Objective: To analyze surveys measuring the prevalence of burnout among Chinese doctors and reveal the overall prevalence, characteristics, timeline, and factors related to burnout.

Methods: A comprehensive search was conducted on China National Knowledge Infrastructure, WANFANG, PubMed, EMBASE, PsycINFO and Cochrane Library databases from their inception to 28 February 2021. Random-effects meta-analyses, meta-regression and planned subgroup analyses were performed, and the standardized mean difference was adopted for comparisons between subgroups. Egger’s and Begg’s tests were performed to evaluate publication bias. Heterogeneity across the studies was tested using the I² statistic. The study protocol was registered on PROSPERO (CRD42018104249).

Results: In total, 3,210 records were reviewed; 64 studies including 48,638 Chinese doctors were eligible for meta-analysis. The prevalence of burnout increased continuously from 2008 to 2017 and decreased significantly from 2018 to 2020, a little increase from 2020 to 2021. The overall prevalence of burnout was 75.48% (95% CI, 69.20 to 81.26; I² = 99.23%, P < 0.001), and high burnout was 9.37% (95% CI, 4.91 to 15.05, I² = 98.88%, P < 0.001). The prevalence of emotional exhaustion was 48.64% (95% CI, 38.73 to 58.59; I² = 99.53%, P < 0.001), depersonalization was 54.67% (95% CI, 46.95 to 62.27; I² = 99.20%, P < 0.001), and reduced personal accomplishment was 66.53% (95% CI, 58.13 to 74.44; I² = 99.37%, P < 0.001). Gender, marriage, professional title and specialty all influenced burnout.

Conclusions: The results showed that the total prevalence of doctor burnout in China is very high. The prevalence of burnout varies by location. Gender, marital status and professional title all affect burnout scores.

1. Introduction

Burnout is a syndrome resulting from overload and stress during work (Peters and Rajasingam, 2019). Maslach characterized burnout according to 3 dimensions, namely, emotional exhaustion (EE), depersonalization (DP), and reduced personal accomplishment (PA) (Maslach et al., 2001), and developed the Maslach Burnout Inventory (MBI) to measure these dimensions. Health care providers are highly prone to burnout, with burnout prevalence being twice as high as that of other professions (Coombs et al., 2019), and the burnout of doctors has become a focus of public health (Chemali et al., 2019; Kopacz et al., 2019). In the United States, 54.4% of physicians had at least one symptom of burnout (Shanafelt et al., 2015), and the burnout prevalence among doctors was as high as 50% (Chambers et al., 2016) in New Zealand, 49% (Kansoun et al., 2019) in France. While in China, 53.2% of neurologists and 69% of anesthesiologists experienced burnout (Zhou et al., 2017) (Li et al.,...
policies might in annual trend on which the changing of public attitude and government.

MeSH terms and related keywords are shown in Appendix 1. We reduced developed search terms and combined overlapping areas with key words to 28 February 2021. An information professional (XW, an author) statement (Moher et al., 2015; Stroup et al., 2000). Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) advance and was published (Zheng et al., 2019). This systematic review in English was published, and no meta-analysis has been conducted (Lo our knowledge, only one systematic review including 11 studies reported and meta-analysis to analyze studies measuring the prevalence of burnout among Chinese doctors using the Maslach burnout scales and to reveal the overall prevalence, characteristics, timeline, and factors related to burnout. Analyzing the overall burnout rate is of great importance for establishing strategies or policies to reduce burnout among Chinese doctors and improve the quality of medical services.

2. Methods

The protocol was registered on PROSPERO (CRD42018104249) in advance and was published (Zheng et al., 2019). This systematic review and meta-analysis is reported according to the Meta-analyses of Observational Studies in Epidemiology (MOOSE) guidelines and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher et al., 2015; Stroup et al., 2000).

2.1. Search strategy

QZ (an author) conducted a comprehensive search without data limits in the China National Knowledge Infrastructure, WANFANG, PubMed, EMBASE, PsyCINFO and Cochrane Library databases from their inception to 28 February 2021. An information professional (XW, an author) developed search terms and combined overlapping areas with key words such as Chinese doctor or physician and burnout or job burnout. The MeSH terms and related keywords are shown in Appendix 1. We reduced publication bias by searching conference records and unpublished literature and using forward and backward citation tracking for included records.

