

# Changes in the Lifestyles among Medical Staff after the COVID-19 Pandemic

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## Abstract

**Objectives:** Limited information was available regarding the impact of COVID-19 on lifestyle among medical staff after the pandemic.

**Methods:** A standardized questionnaire was sent via social media to the medical staff in a COVID-designated hospital in China. It covered self-reported lifestyle changes, psychological state, and work attitude during and after the pandemic.

**Results:** A total of 900 medical staff participated in the survey. During the COVID-19 pandemic, the participants had a high representation of anxiety, following by calm, and upset. 64.11% of the participants searched for COVID-19 information every day during the pandemic. Length of sleep, the frequency and length of physical activity were similar during and after the pandemic. The participants who chose running/jogging as the way of exercise decreased significantly after the pandemic. 53.22% of participants agreed that the pandemic had no impact on physical activities. The selection of traveling and get-together dropped significantly. 42.67% of participants stated that the pandemic was related to alternation. The number of both proactive and demotivated attitudes increased after the pandemic.

**Conclusion:** The present study shared our experience of changes in lifestyle during the post-pandemic period among medical staff.

**Keywords:** COVID-19; Occupational Health; Mental Health; Physician; Cross-Sectional Study

## Introduction

Coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has become a global pandemic since March 2020 [1]. However, China has managed to control the pandemic rapidly and effectively. Medical staff from a COVID-designated hospital suffered from a considerable burden of health care from COVID and its complications. Reviews showed that medical staff might suffer several negative emotional outcomes, including stress, depression, irritability, fear [3, 4]. Medical staff is fighters on the frontline who were exposed to and at high risk of being infected by COVID-19, on top of having long working hours and enormous stress. A survey on Healthy Lifestyle of Chinese Physicians reported that over 60% of doctors believed that their lifestyle is unhealthy [5]. It showed that most doctors feel fatigued for a long time, lack of sleep, anxiety, and emotional problems are also very prominent. A systematic review including more than 33000 participants demonstrated consistent findings [6].

The past year challenged the wellness and lifestyles of medical staff, especially those on the frontline of combating COVID-19. There were several alternations for them. And there were probably changes in their lives outside of medicine too. On one hand, the burden of COVID-19 on health-care workers was substantial in low-income and middle-income countries, where difficult daily triage decisions had to be made in the context of shortages of equipment and consumables. On the other hand, studies from developed countries, such as Italy and France, also reported high prevalence of depressive symptoms, post-traumatic stress disorder, and burnout [7-9]. China is now gradually returning to a more normal state after a series of urgent, strict, and effective measures were utilized to combat the pandemic. However, limited information was available regarding the impact of COVID-19 on lifestyle among medical staff after the pandemic. Anticipating that the ensuing impact of the pandemic and enforced quarantine amid the early stages of the pandemic on lifestyle such as reduced physical activity, ways of leisure, sleep habits, we undertook an online survey using the popular social media application WeChat. The study was designed to provide

timely and reliable data to measure the influence of COVID-19 on lifestyle among medical staff in a COVID-designated hospital status administered by social media.

## Methods

### Study Design and Settings

In this cross-sectional study, a standardized, online questionnaire was sent via WeChat workgroups, a social media application on December 01, 2020. The population of interest was the medical staff working in Guangdong Provincial People's Hospital, China, which was a tertiary, COVID-designated hospital. An affirmative response in the survey determined their position of work, which would be "doctors", or "nurses", or "administrator". Subjects were provided with information regarding the specific study aim, the content of the survey, and that no incentive would be offered. Respondents were assured that all the collected information would be processed anonymously and confidentially. Only the completed survey could be submitted. Since the current study used data that were obtained solely from medical staff, the Ethics Committee did not have to review the protocol.

### Questionnaire Development

The questionnaire covered self-reported demographic information, lifestyle including sleep habits, physical and leisure activity, psychological state and work attitude during and after the pandemic, questions regarding the impact of the COVID-19 pandemic on personal lifestyle. A detailed copy of both the used questionnaire and an English version was included (see S1 and S2 Files). The survey was designed to be completed quickly, on a smartphone, and to be as simple as possible to minimize recall bias. The survey collected data relating to the period during the COVID pandemic in China till September 2020.

The structured questionnaire consisted of four sections. The first requested the socio-demographic characteristics (age, gender, origin family, the position of work, professional title, workplace). Participants were asked for medical specialties and practice settings for stratified analysis. The frontline work was defined as the working fields that had frequent and close exposure to COVID-19 patients, such as emergency room, intensive care unit, or fever clinics. Front-line medical staff in this tertiary hospital have been exposed to multiple stress sources, such as the risk of contracting COVID-19, wearing protective equipment for continuously 4–6 h, increased workload, shift work together with social isolation during the rest period. The second section was the self-reported multiple-choice psychological state during the pandemic. The third section focused on questions relating to attention to the pandemic, sleep habits, physical and leisure activity, working attitude during and after the pandemic.

The fourth section covered the impact of the COVID-19 pandemic on lifestyle changes. The impact of COVID-19 on the lifestyle domain was measured using a set of four or five questions. For this domain, the "had no impact" option showed that the respondents considered the COVID-19 pandemic had no impact on the relating lifestyle; whereas "positive influence" and "negative influence" responses indicated the corresponding impact. Finally, the "irrelevant" option indicated that the pandemic was unrelated to the changes in lifestyle.

### Statistical Analysis

The extracted data were summarized and analyzed using Excel (Microsoft Office, USA) and R version 4.0.2 (<http://www.R-project.org/>; R Foundation for Statistical Computing, Vienna, Austria). Categorical data were shown as counts and percentages and were compared using the chi-square test or Fisher's exact test. To assess the association between lifestyle indicators and COVID-19, chi-square, and Fisher exact tests were used. Means and standard deviations were employed to display normally distributed continuous variables. A  $p$ -value  $< 0.05$  (two-tailed) was considered statistically significant.

