


BMJ Open Association of off-the-job training with work performance and work–family conflict among physicians: a cross-sectional study in China

Xiaoyu Wang,¹ Hua Qin,² Yimei Zhu,³ Zixin Wang,⁴ Beizhu Ye,⁵ Xi Zhu,⁶ Yuan Liang ¹

To cite: Wang X, Qin H, Zhu Y, *et al.* Association of off-the-job training with work performance and work–family conflict among physicians: a cross-sectional study in China. *BMJ Open* 2022;**12**:e053280. doi:10.1136/bmjopen-2021-053280

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2021-053280>).

Received 14 May 2021

Accepted 22 December 2021

ABSTRACT

Objectives To determine whether experiences of off-the-job training in domestic (DT) and overseas study (OS) settings are associated with work performance and work–family conflict in physicians.

Design, setting and participants We conducted a national cross-sectional survey in 77 public hospitals across seven provinces in China between July 2014 and April 2015. Participants were 3182 physicians.

Exposure Participants were categorised into four groups: none, DT only, OS only and DT and OS.

Primary outcome measures Work performance was assessed by work engagement, career attrition and patient-centred care. Work–family conflict was assessed by affecting care for family, feeling guilty towards family and receiving complaints from family.

Results A total of 25.89% participants had experienced DT only, 8.71% OS only and 8.47% DT and OS. After adjustment for potential confounders, participants who had experiences of DT and OS compared with those with no training were more likely to report positive work performance (pride in work: OR=2.11, 95% CI: 1.43 to 3.10; enjoyment of work: OR=1.67, 95% CI: 1.11 to 2.51; turnover intention: OR=0.54, 95% CI: 0.38 to 0.77; early retirement: OR=0.63, 95% CI: 0.45 to 0.89; and exhaustion: OR=0.66, 95% CI: 0.45 to 0.98) and less work–family conflicts (feeling guilty towards family: OR=0.51, 95% CI: 0.35 to 0.74; and complaints from family: OR=0.66, 95% CI: 0.47 to 0.91). We found no obvious association between DT/OS experience with patient-centred care.

Conclusions Physicians with DT and OS experiences are more likely to have better work performance and less work–family conflict than those without such experience. Physicians face increasing pressure to pursue continuing education and experience associated distress. Therefore, hospitals and government policy-makers should promote DT and OS.

INTRODUCTION

Because of the rapid development of medical science over the last few decades, continuing workplace learning, especially job training, is increasingly important for physicians.^{1–4} In China, almost all hospitals have a science and

Strengths and limitations of this study

- This study used a nationally representative sample to investigate the association of domestic (DT) and overseas study (OS) with work performance and work–family conflict among physicians in China.
- The study measured several aspects of work and life not explored in previous studies, namely, work engagement, career attrition, patient-centred care and work–family conflict.
- No information about DT and OS duration was obtained because survey questions did not address this aspect of training.
- The cross-sectional nature of the study design makes it difficult to infer causality.

education department to support medical staff in continuing medical education, including on-the-job training and off-the-job training. Many studies have focused on formal education for physicians (including residency training); therefore, little is known about the effect of job training on physicians' work performance and family life.^{5–7} The difficulties of measuring job training and obtaining relevant data may explain the lack of studies in this area.^{8–10} A study of physicians working in general hospitals in China showed that 43% had received training in the last 3 years; of those who received training, approximately 64% received on-the-job training and 37% received off-the-job training. However, formal types of training (especially on-the-job training) may be considered boring by trainees.^{11 12} Although off-the-job training is generally considered beneficial for personal development, excessive learning tasks at work seem to be a source of stress and job burnout for clinicians.¹³

Additionally, the development of the field of global health has increased the need for international medical education, especially



© Author(s) (or their employer(s)) 2022. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

For numbered affiliations see end of article.

Correspondence to

Dr Yuan Liang;
liangyuan217@hust.edu.cn

in developing countries.^{14–17} In China, the government sponsored overseas study (mainly in form of visiting scholarships) in 111 countries or regions from 1996 to 2016, most such study took place in the USA (37.35%), followed by the United Kingdom (11.33%), Canada (6.88%) and Germany (6.79%).¹⁸ Off-the-job training includes domestic off-the-job training (DT) and off-the-job training abroad (overseas study, OS). Because off-the-job training has not been systematically recognised or routinely assessed in career development, little is known about the characteristics of DT and OS for physicians, or the effect of DT and OS on physicians' work and personal life. Specifically, evaluation of the effect of off-the-job training has focused on the specialised skills and knowledge acquired, such as ultrasound-guided fine needle aspiration biopsy of the thyroid, and on overall satisfaction with the training content, there is a lack of research on work performance.^{19–20} Although training enhance trainees' knowledge and skills, the association of off-the-job training with work performance and work–family conflict among physicians has never been rigorously examined.^{21–22}

Given the importance and breadth of medical training and its association with distress in physicians worldwide,^{15–17} a better understanding of DT and OS and their effect on physicians' work and personal life is now needed. The present study used data from a national survey of physicians in China to explore the association of DT and OS with work performance and work–family conflict among physicians. We hypothesised that physicians who had experiences of DT and OS would be more likely to show better work performance (as measured by self-reported work engagement, career attrition and patient-centred care) than those without such experience. We also hypothesised that physicians who had experiences of DT and OS would be likely to experience more work–family conflict than those without such experience.