2.2. Inclusion and exclusion criteria

The inclusion criteria were as follows: (1) studies involving Chinese doctors; (2) observational studies; (3) studies published in English or Chinese; (4) studies that used the following 3 validated scales: Maslach Burnout Inventory-General Survey (MBI-GS), Maslach Burnout Inventory-Human Services Survey (MBI-HSS), or Chinese Maslach Burnout Inventory (CMBI); (5) studies that provided the necessary data. Studies were included if they met all 5 of the above conditions.

The exclusion criteria were as follows: (1) studies including medical technicians and paramedics; (2) duplicate publications; (3) studies without sufficient data for the meta-analysis. Records were excluded if they met any of the above criteria.

2.3. Job burnout scale

The MBI-HSS scale includes 22 items scored from 0 to 6 (Maslach et al., 1996). The MBI-GS scale includes 15 items scored from 0 to 6 (Maslach et al., 2001). The CMBI scale includes 15 items scored from 1 to 7 (Yongxin, 2003). In the analysis, we respectively analyzed data from studies using the MBI-HSS, CMBI, and MBI-GS. According different assessment standards applied in studies, we further classified the MBI-GS scale as either MBI-GS-A or MBI-GS-B or MBI-GS-C, and the MBI-HSS scale as either MBI-HSS-A or MBI-HSS-B. Detailed descriptions of the scales and the assessment standards are shown in Appendix 2.1-2.3.

2.4. Identification and data extraction

The selected studies were screened in four stages. QZ imported the title and abstracts of identified records into EndNote Software (version X8, Thomson Scientific, USA) and screened them to exclude duplicates and irrelevant studies. In the next stage, QZ and XP S (two authors) independently reviewed the full text of the selected articles for eligibility assessment and examined them according to the inclusion and exclusion criteria.

The data from the included studies were extracted by QZ and added to an Excel table containing the following variables: author name, publication year, research design, region, number of participants, number of doctors exhibiting burnout, burnout score, burnout scale, gender, marital status, professional title, specialty and methodological quality. The discrepancies were resolved through a consensus discussion with a third author (PP). The level of consistency between QZ and XP S was 90%. When the presented data were not clear, one author (XW) contacted the authors by email or telephone. In 7 instances (Hongyan et al., 2016; Hui and Ning, 2008; Li et al., 2013; Lingyun, 2015; Nengzhli et al., 2010; Xiuzhen et al., 2009; Yun, 2011), clarification was obtained from the corresponding author. A random subsample of 20% of the data used for the meta-analysis was examined by ZH O (an author).

2.5. Quality assessment

Because all studies were observational, the quality of the included studies was evaluated with reference to the quality evaluation standard for observational studies proposed by Hoy et al. (2012). The scale includes 11 items. The answer “yes” is scored 1 point, and “no” or “not clear” is scored as 0 points. In this study, the articles were classified as having “excellent” (10–11 points), “good” (7–9 points), “weak” (4–6 points) or “poor” (0–3 points) methodological quality. QZ completed the full quality assessment, and ZH O independently double-checked the accuracy.

2.6. Statistical analysis

2.6.1. Assessment of heterogeneity

The heterogeneity across the studies was assessed by determining the I² statistic (Huedo-Medina et al., 2006) and the underlying theoretical model and whether study-to-study variability, to quantitatively measure the inconsistency across studies. Exploratory subgroup and meta-regression analyses were conducted to examine the possible sources of heterogeneity, and sensitivity analyses were performed to assess the robustness and stability of the results. We choose the random-effects
because the expectation of study effects is unlikely identical and the variability across the studies is expected.

2.6.2. Assessment of reporting biases

Reporting biases were assessed by scrutinizing the protocols of the included studies. Potential publication bias was assessed by visually inspecting the funnel plots and quantified by Egger’s and Begg’s tests.

2.6.3. Data synthesis

The pooled estimates of the outcomes are expressed as percentages with 95% confidence intervals (CIs). Meta-regression analysis was performed to explore the time trend based on the publication year.

The standardized mean difference (SMD) was calculated through the estimated mean difference between the two groups divided by the mean standard deviation (SD) because it can eliminate the influence of the magnitude caused by the different burnout scales (Takeshima et al., 2014).

All analyses were performed with Stata Statistical Software (version 14.0, Stata Corp, College Station, Texas, USA). Visualization was performed with R software (R Foundation for Statistical Computing, Vienna, Austria, version 3.6.1). All analyses were 2-tailed, and a P value < 0.05 was considered statistically significant. The details of the whole meta-analysis procedure are shown in the Appendix 3.