## Results

On December 01, 2020, a total of 900 medical staff in Guangdong Provincial People's Hospital participated in the survey. It is not possible to estimate response rates due to group messaging. The mean age( $\pm$ SD) of the participants was 34.69 $\pm$ 8.14 years. 31.56% of respondents were between 20 and 39 years old, and 42% were between 30-39 years old. 19.67% of the respondents were aged between 40 and 49. Only 5.78% were between 50-60 years old. The study's 900 participants included 362 men (40.22%) and 538 women (59.78%). Approximately 48.6% were doctors, 49.89% were nurses, and the remainder being administrators in the hospital. The demographic data were summarized in Table 1.

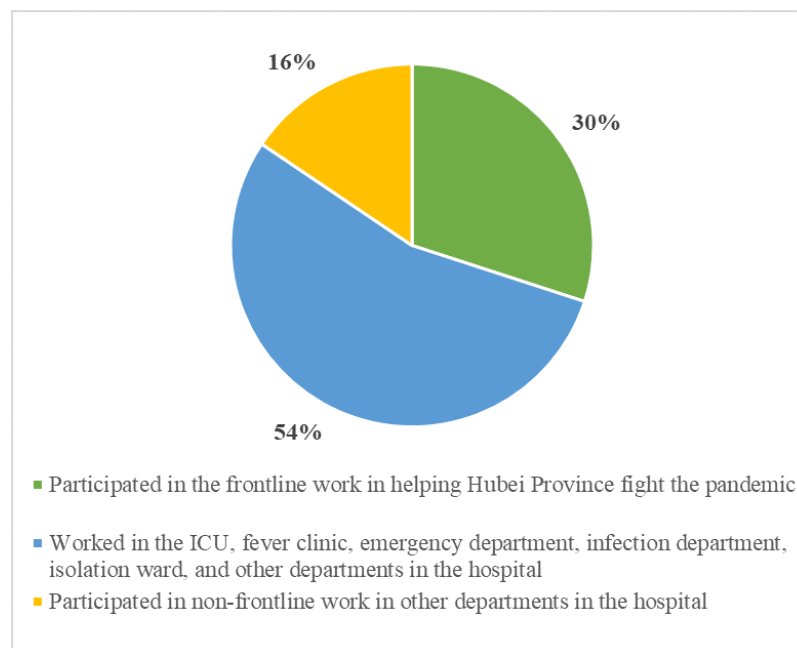
**Table 1:** The demographic data of the participants

	N	% <sup>a</sup>
Gender		
Female	538	59.78%
Male	362	40.22%
Profession		
Doctor	437	48.56%
Nurse	449	49.89%
Administrator	14	1.56%
Age, years		
20-29	284	31.56%
30-39	378	42%
40-49	177	19.67%
50-60	52	5.78%

<sup>a</sup>Percentages may not add up to 100% due to missing values

All 900 participants: title of a senior professional post was achieved in 72 participants (8.00%), and vice-senior was achieved in 192 patients (21.33%). The intermediate title was held by 229 participants (25.44%) and the junior title was admitted in 358 participants (39.78%). The rest of the participants (5.44%) were yet untitled in the profession. (Supplementary Figure 1) Although all of the participants worked in the single center in Guangzhou, Guangdong, China, not all of them were local residents. The majority of them were from Guangdong Province (44.22%), followed by Hainan (21.56%), Fujian (13.11%), and other provinces in southern China. In general, Participants came from 11 different provinces.

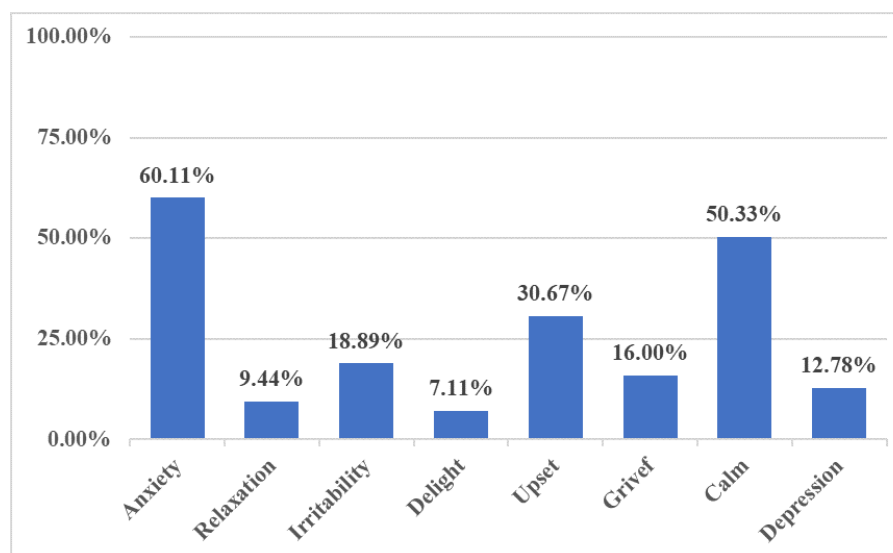
By study design, not all study participants had close exposure to COVID-19 cases. The study population was primarily composed of self-reported individuals. 270 (30.00%) respondents claimed to participate in the frontline work in helping Hubei Province fight the pandemic, and 490 (54.44%) respondents had worked in the ICU, fever clinic, emergency department, infection department, isolation ward, and other departments in Guangdong Provincial People's Hospital. 140 (15.56%) respondents participated in non-frontline work in other departments in this hospital. (Figure 1)



**Figure 1:** The Proportion of Participants with Varied Exposure to COVID-19 Cases. ICU, intensive care unit.

### Emotional Representation among Medical Staff during COVID-19 Pandemic

This study found that during the COVID-19 pandemic, a large number of participants had a high representation of anxiety (60.11%), following by calm (50.33%), and upset (30.67%). The remaining emotions were irritability (18.89%), grief (16.00%), depression (12.78%), relaxation (9.44%), and delight (7.11%), sequentially. (Figure 2)



**Figure 2:** Emotional Representation among Medical Staff during COVID-19 Pandemic

### Personal Perceptions about the Ramifications of COVID-19 Pandemic on Lifestyle

Certain lifestyle changes due to the pandemic notably affected the medical staff. The lifestyle of participants during and after the pandemic was presented in Table 2. A majority, 64.11% ( $n = 577$ ) of the participating medical staff searched for COVID-19 information every day during the pandemic, while after September 2020, most of the participants (37.78%) searched for COVID-19 information for more than once but less than 3 times per week. The attention to the COVID-19 pandemic dropped after September 2020 ( $p < 0.0001$ ). Still, least participant expressed a lack of concern for the information of COVID-19.

