. However, excessive challenge stress might be counterproductive^{1,13}. The JD-R model indicates that, in workplaces with high presenteeism, healthcare workers use more job resources to cope with job stress, regardless of whether it is challenge or hindrance stress. This would decrease attention at work and thus impair the quality of healthcare, a hypothesis that should be examined in future empirical studies.

The concept of presenteeism has been extended to include other conditions and events that limit productivity; however, few empirical data on such conditions and events are available in China. We measured presenteeism broadly, using an instrument with good reliability, and noted a strong association between health and presenteeism. Our results suggest that this broader concept of presenteeism can be applied in future empirical studies and that PAWS is a useful tool for assessing presenteeism. Additionally, future studies should compare PAWS with traditional instruments for assessing presenteeism (e.g., the work limitation questionnaire).

Our model and subgroup analyses showed that workers aged 21-30 years and interns and junior healthcare workers successfully translated challenge stress into decreased productivity loss, while older workers (age 31-69 years) and more-senior workers could not. This finding is con-

Table 4. Standardized regression coefficients (β) with p values ($\alpha=0.05$) for the components of subgroup analyses.

Title	Seniority						Age						Sex			
	Intern & Junior (n=806)		Intermediate (n=384)		Senior (n=120)		21- 30 years (n=727)		31-40 years (n=430)		>40 years (n=189)		Female (n=297)	Male (n=1037)		
	β	p value	β	p value	β	p value	β	p value	β	p value	β	p value	β	p value		
Path																
CS to Presenteeism	-0.15	*	0.02	0.825	-0.03	0.824	-0.13	*	0.00	0.946	-0.10	0.298	-0.08	0.946	-0.13	0.09
HS to Presenteeism	0.32	***	0.06	0.480	0.34	**	0.31	***	0.18	*	0.21	*	0.26	*	0.27	**
CS to Health	-0.30	***	-0.15	*	-0.21	0.079	-0.24	***	-0.23	***	-0.21	*	-0.26	***	-0.18	*
HS to Health	-0.32	***	-0.52	***	-0.35	**	-0.36	***	-0.45	***	-0.41	***	-0.36	***	-0.47	***
Health to Presenteeism	-0.25	***	-0.47	***	-0.21	*	-0.26	***	-0.30	***	-0.36	***	-0.30	***	-0.24	***
CS to HS	0.60	***	0.66	***	0.70	***	0.59	***	0.69	***	0.59	***	0.63	***	0.57	**

CS, challenge stress; HS, hindrance stress; * Significant at $\alpha=0.05$; ** Significant at $\alpha=0.01$; *** significant at $p<0.001$.

sistent with the conditions we observed in Chinese Class A tertiary hospitals during our interviews. In China, doctors are expected to be skilled in both clinical medicine and medical research, and Class A tertiary hospitals are a highly competitive work environment. Young healthcare workers, after 8-11 years at the medical university, must contend with this challenging work environment while living in cities with a very high cost of living, i.e., the typical location of Class A tertiary hospitals. These young healthcare workers perform most of the daily work in Class A tertiary hospitals (>70%-80%). Because of these job demands, we suggest that managers of Class A tertiary Chinese hospitals and government policymakers should address job stress among young healthcare workers. Subsequently, to reduce productivity loss in hospitals, possible interventions should focus on the representative job stress reported in our study (Table 2), such as ambiguity in career development possibilities, excessive workload, burdensome administrative work, and job insecurity. Specific interventions include comprehensive career development planning, training workers to cope with job stress, fairness in promotion, payments of salaries commensurate with employee duties, special subsidies, and provision of housing for junior healthcare workers.

Limitations

This study has several limitations that warrant attention. First, our results may not be valid for Chinese secondary and primary hospitals because the present study sample was recruited from Class A tertiary hospitals, which care for more than two-thirds of inpatients and outpatients in China. A second limitation of our study is that the collection of primary data in the present study limited the selection of target hospitals in this survey. For example, a successful survey of public hospitals in China depends not only on an excellent research proposal. Researchers must also have good relationships with key management and staff and have access to reliable coordinators at hospitals. Health problems are extremely serious in Chinese