METHODS

Study design and participants

The details of this survey have been described in a previous report.²³ Briefly, between July 2014 and April 2015, we obtained data from a national cross-sectional survey of physicians from seven provinces across China. In the selected regions, there were 85 eligible public hospitals, 77 of which (90.59%) agreed to participate. For each hospital, convenience sampling was used to select four surgical departments (eg, departments of thoracic surgery, orthopaedics, hepatological surgery, joint surgery, urology and thyroid and neck surgery) and four internal medicine departments (eg, respiratory, gastroenterology, rheumatology, nephrology, endocrinology, cardiovascular, neurology and haematology). A total of 5754 physicians from 528 departments were asked to complete a survey. Participation was voluntary, and all data were kept confidential. A total of 4281 physicians responded to the survey. After excluding 634 invalid

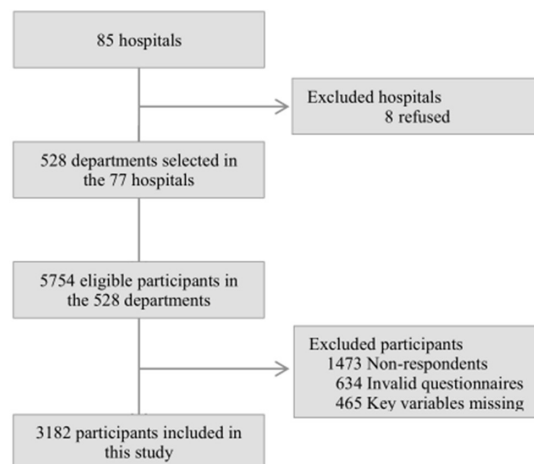


Figure 1 Flowchart for recruitment of the participants.

questionnaires and 465 questionnaires that had incomplete key data related to this study, the sample comprised 3182 (55.30%) physicians (figure 1). Survey participation was voluntary and informed consent was obtained from all participants before any data were collected. No reimbursements or incentives were given to participants.

Measurement

Participants were asked about their experience of off-the-job training using the question, ‘In the last 5 years, how many times did the hospital send you for domestic off-the-job training of more than 3 months?’ (response categories: 0, 1, 2, 3 and ≥ 4). Responses were dichotomised (no and yes) to represent DT experience in the last 5 years. Participants were also asked whether they had studied abroad (generally, this involved visiting scholarships). Responses were coded into two categories (no and yes). We categorised participants into four groups: no domestic off-the-job training or overseas study (none), DT only, OS only and DT and OS.

The primary outcome measures were work performance and work–family conflict, reflecting the effect of training on work and personal life, respectively. We assessed work performance according to three aspects of attitudinal and behavioural performance in the last year (Cronbach’s $\alpha=0.685$): work engagement, career attrition and patient-centred care.^{10–24–26} We examined self-reported work engagement using two items: ‘Are you proud of your work?’ (pride in work) and ‘Do you enjoy your work?’ (enjoyment of work). We examined career attrition using three items: ‘Do you want to change your job?’ (turnover intention), ‘Do you want to retire early?’ (early retirement) and ‘Do you feel physically and mentally exhausted?’ (exhaustion). We assessed patient-centred care using three items: ‘Discussing issues with your patients’ (involvement), ‘Listening to your patients’ (accessibility) and ‘Washing hands after care’ (hand-washing after care). Work–family conflict was assessed using three questions (Cronbach’s $\alpha=0.637$): ‘I am less able to care for my family because of work’ (affecting care for family), ‘I feel guilty about my family because

of work (feeling guilty toward family)' and 'I receive complaints from my family because of work (complaints from family)'.^{27 28} Each question was answered using a five-point Likert scale with response options ranging from 'very low' to 'very high'. All responses were recoded as binary variables: low ('very low/low/average') versus high ('high/very high'). The binary variables were then used as outcome variables in the logistic regression models.

We identified the following covariates as potential confounders: sociodemographic characteristics (sex, age, marital status, educational level, economic status and title), hospital and departmental characteristics (hospital level, hospital type, academic status, physician specialty and the ratio of physicians to beds), internal hospital environmental characteristics (work pressure, pay justice and task justice) and social environmental characteristics (patient trust, unreasonable requests by patients and family support).