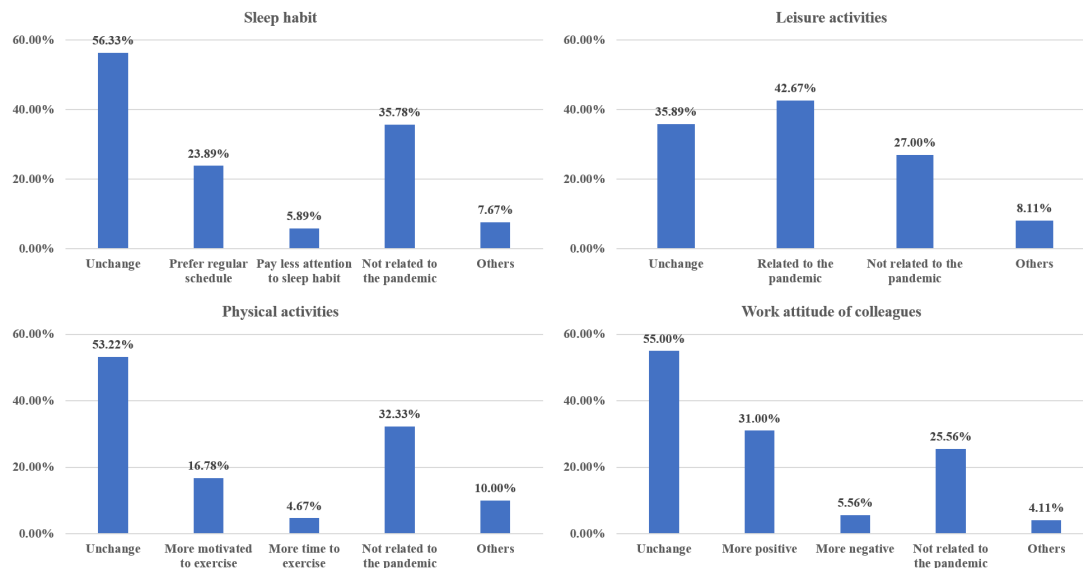
**Table 2:** Comparison of Attention to the Pandemic, Sleep Habits, Physical and Leisure Activities during and after the Pandemic

	During Pandemic (n, %)	After September (n, %)	P value
Search for COVID-19 information			<0.0001
Every day	577, 64.11%	194, 21.56%	
Often (more than 3 times per week)	227, 25.22%	311, 34.56%	
Sometimes (more than once per week)	77, 8.56%	340, 37.78%	
Lack of concern (less than once per week)	19, 2.11%	55, 6.11%	
Length of sleep			0.1634
Less than 6 hours	176, 19.56%	142, 15.78%	
6-7 hours	567, 63.00%	607, 67.44%	
8-10 hours	153, 17.00%	147, 16.33%	
More than 10 hours	4, 4.44%	4, 4.44%	
Physical activity			0.5559
None	189, 21.00%	213, 23.67%	
Rarely	287, 31.89%	293, 32.56%	
Sometimes (one or twice per week)	266, 29.56%	249, 27.67%	
Often (3-4 times per week)	139, 15.44%	124, 13.78%	
Every day	19, 2.11%	21, 2.33%	
Length of physical activity			0.3064
Less than 30 minutes	453, 50.33%	485, 53.89%	
30-60 minutes	354, 39.33%	332, 36.89%	
More than 60 minutes	93, 10.33%	83, 9.22%	
Working attitude of colleagues			0.0022
Proactive	651, 72.33%	690, 76.67%	
Demotivated	16, 1.78%	30, 3.33%	
Normal	233, 25.89%	180, 20.00%	

Length of sleep was similar during and after the pandemic ( $p = 0.1634$ ). The largest group of respondents had a length of 6-7 hours on average (63.00% and 67.44%, respectively). When asked to indicate “the impact of the COVID-19 pandemic on sleeping”, 56.33% of participants agreed with “had no impact” with the statement, 35.78% thought “irrelevant”, and only 23.89% agreed with “more regular” (Figure 3).

The frequency and length of physical activity were also similar during and after the pandemic ( $p = 0.5559$  and  $p = 0.3064$ , respectively). Speaking of the kind of physical activity (Supplementary Figure 2), the majority of respondents chose walking (brisk walking) and there was no significant difference during and after the pandemic (56.89% vs. 55.44%). The participants who chose running/jogging as the way of exercise decreased significantly after the pandemic from 31.67% to 27.33% ( $p=0.0005$ ). likewise, the selection of ball game and swimming were decreased significantly as well (16.44% to 11.00%, 7.89% to

4.67%, respectively). When asked to indicate “the impact of the COVID-19 pandemic on physical exercise”, 53.22% of participants agreed with “had no impact” with the statement, and 32.33% thought it “irrelevant”. Only 16.78% agreed with “more motivated” and 4.67% agreed with “had more time” (Figure 3).



**Figure 3:** Personal Perceptions about the Ramifications of COVID-19 Pandemic on Lifestyle

Speaking of leisure activities, no significant difference was found in terms of vacation (Supplementary Figure 3). However, the selection of traveling and get-together dropped significantly from 43.11% to 24.89% and 44.33% to 21.00%, respectively. When asked to indicate “the impact of the COVID-19 pandemic on leisure activities”, 42.67% of participants agreed with “relevant” with the statement, whereas 35.89% thought “had no impact” and 27.00% agreed with “irrelevant” (Figure 3).