public hospitals, especially in Class A tertiary public hospitals, and interviews and even questionnaires are therefore often declined. Because it was impossible to recruit enough reliable coordinators, we limited our analysis to Class A tertiary hospitals that satisfied our inclusion criteria. This might limit the robustness of our conclusions. Third, our use of self-reported presenteeism rather than objective measures may limit the generalizability of our findings. Future studies should analyze subjective and objective data. Fourth, to differentiate the effects of challenge stress and hindrance stress on presenteeism, we did not consider other aspects of job stress, such as eustress and distress, in this study. Fifth, we chose to use a cross-sectional study design because this is the first comprehensive survey of job stress, general health, and presenteeism among Chinese healthcare workers. Thus, we did not consider the quality of health care in this study, which limits the usefulness of our findings. Future studies should examine causal relationships among these variables. Finally, we did not consider the positive or negative aspects of presenteeism and job stress in this study. This also limits the generalizability of our model and conclusions.

Conclusions

We used a comprehensive framework to analyze data from a representative national survey of Chinese healthcare workers. Challenge stress and hindrance stress were directly associated with presenteeism. Both associations were partially mediated by health. Presenteeism was higher among young and junior healthcare workers. The results suggest that presenteeism is reduced by appropriate challenge stress and better health among healthcare workers and that our broad concept of presenteeism and the reliable PAWS instrument should be considered for use in further empirical studies and assessments. Efforts to enhance productivity in these hospitals should focus on stress and health among junior healthcare workers.

Acknowledgments: This study was supported by the Beijing Natural Science Foundation of China (grant no. 9174042), National Science Funding of China (grant no. 71603018), National Science Funding of China (grant no. 71432002), the Humanities and Social Science Foundation of Ministry of Education (grant no. 16YJC630017), Outstanding Social Research Achievement (grant no. 3210013511703), the Joint Development Program of Beijing Municipal Commission of Education, the Beijing Social Science Foundation (17JDGLB008; 17GLC043), and the Beijing Institute of Technology Research Fund Program for Young Scholars (grant no. 3210012261598; 3210012211711).

Conflicts of interest: None declared.