3. Results

3.1. Literature search

We identified 3,210 records through database searches and 64 studies were eventually included in the meta-analysis (Chenlilang, 2019; Dianzhen, 2013; Diwen et al., 2019; Enfang and Yan, 2017; Fuyingcong, 2012; Gang and Lijun, 2020; Hao, 2012; Haoyun et al., 2019; Hongyan et al., 2016; Hongyao, 2017; Houyuan, 2014; Huang et al., 2020; Huqiang and Zuoqiang, 2011; Hui and Ning, 2008; Huimin et al., 2019; Jing and Yujian, 2017; Jingquan and Wenxiu, 2018; Lei et al., 2015; Li et al., 2013, 2018; Lianhong et al., 2015; Limei and Congying, 2020; Lingyun, 2015; Liqun and Lin, 2020; Lu et al., 2016; Ma et al., 2020; Meng, 2016; Meng et al., 2018; Mengying et al., 2019; Mingke et al., 2011; Nengzhi et al., 2010; Pu et al., 2017; Qiuyu, 2020; Shanshan and Li, 2020; Sun et al., 2012; Suqiu, 2019; Tieshuang, 2010; Xiaoyan et al., 2019; Xiaoyan et al., 2017; Ye et al., 2019; Yi and Liping, 2016; Ye et al., 2019; Yuanbin, 2005; Yun, 2011, 2017; Zou et al., 2020) including 21,501 Chinese doctors provided data about the prevalence of the 3 dimensions of burnout. The overall prevalence of EE was 48.64% (95% CI, 38.73 to 58.59; I^2 = 99.53%, P < 0.001), the overall prevalence of DP was 46.67% (95% CI, 46.95 to 62.27; I^2 = 99.23%, P < 0.001), and the overall prevalence of reduced PA was 66.53% (95% CI, 58.13 to 74.44; I^2 = 99.37%, P < 0.001). The details are shown in Table 2 and Appendix 4.2-4.3.

3.2. Prevalence estimates

3.2.1. Total prevalence of burnout

Thirty-two studies including 27,130 Chinese doctors reported the prevalence of burnout as dichotomous data (Diwen et al., 2019; Enfang and Yan, 2017; Hao, 2012; Haoyun et al., 2019; Hongyan et al., 2016; Hongyao, 2017; Houyuan, 2014; Huang et al., 2020; Huimin et al., 2019; Jingquan and Wenxiu, 2018; Lei et al., 2015; Li et al., 2013; Lingyun, 2015; Ma et al., 2020; Meng, 2016; Miao et al., 2012; Mingke et al., 2011; Nengzhi et al., 2010; Pu et al., 2017; Shanshan and Li, 2020; Wang et al., 2020a, 2021; Wen et al., 2016; Xi et al., 2020; Xiaoyan et al., 2019; Xizheng et al., 2009; Ye et al., 2019; Yun, 2011, 2017; Zheng et al., 2018; Zhou et al., 2020). Of the 32 studies, 19 studies including 12,056 Chinese doctors reported the prevalence of different degrees of burnout as dichotomous data (Diwen et al., 2019; Enfang and Yan, 2017; Hao, 2012; Haoyun et al., 2019; Hongyan et al., 2016; Houyuan, 2014; Hui and Ning, 2008; Lei et al., 2015; Lingyun, 2015; Meng, 2016; Miao et al., 2012; Mingke et al., 2011; Nengzhi et al., 2010; Shanshan and Li, 2020; Xi et al., 2020; Xiaoyan et al., 2019; Ye et al., 2019; Yun, 2011, 2017). The prevalence of low and moderate burnout was 62.01% (95% CI, 54.59 to 69.15, I^2 = 98.51%, P < 0.001), and the prevalence of high burnout was 9.37% (95% CI, 4.91 to 15.05, I^2 = 98.88%, P < 0.001). The specific content is shown in Table 2 and Appendix 4.2-4.3.
high, DP, and decreased PA dimensions (all $P > 0.05$) of burnout prevalence. The detailed results are shown in Appendix 5.1-5.6.

3.2.4. Prevalence of burnout over time

The burnout prevalence over time is shown in Figure 2. The total prevalence of burnout increased continuously from 2008 to 2017 and decreased significantly from 2018 to 2020, a little increase from 2020 to 2021. Furthermore, we analyzed the prevalence based on different scales and 3 dimensions. The prevalence of EE gradually decreased from 2005 to 2014, and gradually increased from 2015 to 2021. The prevalence of DP decreased gradually from 2005 to 2014, increased gradually from 2015 to 2016, and decreased significantly from 2017 to 2021. The prevalence of reduced PA increased gradually from 2005 to 2016, decreased significantly from 2017 to 2019, but increased slightly from 2020 to 2021. All the detailed time trends are shown in Appendix 6.1-6.7.