The working attitude of colleagues had changed during and after the pandemic ( $p=0.0022$ ). The number of both proactive and demotivated attitudes increased after the pandemic (72.33% to 76.67%, 1.78% to 3.33%, respectively). When asked to indicate “the impact of the COVID-19 pandemic on working attitude of colleagues”, 55.00% of participants agreed with “had no impact” with the statement, 31.00% agreed with “more proactive”, and 25.56% thought “irrelevant”.

### Stratified Analyses of the Impact of COVID-19 on Lifestyle

Stratified analyses of personal perceptions about the ramifications of COVID-19 on lifestyle were done within doctors/nurses and having attended the frontline work. Stratified analyses by doctors/nurses revealed that the attention of the COVID pandemic remained statistically significant for both groups ( $p<0.0001$ ) (Table S1). Among doctors, the highest percentage for searching COVID information was every day during the pandemic (63.39%) and lack of concern after the pandemic (75.97%). While among nurses, most of the respondents searched for COVID information every during the pandemic (64.81%), and the frequency was decreased to 1-3 times per week after the pandemic (37.86%). Analysis in the doctors revealed similar levels of working attitude during and after the pandemic ( $p=0.2968$ ). However, alternation in the working attitude of colleagues remained statistically significant for the nurses ( $p=0.0038$ ). The percentages increased regarding both proactive and demotivated attitude to work (from 70.60% to 74.83% and 1.78% to 4.68%, respectively), during and after the pandemic.

Stratified analysis by the three workplaces, the attention for the COVID information revealed similar patterns among groups (Table S2). During the pandemic, the majority of responses (70.37%, 64.08%, and 52.14%, respectively) fell under the option of every day. While after the pandemic, the major options fell under often and sometimes, which included the frequency of more than 3 times and more than once per week. On the working attitude of colleagues, only participants working in the frontline in



helping Hubei Province showed alternation after the pandemic ( $p=0.0381$ ). primary percentages of proactive and demotivated were 68.52% and 1.48%, respectively, during the pandemic. And they increased to 75.93% and 2.96% after the pandemic. The working attitude in participants working in either frontline or non-frontline in this hospital remained similar during and after the pandemic ( $p=0.0954$  and  $p=0.2631$ , respectively).

## Discussion

### Main Findings

The present study provided the experiences or perceptions of medical staff and impacts on their psychological status and lifestyle on the background of COVID-19. our participants were collected from the same hospital in Guangzhou, Guangdong province, which was not the hardest-hit area and well-defended for COVID-19. However, there was a fair proportion of medical staff have been combating the COVID-19 pandemic in Hubei province when it was once the epidemic center. Moreover, in the resuming periods of China, Guangzhou continued having imported cases and being tightly supervised. This explained why the participants were still alert to risk to some extent and the changes continued after the pandemic.

### Emotional Status during the Pandemic

The outbreak of COVID-19 has brought enormous physical and psychological pressure on the medical staff. The medical staff was under a risky anti-pandemic situation, experiencing significant psychological stressors. Both frontline work and quarantine are stressful life events for medical staff [10]. Stressful life events often led to anxiety and depression [11-13]. Previous research showed that stressful situations at work exacerbated the anxiety and depression among medical staff [14]. Recent articles evaluated mental health, especially focusing on a high prevalence of anxiety and depression among medical staff [15-22]. A snapshot survey by the British Medical Association found that 44% of doctors suffered from work-related anxiety, depression, stress, or burnout during the COVID-19 pandemic [23]. Several studies conducted in China during the COVID-19 outbreak indicated a high incidence of psychological problems among medical staff [24-26], with approximately 12.2-50.4% depression, 13.0-44.6% anxiety, and 71.5% distress. India [27] reported that 12.4%, 17.1%, and 3.8% of medical staff suffered from depression, anxiety, and stress, respectively. Singapore [28] also reported symptoms of depression (8.9%), anxiety (14.5%), and stress (6.6%) among medical staff. The present study reported a prevalence of anxiety (60.11%), calm (50.33%), upset (30.67%), irritability (18.89%), grief (16.00%), and depression (12.78%), which were different from the abovementioned research. The emotional assessment was based on an online survey and self-reported, which were lacking in the professional diagnosis of psychiatrists. However, the present study provided multiple options of emotional status not only anxiety and depression but also positive emotion such as calm, relaxation, and delight.

### Sleep Habits

Sleep problems have been identified as another health consequence of stress [29, 30]. It could be a normal stress reaction for medical staff to worry about their physical health threatened by the transmittable virus. However, when the worries persisted or worsened to be anxiety or fears, in a severe sense, they could affect sleep quality and presented as sleep disturbance, early wakes, or nightmares. During the COVID-19 pandemic, researchers regarded sleep quality as an important health indicator [31-33]. A study focusing on frontline medical staff in China showed the prevalence of poor sleep quality (38.9%) was high [34] and similar to the result of a meta-analysis study, that is 38.9% for insomnia<sup>6</sup>. In our survey, poor sleep quality was not the main theme reported by most of the participants. This was inconsistent with previous studies, where frontline medical staff held high prevalence rates of poor sleep quality [25, 26, 31, 35, 36].

### Physical and Leisure Activities



The 2021 Medscape online survey [37] with more than 12000 US physicians in over 29 specialties showed 71% of physicians exercised two or more times a week. Nearly half of all physicians take 3-4 weeks of vacation, while a fifth take 5 or more weeks away from their work, which was similar to the findings of the 2020 Medscape report. The report on Healthy Lifestyle of more than 6000 Chinese Physicians [5], carried out before the COVID-19 pandemic began, showed that 63.4% of male doctors and 62.4% of female doctors believed that their lifestyle was unhealthy and needed adjustment. And most of them realize that they lack time to communicate with family and friends. The report indicated that exercise could help relieve burnout. The fulfillment of annual vacation could also help, given past research found that 23.6% of them have no annual vacation time [38]. The study provides baseline data about burnout among Chinese medical staff, which could help in the analysis and interpretation of burnout during the COVID-19 pandemic. In the present study, the respondents agreed on lifestyle changes due to COVID-19, since social distancing is an essential part of controlling the COVID-19 pandemic [39].