Statistical analysis

To adjust for non-responses, data were weighted by participants' age and sex, according to demographic information issued by the National General Hospital in 2015. For crude comparisons, we used χ^2 tests for categorical variables (online supplemental eTables 1 and 2). Binary logistic regression analysis was conducted; **figure 2** shows the association of participants DT and OS with work performance and work–family conflicts after adjusting for potential confounders. All logistic regression models were adjusted for physicians' sociodemographic characteristics, hospital and departmental characteristics, internal hospital environmental characteristics and social environmental characteristics. ORs and 95% CIs were calculated for the unadjusted and adjusted regression models.

Several sensitivity analyses were conducted to test the robustness of the results: (1) adjustment for the effects of work–family conflict in all work performance models and adjustment for the effects of work engagement in all work–family conflicts models, (2) model excluding participants were physicians of traditional Chinese medicine and (3) model excluding participants from secondary hospital. All new models were adjusted for the previously described potentially confounding factors. All analyses were performed using IBM SPSS Statistics V.22. Statistical tests were two-tailed, and differences were considered significant at $p < 0.05$.

Patient and public involvement

The study was conducted with physicians. Therefore, there was no patients or public involvement of any kind.

RESULTS

Table 1 shows the characteristics of participants by DT and OS experience. Of 3182 participants, more than half had no training experience (56.93%). Of those who had training experience, 25.89% had DT only, 8.71% had OS only and 8.47% had DT and OS. The sociodemographic

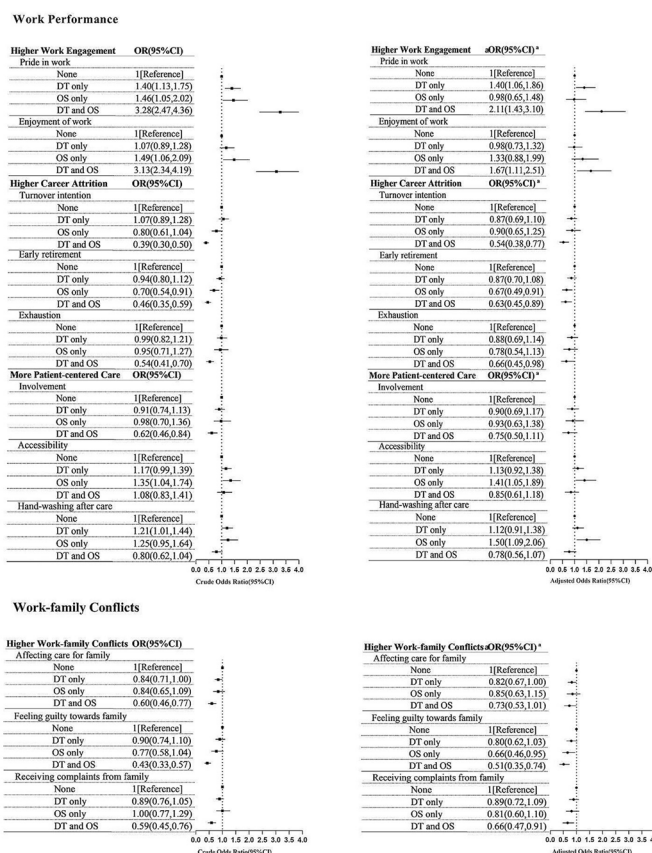


Figure 2 The association of DT and OS with work performance and work–family conflicts. ^a Adjusted models include covariates for sociodemographic characteristics (sex, age, marital status, education level, economic status, title); hospital and departmental characteristics (hospital level, hospital type, academic status, physician specialty, the ratio of physicians to beds); hospital internal environmental factors (work pressure, pay justice, task justice) and social environmental factors (patient trust, unreasonable request by patients, family support). DT, domestic off-the-job training; OS, overseas study.

characteristics of participants in the three training groups were significantly different from the group with no training experience: women, younger participants (age= ≤34 years) and participants with lower economic status and lower job status, were generally less likely to have received training. Participants with DT and OS experience were generally more highly educated, had higher professional ranks and had better economic status than those with no training experience (all $p < 0.001$). Compared with the 'none' group, more participants in DT and OS group worked in tertiary hospitals and teaching hospitals (which are more established and recognised by the government) and reported greater pay justice, task justice and patient trust, and less family support (all $p < 0.001$).