3.2.5. The influence of individual factors on burnout

In this study, we compared burnout prevalence among different genders, marital statuses, title, and specialty. Twenty-five studies (Chenliang, 2019; Dianzhen, 2013; Fuyingcong, 2012; Hao, 2012; Huang et al., 2020; Hui and Ning, 2008; Lianhong et al., 2015; Ma et al., 2020; Qiuyu, 2020; Sun et al., 2012; Suqiu, 2019; Tieshuang, 2010; Tingmei, 2016; Wang et al., 2012, 2020b; Weiyang et al., 2018; Wencheng, 2011; Wenxuan et al., 2016; Xia et al., 2007; Xiao et al., 2014; Xiaojuan and Fuzhong, 2015; Ye et al., 2019; Yu, 2015; Yun, 2011, 2017) including 1,431 physicians, 980 surgeons, 105 obstetricians, 79 pediatricians and 256 psychiatrists provided data of specialties.

We compared the 3 dimensions of burnout using the SMD according to sex, marital status, professional title and specialty of doctors. All detailed results, values of SMD and $I^2$ are shown in Table 3.

The results showed that in terms of gender, the EE and DP scores of male doctors were significantly higher than those of female doctors. The PA score of male doctors was also significantly lower than that of female doctors. In terms of marital status, doctors with primary professional title scored lower than those with advanced professional title on the DP dimension. Additionally, doctors with primary professional title scored lower than those with advanced professional title on the PA dimension.

In terms of specialty, no significant difference was observed between the scores of physicians and surgeons, they all had higher EE scores and lower PA scores than psychiatrists and pediatricians.

The subgroup analyses also showed that the scores of the 3 dimensions were affected by the individual factors, such as gender, marital...
Table 1. Descriptive characteristics of the included studies.