## Work Attitude

Previous studies showed that some medical staff experienced mental health difficulties after encountering adversity [40], while others found that this pandemic brought a new look to their careers and provided them with resilience despite the burnout [41]. Consistent with the abovementioned research, the medical staff participating in the present study also manifested a more positive and negative work attitude simultaneously. The proactive attitude might be associated with the relatively stable situation and advanced coping strategies towards COVID-19 in China [42].

## Changes in the Subgroups

Notably, nurses, under the impact of COVID-19, need to devote more time to the work, take more protective but fussy measures. Additionally, there were a higher proportion of nurses, compared to doctors and other occupations in the screening department, fever clinics, ICU, ED. In the present study, the working attitude of nurses had a significant alternation after the pandemic. This could be due to the disparity of working content between doctors and nurses.

It is worth noting that medical staff who took care of patients with COVID-19 were more prone to psychological disorders and illnesses, such as burnout, post-traumatic stress disorder, anxiety, depression, and insomnia. The working scenario was a risk factor since people who are closer to the epidemic center are more likely to bear psychological pressure. The present study divided medical staff into subgroups according to their exposure risk. The results showed that frontline workers combating the COVID-19 in Hubei Province during the pandemic manifested changes in working attitudes significantly. The polarized result revealed the different adaptation after experiencing adversity and burnout. The heavy but distinguished toll on health-care workers might explained the different changes on lifestyles and working attitude.

## Limitation

Several limitations of this study merit discussion. First, the survey was conducted via social media and was distributed non-randomly, so selection bias should be acknowledged. Second, the questionnaire was relatively simplified, lacking a comprehensive understanding of other variables, including marriage, income, family issues, and social support. Third, a homogenous sample of medical staff within one tertiary hospital would influence the generalization of the findings. We intend to provide our findings as valuable data to other regions where the rough battle against COVID-19 is still ongoing.

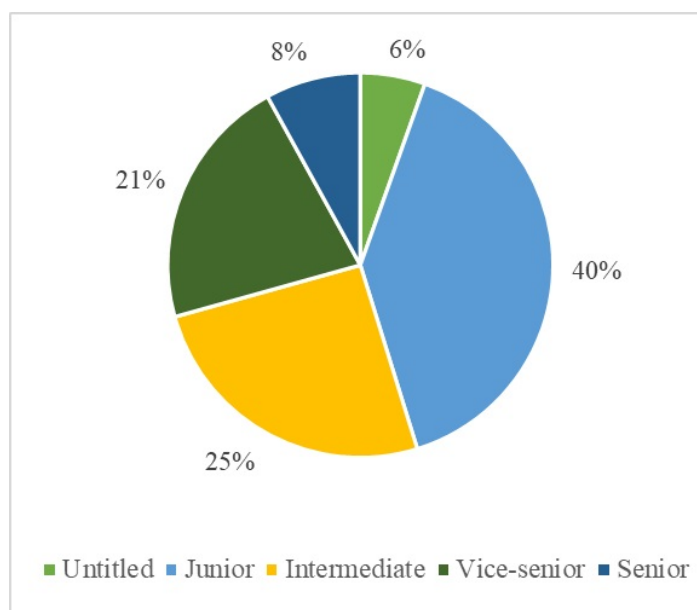
Therefore, it is crucial to investigate the emotional status and lifestyle changes of the medical staff during the “post-pandemic” period in China. However, research on the lifestyle changes of medical staff under the COVID-19 pandemic was rarely performed. By acknowledging the commonality and discrepancy of emotional status and lifestyle related to caring for the COVID-19, our study assisted the formulation of the recovery program for the medical staff under the public health events, in-

cluding education, protection, and compensation.

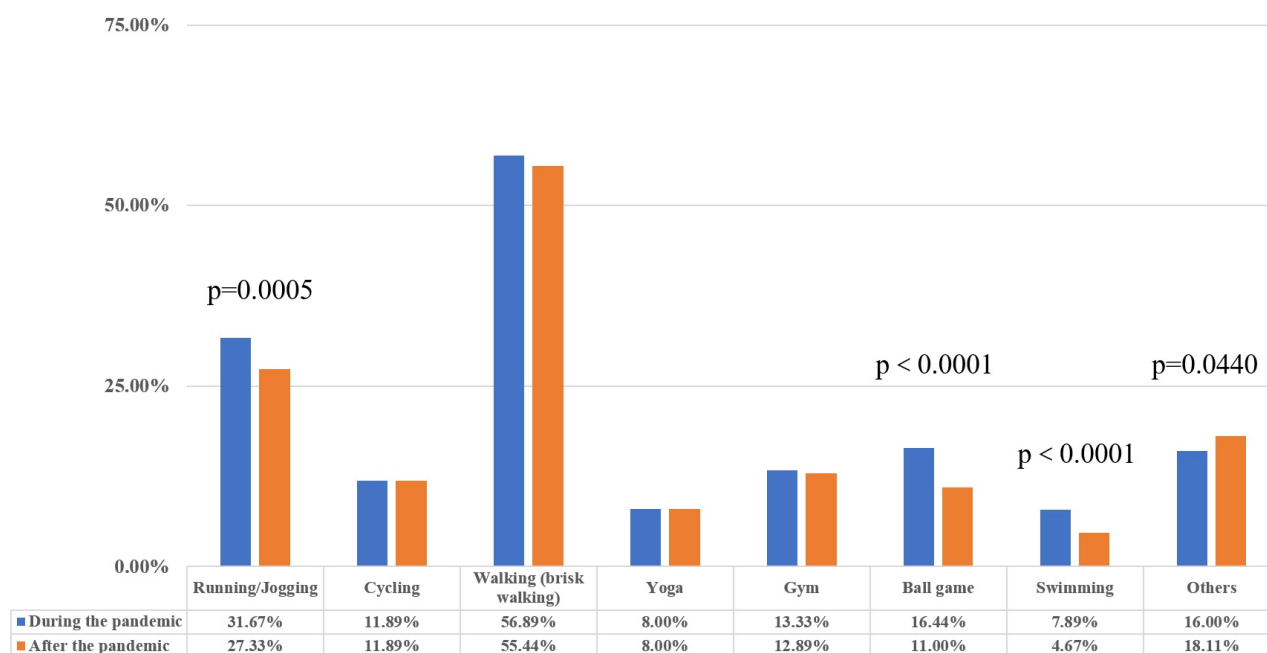
## Conclusion

Although the COVID-19 is still prevalent all over the world, some countries are bringing the pandemic under control, with gradually adopted epidemic prevention and control measures. Such measures force changes in lifestyle during the post-pandemic period among medical staff. The present study shared our experience with others in the medical field. We hope that this will encourage more attention to be paid to this issue. 3 Personal Perceptions about the Ramifications of COVID-19 Pandemic on Lifestyle