Positive work and life performance were more frequently reported by the DT and OS group (**table 2**). The overall work performance of participants was not high, but work–family conflict was high. For example, only 15.28% participants reported high work enjoyment, whereas 74.53% reported high job exhaustion and 77.71% reported high

**Table 1** General characteristics by experience of DT and OS

	Total %	Experience of DT and OS						
		None	DT only		OS only		DT and OS	
		% (ref.)	%	P value	%	P value	%	P value
Total		56.93	25.89		8.71		8.47	
Sociodemographic characteristics								
Sex								
Men	56.60	54.03	59.22	0.013	61.73	0.016	60.59	0.043
Women	43.40	45.97	40.78		38.27		39.41	
Age (years)								
≤34	29.00	34.35	23.42	<0.001	23.74	<0.001	15.61	<0.001
35–44	34.70	29.27	49.39		23.74		37.17	
≥45	36.30	36.39	27.18		52.52		47.21	
Marital status								
Single or other	16.41	19.94	11.01	<0.001	16.54	0.196	9.16	<0.001
Married	83.59	80.06	88.99		83.46		90.84	
Education level								
Undergraduate and below	52.98	54.38	57.36	0.083	47.10	0.005	36.43	<0.001
Masters	35.66	36.02	35.60		37.32		31.40	
PhD	11.36	9.60	7.04		15.58		32.17	
Economic status								
Poor	32.98	36.36	30.05	0.005	29.60	<0.001	23.05	<0.001
Fair	58.61	57.54	62.41		56.32		56.51	
Good	8.41	6.10	7.54		14.08		20.45	
Title								
Primary or other	24.16	31.10	15.64	<0.001	19.37	<0.001	8.62	<0.001
Middle	31.68	25.77	48.56		20.95		31.03	
High	44.16	43.13	35.80		59.68		60.34	
Hospital and departmental characteristics								
Hospital level								
SH	14.87	16.73	16.38	0.824	8.30	<0.001	4.46	<0.001
TH	85.13	83.27	83.62		91.70		95.54	
Hospital type								
WM	72.05	74.61	62.14	<0.001	81.65	0.011	75.09	0.866
TCM	27.95	25.39	37.86		18.35		24.91	
Academic status								
Non-teaching	80.22	80.34	85.44	0.002	72.30	0.002	71.75	0.001
Teaching	19.78	19.66	14.56		27.70		28.25	
Physician specialty								
Internal medicine	52.74	52.81	53.03	0.917	52.71	0.973	51.30	0.643
Surgery	47.26	47.19	46.97		47.29		48.70	
The ratio of physicians to beds								
<0.20	27.87	26.99	30.93	0.092	30.15	0.192	22.47	0.131
0.20–0.30	40.13	39.64	38.76		41.91		45.69	
≥0.30	32.00	33.37	30.31		27.94		31.84	
Hospital internal environmental characteristics								
Work pressure								

Continued

Table 1 Continued

	Total %	Experience of DT and OS						
		None % (ref.)	DT only %	P value	OS only %	P value	DT and OS %	P value
Very low, somewhat low or neutral	20.31	19.49	20.80	0.435	18.41	0.672	26.02	0.013
Somewhat high or very high	79.69	80.51	79.20		81.59		73.98	
Pay justice								
Very low, somewhat low or neutral	92.06	93.81	92.60	0.243	91.27	0.112	79.26	<0.001
Somewhat high or very high	7.94	6.19	7.40		8.73		20.74	
Task justice								
Very low, somewhat low or neutral	86.50	88.72	85.80	0.034	86.96	0.393	73.33	<0.001
Somewhat high or very high	13.50	11.28	14.20		13.04		26.67	
Social environmental characteristics								
Patient trust								
Very low, somewhat low or neutral	88.64	91.51	88.11	0.006	82.97	<0.001	76.87	<0.001
Somewhat high or very high	11.36	8.49	11.89		17.03		23.13	
Unreasonable requests by patients								
Very low, somewhat low or neutral	65.95	65.80	66.87	0.591	65.45	0.910	64.68	0.719
Somewhat high or very high	34.05	34.20	33.13		34.55		35.32	
Family support								
Very low, somewhat low or neutral	21.04	20.73	18.71	0.231	21.30	0.828	29.74	<0.001
Somewhat high or very high	78.96	79.27	81.29		78.70		70.26	

DT, domestic off-the-job training; OS, overseas study; SH, secondary hospital; TCM, traditional Chinese medicine; TH, tertiary hospital; WM, western medicine.

levels of guilty about family. Specifically, compared with none group, the DT and OS group reported greater work engagement (pride in work: 13.97% vs 34.81% and enjoyment of work: 12.75% vs 31.48%), less career attrition (turnover intention: 68.38% vs 45.56%; early retirement: 62.86% vs 43.70% and exhaustion: 75.72% vs 62.59%) and less work–family conflict (affecting care for family: 61.92% vs 49.44%; guilty towards family: 79.97% vs 63.20%; and complaints from family: 55.05% vs 41.64%) (all $p < 0.001$).