| Lead author          | Publication year | Research design | Number | Region                     | Burnout measurement | Quality score |
|----------------------|------------------|-----------------|--------|----------------------------|----------------------|---------------|
| Li Yuanbin et al.    | 2005             | Cross-sectional | 281    | Chengdu City               | MBI-HSS             | 8             |
| Ren Xia et al.       | 2007             | Cross-sectional | 256    | Beijing City               | MBI-HSS             | 7             |
| Wang Hui et al.      | 2008             | Cross-sectional | 646    | Nanjing, Wuxi and Lianyungang City | CMBI                | 8             |
| Chen Xuezhen et al.  | 2009             | Prospective     | 108    | Haikou City                | MBI-HSS             | 7             |
| Zhang Yuan et al.    | 2009             | Cross-sectional | 364    | Inner Mongolia             | MBI-GS              | 7             |
| Chi Tieshuang et al. | 2010             | Cross-sectional | 1105   | Liaoning Province          | MBI-GS              | 7             |
| Jiang Nengzi et al.  | 2010             | Cross-sectional | 461    | Shandong, Hebei Province and Beijing City | CMBI    | 7             |
| Yu Mingke et al.     | 2011             | Cross-sectional | 230    | Nanning City               | CMBI                | 8             |
| Huang Yun et al.     | 2011             | Cross-sectional | 692    | Jiangsu, Anhui and Guizhou Province | CMBI    | 8             |
| Yang Wencheng et al. | 2011             | Cross-sectional | 1007   | Liaoning Province          | MBI-GS              | 7             |
| Zhong Huaxing et al. | 2011             | Cross-sectional | 68     | Ganzhou City               | CMBI                | 7             |
| Liu Fuyingcong       | 2012             | Cross-sectional | 266    | Shenzhen City              | MBI-HSS             | 7             |
| Cheng Hao et al.     | 2012             | Cross-sectional | 653    | Western China              | MBI-HSS             | 8             |
| Liu Miao et al.      | 2012             | Cross-sectional | 1569   | Eastern, western and central China | CMBI    | 8             |
| Yang Wang et al.     | 2012             | Cross-sectional | 1011   | Liaoning Province          | MBI-GS              | 9             |
| Wei Sun et al.       | 2012             | Cross-sectional | 1034   | Liaoning Province          | MBI-GS              | 9             |
| Li Yanli et al.      | 2012             | Cross-sectional | 219    | Sichuan Province           | MBI-GS              | 8             |
| Tang Dianzheng       | 2013             | Cross-sectional | 902    | 12 Provinces of China      | CMBI                | 7             |
| Huang Li et al.      | 2013             | Cross-sectional | 735    | Shanghai City              | MBI-GS              | 7             |
| Yubei XIAO et al.    | 2014             | Cross-sectional | 205    | Beijing City               | MBI-GS              | 8             |
| Luo Houyuan et al.   | 2014             | Cross-sectional | 2404   | Eastern, western and central China | CMBI    | 7             |
| Shi Lingyun et al.   | 2015             | Cross-sectional | 435    | Xinjiang Province          | CMBI                | 7             |
| Zhou Lianhong et al. | 2015             | Cross-sectional | 1611   | Beijing City               | MBI-HSS             | 8             |
| Zhang Yu et al.      | 2015             | Cross-sectional | 160    | Beijing City               | MBI-HSS             | 7             |
| Liu Xiaojuan et al.  | 2015             | Cross-sectional | 415    | Jilin City                 | MBI-HSS             | 8             |
| Huang Lei et al.     | 2015             | Cross-sectional | 775    | Zhejiang City              | MBI-GS              | 8             |
| Juncai Pu et al.     | 2016             | Cross-sectional | 5558   | China                      | MBI-HSS             | 8             |
| Wang Lu et al.       | 2016             | Cross-sectional | 78     | Taiyuan City               | MBI-HSS             | 8             |
| Xin Wen et al.       | 2016             | Cross-sectional | 1537   | 10 Provinces of China      | MBI-GS              | 9             |
| Zhu Hongyan et al.   | 2016             | Cross-sectional | 414    | Shanghai City              | MBI-GS              | 8             |
| Lv Meng et al.       | 2016             | Cross-sectional | 312    | Xinjiang Province          | CMBI                | 7             |
| Zhang Wexuan et al.  | 2016             | Cross-sectional | 1098   | 12 Provinces of China      | CMBI                | 7             |
| Li Yiyi et al.       | 2016             | Cross-sectional | 292    | Shenzhen City              | MBI-HSS             | 7             |
| Yan Tingmei et al.   | 2016             | Cross-sectional | 1863   | Liaoning Province          | MBI-GS              | 7             |
| Fan Enfang et al.    | 2017             | Cross-sectional | 85     | Shanghai City              | CMBI                | 7             |
| Li Hongyao et al.    | 2017             | Cross-sectional | 1047   | Chongqing City             | MBI-GS              | 7             |
| Hanlong Zheng et al. | 2017             | Cross-sectional | 202    | China                      | MBI-HSS             | 7             |
| Sun Yun et al.       | 2017             | Cross-sectional | 379    | Wuhan City                 | MBI-GS              | 7             |
| Yang Jing et al.     | 2017             | Cross-sectional | 560    | Xinjiang Province          | MBI-GS              | 7             |
| Cai Jingquan et al.  | 2018             | Cross-sectional | 475    | Beijing City               | MBI-GS              | 7             |
| Hange Li et al.      | 2018             | Cross-sectional | 2873   | Beijing, Tianjin City and Hebei Province | MBI-HSS | 9             |
| Yang Meng et al.     | 2018             | Cross-sectional | 227    | Guangdong Province         | MBI-HSS             | 7             |
| Liang Weiyi et al.   | 2018             | Cross-sectional | 225    | Beijing, Tianjin City and Hebei Province | MBI-HSS | 8             |
| Zhai Chendiang       | 2019             | Cross-sectional | 245    | Wuhan City                 | MBI-HSS             | 8             |
| Lu Huimin et al.     | 2019             | Cross-sectional | 568    | Xuzhou City                | MBI-GS              | 8             |
| Qi Xiaoyu et al.     | 2019             | Cross-sectional | 217    | Shanghai City              | MBI-GS              | 8             |
| Zhang Haoyun et al.  | 2019             | Cross-sectional | 131    | Guangzhou Province         | MBI-GS              | 8             |
| Wu Ye et al.         | 2019             | Cross-sectional | 499    | Jilin Province             | MBI-GS              | 9             |
| Hui Ma et al.        | 2019             | Cross-sectional | 2530   | China                      | CMBI                | 9             |
| Shen Diwen et al.    | 2019             | Cross-sectional | 602    | China                      | CMBI                | 9             |
| Zheng et al.         | 2019             | Cross-sectional | 3236   | China                      | MBI-HSS             | 8             |
| Cao Suqiu et al.     | 2019             | Cross-sectional | 110    | Guangzhou Province         | CMBI                | 8             |
| Li Mengying et al.   | 2019             | Cross-sectional | 265    | Henan Province             | MBI-GS              | 9             |
| Gu Shanghan et al.   | 2020             | Cross-sectional | 244    | Chongqing City             | CMBI                | 9             |
| Ying Zhou et al.     | 2020             | Cross-sectional | 125    | Shanghai City              | MBI-HSS             | 9             |
| Lei Huang et al.     | 2020             | Cross-sectional | 318    | Shanghai City              | MBI-HSS             | 9             |
| Jing Wang et al.     | 2020             | Cross-sectional | 58     | 4 Provinces of China       | MBI-HSS             | 9             |
| Zhang Xi et al.      | 2020             | Cross-sectional | 1308   | Jiangsu Province           | MBI-GS              | 9             |