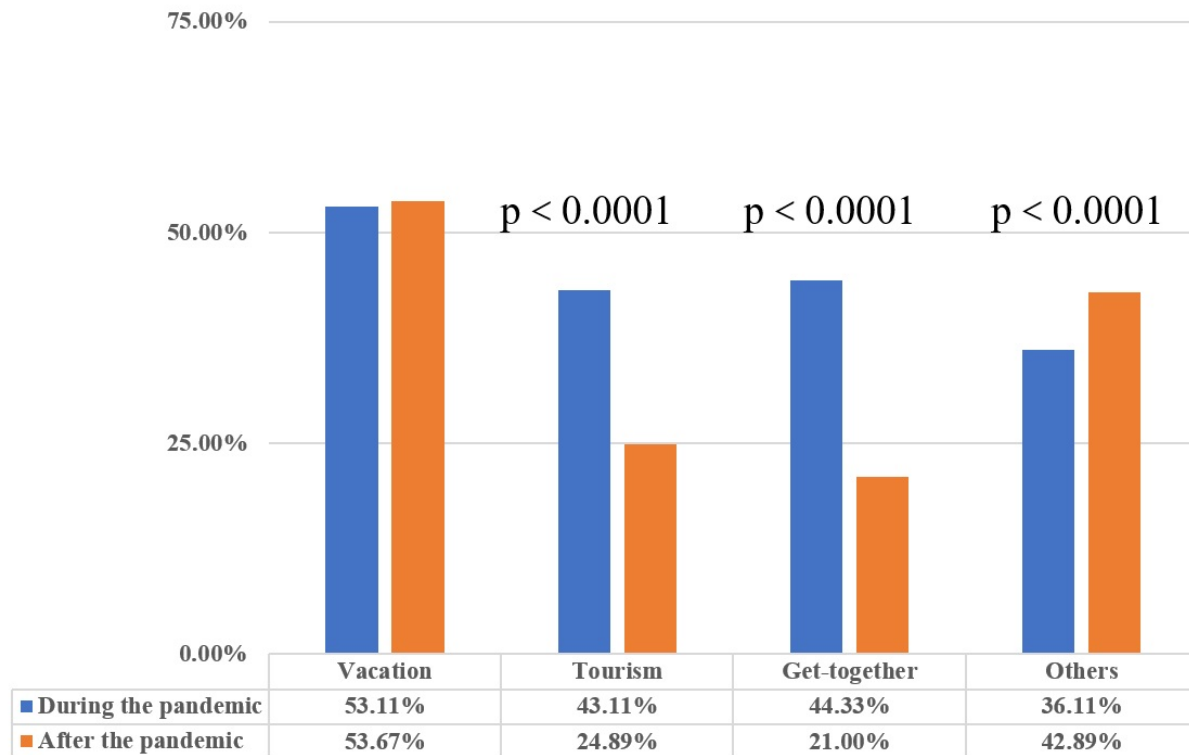
## Supplementary Information



**Supplementary Figure 1:** The Proportion of Professional Title among Participants



**Supplementary Figure 2:** Comparison of the Kind of Physical Activity during and after the Pandemic



**Supplementary Figure 3:** Comparison of the Kind of Leisure Activity during and after the Pandemic

**Supplementary Table 1:** Comparison of Lifestyle during and after the Pandemic in Subgroup of Doctors and Nurses

	Doctor (N=437)			Nurse (N=449)		
	During Pandemic (n, %)	After September (n, %)	P value	During Pandemic (n, %)	After September (n, %)	P value
Search for COVID-19 information			<0.0001			<0.0001
Every day	277, 63.39%	95, 21.74%		291, 64.81%	99, 22.05%	
Often (more than 3 times per week)	121, 27.69%	144, 32.95%		104, 23.16%	158, 35.19%	
Sometimes (more than once per week)	31, 7.09%	165, 37.76%		44, 9.80%	170, 37.86%	
lack of concern (less than once per week)	8, 1.83%	332, 75.97%		10, 2.23%	22, 4.90%	
length of sleep			0.7648			0.1563
Less than 6 hours	86, 19.68%	79, 18.08%		85, 18.93%	61, 13.59%	
6-7 hours	280, 64.07%	292, 66.82%		278, 61.92%	303, 67.48%	
8-10 hours	70, 16.02%	64, 14.65%		83, 18.49%	83, 18.49%	
More than 10 hours	1, 0.23%	2, 0.46%		3, 0.67%	2, 0.45%	
Physical activity			0.6177			0.6752
None	65, 14.87%	77, 17.62%		123, 27.39%	135, 30.07%	
Rarely	127, 29.06%	138, 31.58%		154, 34.30%	151, 33.63%	

Sometimes (one or twice per week)	143, 32.72%	131, 29.98%		121, 26.95%	115, 25.61%	
Often (3-4 times per week)	90, 20.59%	81, 18.54%		45, 10.02%	38, 8.46%	
Every day	12, 2.75%	10, 2.29%		6, 1.34%	10, 2.23%	
Length of physical activity			0.2322			0.7914
Less than 30 minutes	187, 42.79%	212, 48.51%		262, 58.35%	268, 59.69%	
30-60 minutes	193, 44.16%	172, 39.36%		153, 34.08%	152, 33.85%	
More than 60 minutes	57, 13.04%	53, 12.13%		34, 7.57%	29, 6.46%	
Working attitude of colleagues			0.2968			0.0038
Proactive	325, 74.37%	344, 78.72%		317, 70.60%	336, 74.83%	
Demotivated	7, 1.60%	7, 1.60%		8, 1.78%	21, 4.68%	
Normal	105, 24.03%	86, 19.68%		124, 27.62%	92, 20.49%	