DT and OS experience was strongly associated with work performance and work–family conflict after adjusting for potential confounders (figure 2). In the unadjusted analyses, participants who had DT and OS experience were three times as likely as those with no training experience to report greater work engagement (pride in work: OR=3.28, 95% CI: 2.47 to 4.36 and enjoyment of work: OR=3.13, 95% CI: 2.34 to 4.19) and lower career attrition (turnover intention: OR=0.39, 95% CI: 0.30 to 0.50; early retirement: OR=0.46, 95% CI: 0.35 to 0.59 and exhaustion: OR=0.54, 95% CI: 0.41 to 0.70). DT and

OS experience was negative associated with work–family conflict (care for family: OR=0.60, 95% CI: 0.46 to 0.77; guilty towards family: OR=0.43, 95% CI: 0.33 to 0.57 and complaints from family: OR=0.59, 95% CI: 0.45 to 0.76). There was no significant association of DT and OS experience with patient-centred care.

After adjusting for all covariates, the ORs of the DT and OS group were slightly reduced but remained significant. Compared with those who had received no training, participants with DT and OS experiences were more likely to report better work performance (pride in work: OR=2.11, 95% CI: 1.43 to 3.10; enjoyment of work: OR=1.67, 95% CI: 1.11 to 2.51; turnover intention: OR=0.54, 95% CI: 0.38 to 0.77; early retirement: OR=0.63, 95% CI: 0.45 to 0.89 and exhaustion: OR=0.66, 95% CI: 0.45 to 0.98) and less work–family conflicts (guilty towards family: OR=0.51, 95% CI: 0.35 to 0.74 and complaints from family: OR=0.66, 95% CI: 0.47 to 0.91). We found no obvious association of DT and OS experience with patient-centred care.

The results of all sensitivity analyses showed no significant changes in the size significance of the effects.

**Table 2** Work performance and work–family conflicts by experience of DT and OS

	Total %	Experience of DT and OS						
		None % (ref.)	DT only % P value	OS only % P value	DT and OS % P value			
Total		56.93	25.89		8.71		8.47	
Work performance								
Work engagement								
Pride in work								
Very low or somewhat low	41.18	46.22	38.71	<0.001	36.69	0.006	19.63	<0.001
Neutral	41.45	39.81	42.72		44.24		45.56	
Somewhat high or very high	17.37	13.97	18.57		19.06		34.81	
Enjoyment of work								
Very low or somewhat low	50.17	54.86	49.70	0.045	43.32	<0.001	27.04	<0.001
Neutral	34.54	32.40	35.60		38.63		41.48	
Somewhat high or very high	15.28	12.75	14.70		18.05		31.48	
Career attrition								
Turnover intention								
Very low or somewhat low	11.89	10.26	11.18	0.330	11.19	0.258	25.93	<0.001
Neutral	21.68	21.36	18.96		25.27		28.52	
Somewhat high or very high	66.43	68.38	69.87		63.54		45.56	
Early retirement								
Very low or somewhat low	14.96	13.08	15.17	0.350	17.63	0.018	24.44	<0.001
Neutral	24.88	24.06	23.30		28.06		31.85	
Somewhat high or very high	60.16	62.86	61.53		54.32		43.70	
Exhaustion								
Very low or somewhat low	5.06	4.30	5.22	0.528	5.05	0.842	9.63	<0.001
Neutral	20.41	19.98	19.08		20.22		27.78	
Somewhat high or very high	74.53	75.72	75.70		74.73		62.59	
Patient-centred care								
Involvement								
Very rarely or rarely	3.35	2.87	4.25	0.184	1.80	0.486	5.58	0.004
Occasionally	14.79	14.24	14.20		15.83		19.33	
Frequently or very frequently	81.86	82.89	81.55		82.37		75.09	
Accessibility								
Very rarely or rarely	26.87	29.58	23.33	0.004	24.55	0.060	21.85	0.025
Occasionally	37.90	36.87	39.49		35.02		42.96	
Frequently or very frequently	35.23	33.55	37.18		40.43		35.19	
Hand washing after care								
Very rarely or rarely	10.56	10.65	11.18	0.026	9.75	0.283	8.89	0.043
Occasionally	23.49	24.45	19.68		20.58		31.48	
Frequently or very frequently	65.96	64.90	69.14		69.68		59.63	
Work–family conflicts								
Affecting care for family								
Very low or somewhat low	25.24	23.68	26.33	0.144	26.71	0.405	30.86	<0.001
Neutral	15.29	14.40	15.78		15.52		19.70	
Somewhat high or very high	59.47	61.92	57.89		57.76		49.44	
Feeling guilty towards family								

Continued

Table 2 Continued

	Total %	Experience of DT and OS						
		None % (ref.)	DT only % P value	OS only % P value	DT and OS % P value			
Very low or somewhat low	6.00	4.91	5.83 0.505	7.22 0.147	12.64 <0.001			
Neutral	16.30	15.12	15.92	17.33	24.16			
Somewhat high or very high	77.71	79.97	78.25	75.45	63.20			
Receiving complaints from family								
Very low or somewhat low	17.61	16.68	17.60 0.389	19.13 0.522	22.30 <0.001			
Neutral	29.23	28.27	30.22	25.99	36.06			
Somewhat high or very high	53.15	55.05	52.18	54.87	41.64			

DT, domestic off-the-job training; OS, overseas study.