(continued on next page)
status, title, and specialty. Furthermore, through a visual inspection of the funnel plots and Egger’s and Beggs’s tests, we qualitatively and quantitatively evaluated the publication bias of the analysis of individual factors. The results showed that 52 of the 60 studies had no publication bias (P > 0.05). Eight studies that reported data for specialty had biases because the sample size was limited. Therefore, the results for specialty should be considered with caution. The forest plots of the subgroup studies and funnel plots of publication bias are shown in Appendix 7.1-7.4.

4. Discussion

The results of our study showed that the total prevalence of burnout in doctors in China was 75.48%, and the prevalence of high burnout was 9.37%, suggesting that the burnout situation in Chinese doctors might be very serious, since the total prevalence of burnout of doctors was 49% in France (Kansoun et al., 2019) and 51.64% in United State (Low et al., 2019) This result is consistent with a previous study reporting that the prevalence of doctor burnout was higher in Asian countries than in Western countries (De Simone et al., 2019). We also found the prevalence of EE was 48.64%, the prevalence of DP was 54.67%, and the prevalence of reduced PA was 66.53% among Chinese doctors. The results were obviously higher than those among doctors in France (EE 21%, DP 29% and reduced PA 21%) (Kansoun et al., 2019) and consistent with a previous study reporting that Chinese doctors had the highest EE scores among 37 middle-income countries worldwide (Sabitova et al., 2020).

The reasons for the high prevalence of burnout in Chinese doctors might be as follows.

First, heavy workload could lead to severe burnout. According to the Fifth Survey of Doctors’ Clinical Conditions by the Chinese Medical Doctors Association, 52.72% of doctors worked more than 40 h per week, and 32.69% of doctors worked more than 60 h per week (Association, 2015). Although the Chinese healthcare system is structured into three tiers (primary clinics, secondary hospitals and tertiary hospitals), the payment for consultation and tests in different tiers of hospitals is regulated by the government and is approximately same price. Chinese patients are free to visit any higher-tier hospital without referral by a primary doctor (Bo et al., 2020); thus, doctors in top-tier hospitals are overloaded due to an increased number of patients and forced to reduce the consultation time for all patients.

Second, government health care policies might contribute to burnout. In China, the government spends only 3% of the total world health expenditure on 20% of the world’s population (L.E. 2014). The national investment in medical services has been neglected since 1979, with the total medical expenditure less than 7% of the annual state fiscal expenditure each year (China), and the proportion of the medical insurance expenditure of the total medical expenditure has decreased from 36% to 16% (X et al., 2000). Meanwhile, medical insurance payments for services have been strictly controlled (O et al., 2014). Therefore, in order to sustain themselves, Chinese doctors are encouraged by hospitals to prescribe more medicines and expensive tests for patients. The conversion from a doctor to businessman not only causes doctors to experience severe burnout but also leads patients to mistrust doctors (J et al., 2014; Lancet, 2010).

Third, violence against doctors might lead to burnout as well. Due to the situations mentioned above, patients’ dissatisfaction with and...
distrust of doctors has triggered violence against doctors. The incidence of violence increased abruptly after 2010 (Bo et al., 2020; L.E, 2014; Paper, 2017). Among Chinese doctors, one-third had experienced conflict with patients, and thousands had been injured (L.E, 2014).