References

- 1) Yang T, Guo Y, Ma M, et al. Job stress and presenteeism among chinese healthcare workers: The mediating effects of affective commitment. *International Journal of Environmental Research and Public Health* 2017; 14(9): 978.
- 2) Goetzel RZ, Long SR, Ozminkowski RJ, et al. Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting U.S. employers. *Journal of Occupational and Environmental Medicine* 2004; 46(4): 398-412.
- 3) Schultz AB, Chen CY, Edington DW. The cost and impact of health conditions on presenteeism to employers. *Pharmacoeconomics* 2009; 27(5): 365-378.
- 4) Lu L, Cooper CL, Lin HY. A cross-cultural examination of presenteeism and supervisory support. *Career Development International* 2013; 18(5): 440-456.
- 5) Hesketh T, Wu D, Mao L, et al. Violence against doctors in China. *BMJ* 2012; 345: e5730.
- 6) Editorial. Violence against doctors: Why China? Why now? What next? *Lancet* 2014; 383(9922): 1013.
- 7) McCue JD. The effects of stress on physicians and their medical practice. *The New England journal of medicine* 1982; 306(8): 458-463.
- 8) Whitehouse D. Workplace presenteeism: how behavioral professionals can make a difference. *Behavioral healthcare tomorrow* 2005; 14(1): 32-36.
- 9) Hemp P. Presenteeism: At work- but out of it. *Harvard business review* 2004; 82(10): 49-58.
- 10) Cooper CL. The future of stress and health research. *Stress and health* 2013; 29: 349.
- 11) Ware J, Kosinski M, Gandek B. SF-36 health survey: Manual & interpretation guide. Lincoln: Quality Metric Incorporated; 2000.
- 12) Zhang XQ, Wang HQ, Chen XY. A survey of medical staffs in China. *Science & Technology Review* 2009; 27(18): 118-119.
- 13) Yang T, Hou F, Guo Y, et al. The investigation of the relationship between challenge stress, hindrance stress and burnout among private hospital's medical staffs. *Chinese Health Service Management* 2017; 32(5): 384-387.
- 14) Wang S. China's health system: from crisis to opportunity. *Yale-China Health Journal* 2004; 3: 5-49.
- 15) Bloom G. Building institutions for an effective health system: lessons from China's experience with rural health reform. *Social science & medicine* 2011; 72(8): 1302-1309.
- 16) Cavanaugh MA, Boswell WR, Roehling MV, et al. An empirical examination of self-reported work stress among U.S. managers. *Journal of Applied Psychology* 2000; 85(1): 65-74.
- 17) Wallace JC, Edwards BD, Arnold T, et al. Work stressors, role-based performance, and the moderating influence of organizational support. *Journal of applied psychology* 2009; 94: 254-262.
- 18) Bandura A. *Social foundations of thought and action: A social cognitive theory* (3rd ed.). Englewood Cliffs, NJ: Prentice-Hall; 1986.
- 19) LePine JA, Podsakoff NP, LePine MA. A meta-analytic test of the challenge stressor-hindrance stressor framework: An explanation for inconsistent relationships among stressors and performance. *Academy of Management Journal* 2005; 48(5): 764-775.
- 20) LePine JA, LePine MA, Jackson CL. Challenge and hindrance stress: relationships with exhaustion, motivation to learn, and learning performance. *The Journal of applied psychology* 2004; 89(5): 883-891.
- 21) Yang T, Zhu M, Xie X. The determinants of presenteeism: A comprehensive investigation of stress-related factors at work, health and individual factors among aging workforce. *Journal of Occupational Health* 2016; 58(1): 25-35.
- 22) Yang T, Shen YM, Zhu M, et al. Effects of co-worker and supervisor support on job stress and presenteeism in an aging workforce: A structural equation modelling approach. *International journal of environmental research and public health* 2016; 13(1): 72.
- 23) Johns G. Presenteeism in the workplace: A review and research agenda. *Journal of Organizational Behavior* 2010; 31(4): 519-542.
- 24) Yang T, Deng J, Liu Y, et al. Chinese medical staffs in private hospitals are more productive than those in public hospitals, really? in *International Conference on Sustainable Employability* 2016. Brussels: 2016.
- 25) Ministry of Health. *A hierarchical approach to hospital management*. PRC: Beijing: Ministry of Health; 1989.
- 26) NHFP Commission. *China health and family planning statistical digest*. Beijing: Peking Union Medical College Press; 2015.
- 27) Vänni K, Virtanen P, Luukkaala T, et al. Relationship between perceived work ability and productivity loss. *International Journal of Occupational Safety and Ergonomics* 2012; 18(3): 299-309.
- 28) Ilmarinen J, Rantanen J. Promotion of work ability during ageing. *American Journal of Industrial Medicine* 1999; 36(S1): 21-23.
- 29) Smith J, Fisher G, Ryan L, et al. *Psychosocial and Lifestyle Questionnaire 2006-2010 Documentation Report Core Section*

- LB. Ann Arbor, MI, USA: The HRS Psychosocial Working Group; 2013.
- 30) Ullman J. Encyclopedia of health services research 1st Edition, ed. Mullner. Chicago: SAGE Publications; 2009. p. 1080-1086.
- 31) Ware J. Improvements in short-form measures of health status: introduction to a series. *Journal of Clinical Epidemiology* 2008; 61(1): 1-5.
- 32) Turner-Bowker DM, Bayliss MS, Ware Jr JE, et al. Usefulness of the SF-8™ Health Survey for comparing the impact of migraine and other conditions. *Quality of Life Research* 2003; 12(8): 1003-1012.
- 33) Ullman J. B.G.T.L.S. Fidell, editor. *Structural equation modeling using multivariate statistics* 3rd, ed. New York: Harper Collins College Publishers; 1996. p. 709-811.
- 34) Jourdain G, Vézina M. How psychological stress in the workplace influences presenteeism propensity: A test of the Demand-Control-Support model. *European Journal of Work and Organizational Psychology* 2013; 23(4): 483-496.
- 35) Elstad JI, Vabø M. Job stress, sickness absence and sickness presenteeism in Nordic elderly care. *Scandinavian Journal of Social Medicine* 2008; 36(5): 467-474.
- 36) Pilette PC. Presenteeism in nursing: A clear and present danger to productivity. *Journal of nursing administration* 2005; 35(6): 300-303.
- 37) Hobfoll SE. The Influence of culture, community, and the nested-self in the stress process: advancing conservation of resources theory. *Applied Psychology* 2001; 50(3): 337-370.

Journal of Occupational Health is an Open Access article distributed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. To view the details of this license, please visit (<https://creativecommons.org/licenses/by-nc-sa/4.0/>).