Specifically, further adjustment for the effects of work–family conflict in all work performance models and adjustment for the effects of work engagement in all work–family conflict models produced results very similar to the original results (online supplemental eFigures 1 and 2, respectively). When we separately excluded participants were physicians of traditional Chinese medicine and those who worked in secondary hospitals, the results were the same, that is, participants with experience of DT and OS had better work performance and less experienced work–family conflict (online supplemental eFigures 3 and 4, respectively).

DISCUSSION

To the best of our knowledge, this is the first study to use a nationally representative sample to explore the association of DT and OS with work performance and work–family conflict in physicians in China. Overall, approximately one-third physicians had DT experience in general hospitals in China and one-sixth had OS experience. More interestingly, compared with physicians with no off-the-job training experience, those with DT or/and OS showed better work performance and less work–family conflict.

In response to the rapid development of medical science and the need for hospitals to maintain work efficiency to save human resources, the main type of continuing medical education is currently in-service training, which includes online learning.^{29 30} In-service training and online training may save time and money because they are less likely to negatively affect physicians' workload than onsite DT or OS. Therefore, it is important to determine the extent to which off-the-job training can improve physicians' work performance.

We found that compared with physicians with no off-the-job training, those with off-the-job training experience had better work performance and less work–family conflict. Most previous studies have used a satisfaction index to assess the effect of training; in contrast, the present study assessed work engagement, career attrition

and patient-centred care to provide a more detailed measure of physician work performance.³¹ DT and OS experience was found to improve work engagement and reduce career attrition, which is consistent with previous study findings. To some extent, off-the-job training is similar to the use of (domestic and international) study tour, which is a traditional approach to education used in various countries and approach groups worldwide.^{32 33} It is worth pointing out that we found no significant association of DT and OS with patient-centred care. This suggests that DT and OS have no clear effect on enhancing physicians' ability to care for patients and thus improving physician–patient relationships.^{26 34} This may be a problem worthy of attention in the development of future training programmes.

Regarding work–family conflict, previous studies have shown that medical trainees face many personal challenges when participating in off-the-job training, such as how to balance clinical training and family responsibilities. However, our findings indicate that DT and OS can reduce work–family conflict. This may be because DT and OS provide travel opportunities that enable the family for holidays, or provide educational opportunities for physicians' spouse and children.

The finding that the combination of DT and OS leads to better work performance and less work–family conflict suggests the presence of a synergistic effect.³⁵ There is evidence of an increasing interest in and sense of importance of global health training during residency; trained physicians with global health knowledge will be essential in both developing and developed countries, as civilian mobilisation and globalisation of diseases.^{3 15}

Training may be seen as expensive by hospitals and medical authorities who may spend resources on projects other than staff trainings. In fact, very few physicians display good performance and effectiveness in high-intensity work environments. One survey found that physicians at all levels were dissatisfied with their day-to-day work; some general practitioners who had worked full time with no training breaks had experienced

burnout, or had left the profession earlier than planned because they felt they could not guarantee safe standards of care for their patients.³¹ This suggests that an over-emphasis on efficiency is not helpful. On the contrary, physicians in a continuous high-intensity working environment experience high levels of distress. DT or OS may not only provide new skills and knowledge and improve work performance but also relieve the stress of medical professionals. This is beneficial to individual physicians, their families and their workplaces.

This study had several limitations. First, the response rate was relatively low. Low response rates are common in clinician surveys worldwide,^{36 37} particularly in China. To address this limitation, we used a sample of physicians that corresponded to the national demographic statistics in the same period as the survey to weight the sample and improve its representativeness. Second, we did not compare off-the-job training with on-the-job training (including online training). Because continuing medical education is compulsory for all clinicians in China, almost all participants had received on-the-job training. Because of differences in training content, it is difficult to compare the effects of on-the-job and off-the-job training. Third, we had no information about the duration of DT and OS because the survey questions did not address this aspect of training. Future studies could expand on our preliminary findings by conducting a more in-depth analysis of the dose–response relationship. Finally, because of the cross-sectional study design, we were unable to determine the cause-and-effect relationships between DT/OS experience and work performance and work–family conflict.