These three reasons have not only caused and exacerbated burnout but also negatively influenced the recruitment and retention of Chinese doctors. More than 60% of physicians have expressed an unwillingness to advise their children to go into the medical profession (Association, 2015). Additionally, 35.2% of general practitioners (Yanling et al., 2019b) and 34.03% of primary care doctors (Binjie et al., 2018) have admitted to having thoughts of altering career. From 2005 to 2015, all medical collages in China enrolled 4.7 million medical students, but the total number of doctors increased by only 0.75 million (Paper, 2017). The quantity and quality of Chinese doctors has been negatively impacted (Bo et al., 2020).

We also found that, although the burnout prevalence was significantly high, starting from 2018, the total burnout prevalence of Chinese doctors and the scores of the 3 dimensions had started to obviously decline. The decreasing trend might mainly be caused by alteration of regulations and laws. For example, the Regulations on Prevention and

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**Figure 2.** Prevalence of burnout in Chinese doctors through 2020. The total prevalence of burnout increased from 2008 to 2017 and decreased significantly from 2018 to 2020, a little increase from 2020 to 2021. The prevalence of EE gradually decreased from 2005 to 2014, and gradually increased from 2015 to 2021. The prevalence of DP decreased gradually from 2005 to 2014, increased gradually from 2015 to 2016, and decreased significantly from 2017 to 2021. The prevalence of reduced PA increased gradually from 2005 to 2016, decreased significantly from 2017 to 2019, but increased slightly from 2020 to 2021.

**Table 3.** Comparison of related factors according to the three dimension.

| Gender                  | EE       | P       | I-squared | DP       | P       | I-squared | PA       | P       | I-squared |
|-------------------------|----------|---------|-----------|----------|---------|-----------|----------|---------|-----------|
| Male vs Female          | 0.094 (0.064, 0.124) | <.001   | 74.90%    | 0.117 (0.087, 0.147) | <.001   | 52.20%    | -0.079 (-0.109, -0.049) | <.001   | 74.70%    |
| Marriage stage          |          |         |           |          |         |           |          |         |           |
| Single vs Married       | 0.017 (-0.029, 0.062) | 0.473   | 42.40%    | 0.133 (0.088, 0.179) | <.001   | 74.20%    | 0.002 (-0.044, 0.048) | 0.933   | 77.90%    |
| Title                   |          |         |           |          |         |           |          |         |           |
| Primary vs Intermediate | -0.038 (-0.091, 0.015) | 0.164   | 0.00%     | -0.072 (-0.125, -0.019) | 0.008   | 59.30%    | 0.011 (-0.042, 0.064) | 0.682   | 39.80%    |
| Primary vs Advance      | 0.042 (-0.044, 0.128) | 0.336   | 76.90%    | -0.109 (-0.195, -0.023) | 0.013   | 87.60%    | -0.086 (-0.173, 0) | 0.05    | 92.80%    |
| Department              |          |         |           |          |         |           |          |         |           |
| Physician vs Surgeon    | 0.052 (-0.030, 0.134) | 0.211   | 71.00%    | -0.058 (-0.140, 0.024) | 0.165   | 32.30%    | 0.078 (-0.004, 0.160) | 0.062   | 51.80%    |
| Physician vs Psychiatrist| 0.216 (0.072, 0.361) | 0.003   | 0         | -0.029 (-0.173, 0.115) | 0.695   | 0         | -0.202 (-0.346, -0.057) | 0.006   | 21.80%    |
| Surgical vs Psychiatry  | 0.179 (0.029, 0.330) | 0.019   | 51.40%    | 0.052 (-0.098, 0.202) | 0.5     | 0         | -0.366 (-0.517, -0.214) | <.001   | 61.90%    |
| Physician vs Obstetrician| -0.012 (-0.238, 0.215) | 0.92    | 75.40%    | 0.017 (-0.213, 0.247) | 0.885   | 92.20%    | 0.320 (0.094, 0.546) | 0.006   | 40.80%    |
| Surgeon vs Obstetrician | 0.023 (-0.206, 0.252) | 0.844   | 75.50%    | 0.083 (-0.148, 0.314) | 0.479   | 85.80%    | 0.417 (0.185, 0.648) | <.001   | 80.70%    |
| Physician vs Pediatrician| 0.352 (0.080, 0.623) | 0.011   | 0         | 0.387 (0.114, 0.659) | 0.005   | 63.10%    | 0.087 (-0.185, 0.358) | 0.532   | 79.90%    |
| Surgeon vs Pediatrician | 0.375 (0.104, 0.645) | 0.007   | 0         | 0.385 (0.113, 0.656) | 0.005   | 32.30%    | 0.120 (-0.150, 0.390) | 0.383   | 61.20%    |

SMD

*1-V pooled SMD; I-squared: variation in SMD attributable to heterogeneity; P: Test of SMD = 0.*
Treatment of Medical Disputes was approved by Chinese State council in June 2018, to protect doctors from violence (PRC, 2018). Meanwhile, a series of policies and projects was applied in 2018 to improve the health care system, referral regulation and insurance coverage of low-income people. New regulation of the network was also applied in 2018 to restrict vicious and insulting information against doctors on websites. All these reformative policies and regulations might contribute to the decrease in burnout of Chinese doctors. However, there was a slight upward trend from 2020 to 2021, which may be due to the impact of the COVID-19.