**Supplementary Table 2:** Comparison of Lifestyle during and after the Pandemic in Subgroup of Varied Exposure to COVID-19 Cases

	Frontline Work in Hubei Province (N=270)			Frontline Work in the Hospital (N=490)			Non-frontline Work in the Hospital (N=140)		
	During Pandemic (n, %)	After Sep. (n, %)	P value	During Pandemic (n, %)	After Sep. (n, %)	P value	During Pandemic (n, %)	After Sep. (n, %)	P value
Search for COVID-19 information			<0.0001			<0.0001			<0.0001
Every day	190, 70.37%	54, 20.00%		314, 64.08%	115, 23.47%		73, 52.14%	25, 17.86%	
Often (more than 3 times per week)	62, 22.96%	103, 38.15%		122, 24.90%	154, 31.43%		43, 30.71%	54, 38.57%	
Sometimes (more than once per week)	14, 5.19%	93, 34.44%		40, 8.16%	197, 40.20%		23, 16.43%	50, 35.71%	
Lack of concern (less than once per week)	4, 1.48%	20, 7.41%		14, 2.86%	24, 4.90%		1, 0.71%	11, 7.86%	
Length of sleep			0.1284			0.6416			0.9414
Less than 6 hours	59, 21.85%	42, 15.56%		92, 18.78%	77, 15.71%		25, 17.86%	23, 16.43%	

6-7 hours	165, 61.11%	185, 68.52%		316, 64.49%	331, 67.55%		86, 61.43%	91, 65.00%	
8-10 hours	46, 17.04%	43, 15.93%		79,16.12%	79, 16.12%		28, 20.00%	25, 17.86%	
More than 10 hours				3, 0.61%	3, 0.61%		1, 0.71%	1, 0.71%	
Physical activity			0.585			0.6247			0.7627
None	54, 20.00%	64, 23.70%		110, 22.45%	120, 24.49%		25, 17.85%	29, 20.71%	
Rarely	83, 30.74%	86, 31.85%		161, 32.86%	163, 33.27%		43, 30.71%	44, 31.43%	
Sometimes (one or twice per week)	80, 29.63%	67, 24.81%		138, 28.16%	142, 28.98%		48, 34.29%	40, 28.57%	
Often (3-4 times per week)	48, 17.78%	45, 16.67%		71, 14.49%	59, 12.04%		20, 14.29%	20, 14.29%	
Every day	5, 1.85%	8, 2.96%		10, 2.04%	6, 1.22%		4, 2.86%	7, 5.00%	
Length of physical activity			0.6231			0.3257			0.7726
Less than 30 minutes	126, 46.67%	137, 50.74%		252, 51.43%	274, 55.92%		75, 53.57%	74, 52.86%	
30-60 minutes	111, 41.11%	104, 38.52%		186, 37.96%	173,35.31%		57, 40.71%	55, 39.29%	
More than 60 minutes	33, 12.22%	29, 10.74%		52, 10.61%	43, 8.78%		8, 5.71%	11, 7.86%	
Working attitude of colleagues			0.0381			0.0954			0.2631
Proactive	185, 68.52%	205, 75.93%		361, 73.67%	269, 54.90%		105, 75.00%	116, 82.86%	
Demotivated	4, 1.48%	8, 2.96%		11, 2.24%	21, 4.29%		1, 0.71%	1, 0.71%	
Normal	81, 30.00%	57, 21.11%		118, 24.08%	100, 20.41%		34, 24.29%	23, 16.43%	

## Survey on the Healthy Life Concept of Medical Staff during and After the Pandemic

The purpose of this questionnaire is to understand the physical exercise status of medical staff during and after the pandemic, as well as the changes in their attitudes towards healthy life.

### 1. Your gender

- Male
- Female

2. Date of Birth\_\_\_\_\_

3. Your Job Title

- Not Obtained
- Primary
- Intermediate
- Vice Senior
- Senior

4. Your Occupation

- Doctors
- Nurse
- Administration Staff

5. Your City\_\_\_\_\_

6. Are you involved in the frontline anti-pandemic work?

- Yes, participate in the front-line work of helping Hubei to fight the pandemic
- Yes, work in the ICU, fever clinic, emergency department, infection department, isolation ward and other departments of this hospital
- No, participate in non-frontline work in other departments of the hospital

7. The COVID-19 pandemic lasted for several months. How did you feel about it? [Multiple Choice Questions]

- Anxiety
- Relaxed
- Irritability
- Cheerful
- Upset
- Grieved

- Calm
- Depressed

8. During the pandemic (approximately before September, 2020), how often did you check the number of new confirmed cases nationwide and the situation in nearby areas?

- Every Day
- Often (>3 Times/Week)
- Occasionally (>1 Time/Week)
- Don't Pay Attention (<1 Time/Week)

9. After the pandemic (approximately after September, 2020), how often did you check the number of new confirmed cases nationwide and the situation in nearby areas?

- Every Day
- Often (>3 Times/Week)
- Occasionally (>1 Time/Week)
- Don't Pay Attention (<1 Time/Week)

10. During the pandemic (approximately before September, 2020), how many hours did you sleep per day?

- Less than 6 hours
- 6~7 hours
- 8~10 hours
- More than 10 hours

11. After the pandemic (approximately after September, 2020), how many hours do you usually sleep per day?

- Less than 6 hours
- 6~7 hours
- 8~10 hours
- More than 10 hours

12. Subjectively, what factors are related to sleep habits during and after the pandemic? [Multiple Choice Questions]

- My sleep habits have not changed



- The pandemic has made me pay more attention to regular work and rest
- The pandemic made me pay less attention to sleep
- The change in my sleep habits is not directly related to the pandemic
- other\_\_\_\_\_

13. During the pandemic (approximately before September, 2020), your willingness to leisure activities [multiple choice questions]