CONCLUSION

Our findings provide evidence that physicians with experience of DT and OS are more likely to show better work performance and less work–family conflict than those without such experience. As physicians face increasing pressure to engage in continuing education, and experience associated distress, our findings suggest that provision of DT and OS (similar to study tours) may be an effective approach that has many benefits. This approach should be promoted by hospitals and government policy-makers.

Author affiliations

¹Department of Social Medicine and Health Management, School of Public Health, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, Hubei, China

²Department of Gastroenterology, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, Hubei, China

³Department of Media and Communication, University of Leicester, Leicester, UK

⁴School of Public Health and Primary Care, Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong, Hong Kong

⁵Department of Social Medicine and Health Management, School of Public Health, Zhengzhou University, Zhengzhou, Henan, China

⁶Department of Health Policy and Management, UCLA Fielding School of Public Health, Los Angeles, California, USA

Acknowledgements We would like to thank all the health staff at 77 general hospitals who participated in the study. We also thank Diane Williams, PhD, from Liwen Bianji (Edanz) (www.liwenbianji.cn/), for editing the English text of a draft of this manuscript.

Contributors XW: analysis and interpretation of data, drafting of the manuscript and critical revision of the manuscript for important intellectual content. HQ, YZ and ZW: acquisition of data, analysis and interpretation of data and critical revision of the manuscript for important intellectual content. BY: statistical analysis, analysis and interpretation of data, and critical revision of the manuscript for important intellectual content. XZ: analysis and interpretation of data, and critical revision of the manuscript for important intellectual content. YL: study concept and design, acquisition of data, analysis and interpretation of data, administrative, technical and material support, drafting of the manuscript and critical revision of the manuscript for important intellectual content. XW and YL had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. All authors approved the final version to be published.

Funding This study was supported by grants from National Natural Science Foundation of China (grant number: 71273098).

Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by the Ethics Committee of Tongji Medical College, Huazhong University of Science and Technology (Wuhan, China) (approval number: IORG0003571). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. All free text entered below will be published.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

Author note L

ORCID iD

Yuan Liang <http://orcid.org/0000-0003-2330-1837>

REFERENCES

- 1 Tian L, Pu J, Liu Y, *et al*. Relationship between burnout and career choice regret among Chinese neurology postgraduates. *BMC Med Educ* 2019;19:162.
- 2 Simelane ML, Georgeu-Pepper D, Ras C-J, *et al*. The practical approach to care kit (pack) training programme: scaling up and sustaining support for health workers to improve primary care. *BMJ Glob Health* 2018;3:e001124.
- 3 Osseo-Asare A, Balasuriya L, Huot SJ, *et al*. Minority resident physicians' views on the role of race/ethnicity in their training experiences in the workplace. *JAMA Netw Open* 2018;1:e182723.
- 4 Stone C, Dogbey GY, Klenzak S, *et al*. Contemporary global perspectives of medical students on research during undergraduate medical education: a systematic literature review. *Med Educ Online* 2018;23:1537430.
- 5 Hall AK, Mills SL, Lund PK. Clinician-investigator training and the need to pilot new approaches to recruiting and retaining this workforce. *Acad Med* 2017;92:1382–9.
- 6 Panattoni L, Stone A, Chung S, *et al*. Patients report better satisfaction with part-time primary care physicians, despite less continuity of care and access. *J Gen Intern Med* 2015;30:327–33.