Meanwhile, our results also suggested that gender, marital status, professional title, and specialty were all related to occupational burnout. Male doctors were more prone to emotional failure, disinhibition of personality, and having a lower sense of achievement than female doctors. These results are different from previous studies in Western countries. One survey in Australia suggested that female doctors were more likely to suffer from burnout (Clough et al., 2020). One study in the United States observed that the burnout prevalence of female doctors was 1.6 times higher than that of male doctors (McMurray et al., 2000). The reason for this inconsistency might be due to the different context and culture by which Chinese males are required to bear more life responsibilities (Wei, 2006). In the present study, single doctors were more likely to be depersonalized than married doctors. Due to the lack of support from partners, they often retreat when encountering difficulties in work and life (Ma et al., 2020). This was consistent with the results of previous studies in the United States and European countries (Banerjee et al., 2017; Halbesleben, 2006; Shanafelt et al., 2014). Meanwhile, possibly due to the enthusiasm of junior doctors, in our study, they had a lower DP score than doctors with intermediate and advanced professional titles. We also found that physicians and surgeons were more likely to suffer from EE and reduced PA, which was consistent with a previous study conducted in the United States (Shanafelt et al., 2019). However, this result was tentative due to the high heterogeneity and publication biases in studies included in the specialty analysis.

4.1. Strengths and limitations

This study has some strengths worth mentioning. To the best of our knowledge, this is the first comprehensive meta-analysis of studies surveying burnout among Chinese doctors. We applied a holistic strategy to search the literature and conducted a robust statistical procedure in the analysis. Studies in both the English and Chinese languages were included. Because 3 different burnout scales were applied in 64 studies and the quality of studies was uneven, sensitivity and subgroup analyses were conducted to evaluate the potential heterogeneity and bias in the analysis.

Several limitations still exist. First, the quality of literature included in this study was not excellent, with a mean quality score of 7.92. However, the sensitivity analysis showed that the main results of our study were not significantly impacted by the factor of quality. Second, although we conducted a subgroup exploration based on different scales, the heterogeneity of the included studies was still high. Nevertheless, this approach is widely accepted and applied, and heterogeneity is an inevitable and primary characteristic in meta-analyses of prevalence rates. The heterogeneity has been shown high in previous meta-analysis studies of burnout prevalence (Kansoun et al., 2019; Low et al., 2019; Sabitova et al., 2020). Third, we used the publication year instead of the research year to analyze time trends; therefore, a delay effect might be present, but it did not affect the overall result. Forth, when measuring the effects of individual factors on burnout, the sample size was limited, thus caution is needed when interpreting this result.

5. Conclusions

The total prevalence of doctor burnout in China was higher than that in developed countries. Gender, marital status, professional title and specialty all might affect burnout scores. The prevalence of burnout in Chinese doctors has decreased since 2018, which suggests that transformative policies and government regulations might affect burnout in Chinese doctors, although longitudinal research is needed to provide evidence supporting this conclusion. Because of the high heterogeneity and limited quality of the included studies, the conclusions are tentative. In the future, more effective policies will be continuously needed to improve burnout. Meanwhile, a unified standard and normative scale of burnout should be developed and applied in high quality studies with large sample sizes. The results would help to establish a theoretical basis for developing strategies to alleviate burnout in doctors, increase the recruitment and retention of doctors, improve the quality of medical services, and eventually optimize the health care system.

Declarations

Author contribution statement

All authors listed have significantly contributed to the development and the writing of this article.

Funding statement

Qin Zheng was supported by Beijing Science and Technology Planning Project (Z171100010172277).

Data availability statement

Data included in article supp. material/referenced in article.

Declaration of interest's statement

The authors declare no conflict of interest.

Additional information

Supplementary content related to this article has been published online at https://doi:10.1016/j.heliyon.2022.e09821.

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