- 7 Mechaber HF, Levine RB, Manwell LB, *et al.* Part-time physicians, prevalent, connected, and satisfied. *J Gen Intern Med* 2008;23:300–3.
- 8 Lachish S, Svirko E, Goldacre MJ, *et al.* Factors associated with less-than-full-time working in medical practice: results of surveys of five cohorts of UK doctors, 10 years after graduation. *Hum Resour Health* 2016;14:62.
- 9 Harries RL, Gokani VJ, Smitham P, *et al.* Less than full-time training in surgery: a cross-sectional study evaluating the accessibility and experiences of flexible training in the surgical trainee workforce. *BMJ Open* 2016;6:e010136.
- 10 Chen F-L, Chen K-C, Chiou S-Y, *et al.* The longitudinal study for the work-related factors to job performance among nurses in emergency department. *Medicine* 2019;98:e14950.
- 11 Shao J, Yan L, Song X. Investigation and analysis on the purpose and training form of continuing medical education for health professionals in 7 provinces (regions). *Chinese Higher Medical Education* 2020;1:29–30.
- 12 Wang A, Wu X, Hao G. Investigation and analysis on medical staff in-service training in general hospitals. *Chinese General Practice* 2008;6:1070–1.
- 13 Kushnir T, Cohen AH, Kitai E. Continuing medical education and primary physicians' job stress, burnout and dissatisfaction. *Med Educ* 2000;34:430–6.
- 14 Sawatsky AP, Rosenman DJ, Merry SP, *et al.* Eight years of the Mayo international health program: what an international elective adds to resident education. *Mayo Clin Proc* 2010;85:734–41.
- 15 Lauden SM, Gladding S, Slusher T, *et al.* Learning abroad: residents' narratives of clinical experiences from a global health elective. *J Grad Med Educ* 2019;11:91–9.
- 16 Liu Y, Zhang Y, Liu Z, *et al.* Gaps in studies of global health education: an empirical literature review. *Glob Health Action* 2015;8:25709.
- 17 Brouwer E, Frambach J, Somodi K, *et al.* 'Being international is always a good thing': a multicentre interview study on ethics in international medical education. *Med Educ* 2020;54:427–35.
- 18 Miao D, Guan X, Yang X. Review and prospect of studying abroad in the past 40 years of reform and opening up. *J. of Jiangsu Normal Uni. Philosophy and Social Sciences Edition* 2018;44:11–22.
- 19 Nitta J, Akai T, Miyahara K, *et al.* Original homebuilt off-the-Job training system for vascular surgeons: system analysis and assessment. *Ann Vasc Dis* 2018;11:525–30.
- 20 Han E-R, Yeo S, Kim M-J, *et al.* Medical education trends for future physicians in the era of advanced technology and artificial intelligence: an integrative review. *BMC Med Educ* 2019;19:460.
- 21 Li M, Pérez-Díaz PA, Mao Y, *et al.* A multilevel model of teachers' job performance: understanding the effects of trait emotional intelligence, job satisfaction, and organizational trust. *Front Psychol* 2018;9:2420.
- 22 van Dijk DM, van Rhenen W, Murre JMJ, *et al.* Cognitive functioning, sleep quality, and work performance in non-clinical burnout: the role of working memory. *PLoS One* 2020;15:e0231906.
- 23 Zhang P, Wang F, Cheng Y, *et al.* Impact of organizational and individual factors on patient-provider relationships: a national survey of doctors, nurses and patients in China. *PLoS One* 2017;12:e0181396.
- 24 Schaufeli WB, Salanova M, González-romá V, *et al.* The measurement of engagement and burnout: a two sample confirmatory factor analytic approach. *J Happiness Stud* 2002;3:71–92.
- 25 Deng J, Guo Y, Ma T, *et al.* How job stress influences job performance among Chinese healthcare workers: a cross-sectional study. *Environ Health Prev Med* 2019;24:2.
- 26 Jha AK, Orav EJ, Zheng J, *et al.* Patients' perception of hospital care in the United States. *N Engl J Med* 2008;359:1921–31.
- 27 Akkas MA, Hossain MI, Rhaman S. Causes and consequences of work-family conflict (WFC) among the female employees in Bangladesh: an empirical study. *JBE* 2015;6:2063–71.
- 28 Obrenovic B, Jianguo D, Khudaykulov A, *et al.* Work-family conflict impact on psychological safety and psychological well-being: a job performance model. *Front Psychol* 2020;11:475.
- 29 Tumlinson K, Jaff D, Stilwell B, *et al.* Reforming medical education admission and training in low- and middle-income countries: who gets admitted and why it matters. *Hum Resour Health* 2019;17:91.
- 30 Rimmer A. Make medical training more flexible to accommodate doctors' changing needs, says GMC. *BMJ* 2019;367:l7021.
- 31 Hancock J, Mattick K. Tolerance of ambiguity and psychological well-being in medical training: a systematic review. *Med Educ* 2020;54:125–37.
- 32 Howell BA, Kristal RB, Whitmire LR, *et al.* A systematic review of advocacy curricula in graduate medical education. *J Gen Intern Med* 2019;34:2592–601.
- 33 Lilia GL. The experiential learning impact of international and domestic study tours: class excursions that are more than field trips. *Int J Teaching and Learning Higher Edu* 2017;29:129–44.
- 34 Hu G, Chen Y, Liu Q, *et al.* Patient experience of hospital care in China: major findings from the Chinese patient experience questionnaire survey (2016-2018). *BMJ Open* 2019;9:e031615.
- 35 Greysen SR, Richards AK, Coupet S, *et al.* Global health experiences of U.S. physicians: a mixed methods survey of clinician-researchers and health policy leaders. *Global Health* 2013;9:19.
- 36 Shanafelt TD, Balch CM, Bechamps GJ, *et al.* Burnout and career satisfaction among American surgeons. *Ann Surg* 2009;250:463–71.
- 37 Dyrbye LN, Freischlag J, Kaups KL, *et al.* Work-home conflicts have a substantial impact on career decisions that affect the adequacy of the surgical workforce. *Arch Surg* 2012;147:933–9.