- Vacation
- Tourism
- Get Together
- Other

14. After the pandemic (approximately after September, 2020), your willingness to leisure activities [multiple choice questions]

- Vacation
- Tourism
- Get-Together
- Other

15. Subjectively, what factors are related to leisure habits during and after the pandemic? [Multiple Choice Questions]

- My leisure habits have not changed
- The change in my leisure habits is directly related to the pandemic
- The change in my leisure habits is not directly related to the pandemic
- other\_\_\_\_\_

16. Did you usually exercise at home during the pandemic?

- No, too lazy to move
- Rarely, several times a month
- Occasionally, once or twice a week
- Often, three to four times a week
- Every day

17. What exercises were the main exercises during the pandemic [multiple choice questions]

Running/jogging

- Cycling
- Walking (Brisk Walking)
- Yoga
- Gym
- Ball Game
- Swimming
- Other \_\_\_\_\_

18. The average length of each exercise during the pandemic

- <30min
- 30-60min
- >60min

19. After the pandemic, did you usually exercise at home?

- No, too lazy to move
- Rarely, several times a month
- Occasionally, once or twice a week
- Often, three to four times a week
- Every day

20. After the pandemic, what exercise will be the main exercise [multiple choice]

Running/jogging

- Cycling
- Walking (brisk walking)
- Yoga
- Gym

- Ball Game
- Swimming
- Other \_\_\_\_\_

21. The average length of each exercise after the pandemic

- <30min
- 30-60min
- >60min

22. Subjectively, what factors are related to changes in exercise habits during and after the pandemic? [Multiple Choice Questions]

- My exercise habits have not changed
- The pandemic has made me more motivated to exercise
- The pandemic has given me more time to exercise
- The change in my exercise habits is not directly related to the pandemic
- other \_\_\_\_\_

23. During the pandemic, what do you think of your colleagues' work attitude

- Mostly proactive
- Mostly passive sabotage
- Mostly treated in general

24. After the pandemic, what do you think of the work attitude of your colleagues

- Mostly proactive
- Mostly passive sabotage
- Mostly treated in general

25. Subjectively, what factors are related to changes in colleagues' work attitudes during and after the pandemic? [Multiple Choice Questions]

- The work attitude of colleagues has not changed
- The pandemic has made colleagues more positive at work

- The pandemic has made colleagues' work attitudes more negative
- The change in colleagues' work attitude is not directly related to the pandemic
- other \_\_\_\_\_

## Declarations

### Ethics Approval and Consent to Participate

Since the current study used data that were obtained solely from medical staff, the Ethics Committee did not have to review the protocol

### Consent for Publication

All authors gave their consent for publication

### Availability of Data and Materials

No additional data

### Competing Interests

The author declares that there is no conflict of interests

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Huan Ma: Writing - review & editing.

Bangjun Luo: Interpretation of data.

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Tiehe Qin: Project administration.

Xiuchan Song: Data curation.

Shouhong wang: Funding acquisition.

Feier Song: Formal analysis, Writing - original draft.

All authors read and approved the final manuscript

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## References

1. Guddati A (2020) Protection of Health Care Professionals During an Epidemic: Medical, Ethical, and Legal Ramifications. *Interact J Med Res*, 9: e19144.
2. Burki T (2020) China's successful control of COVID-19. *Lancet Infect Dis*, 20: 1240-1.
3. Benedek DM, Fullerton C, Ursano RJ (2007) First responders: mental health consequences of natural and human-made disasters for public health and public safety workers. *Annu Rev Public Health*, 28: 55-68.
4. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S et al. (2020) The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet*, 395: 912-20.
5. Xu X (2020) Survey Report on Chinese Physicians' Healthy Lifestyle. *Food Industry*, 9: 22-3.
6. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsis E (2020) Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain Behav Immun*, 88: 901-7.
7. Azoulay E, Cariou A, Bruneel F, Demoule A, Kouatchet A (2020) Symptoms of Anxiety, Depression, and Peritraumatic Dissociation in Critical Care Clinicians Managing Patients with COVID-19. A Cross-Sectional Study. *Am J Respir Crit Care Med*, 202: 1388-98.
8. Carmassi C, Foghi C, Dell'Oste V, Cordone A, Bertelloni CA et al. (2020) PTSD symptoms in healthcare workers facing the three coronavirus outbreaks: What can we expect after the COVID-19 pandemic. *Psychiatry Res*, 292: 113312.
9. Giusti EM, Pedrolis E, D'Aniello GE, Stramba Badiale C, Pietrabissa G et al. (2020) The Psychological Impact of the COVID-19 Outbreak on Health Professionals: A Cross-Sectional Study. *Front Psychol* 2020, 11:1684.
10. Gomez-Duran EL, Martin-Fumado C, Forero CG (2020) Psychological impact of quarantine on healthcare workers. *Occup*

Environ Med, 77: 666-74.

11. Kessler RC (1997) The effects of stressful life events on depression. *Annu Rev Psychol* 1997, 48:191-214.
12. Schneiderman N, Ironson G, Siegel SD (2005) Stress and health: psychological, behavioral, and biological determinants. *Annu Rev Clin Psychol*, 1: 607-28.
13. Tennant C (2002) Life events, stress and depression: a review of recent findings. *Aust N Z J Psychiatry*, 36: 173-82.
14. Weinberg A, Creed F (2000) Stress and psychiatric disorder in healthcare professionals and hospital staff. *Lancet*, 355: 533-7.
15. Kang L, Li Y, Hu S, Chen M, Yang C et al. (2020) The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *Lancet Psychiatry*, 7: e14.
16. Zhou SJ, Zhang LG, Wang LL, Guo ZC, Wang JQ et al. (2020) Prevalence and socio-demographic correlates of psychological health problems in Chinese adolescents during the outbreak of COVID-19. *Eur Child Adolesc Psychiatry*, 29: 749-58.
17. Moghanibashi-Mansourieh A (2020) Assessing the anxiety level of Iranian general population during COVID-19 outbreak. *Asian J Psychiatr*, 51: 102076.
18. Huang Y, Zhao N (2020) Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res*, 288: 112954.
19. Xiong J, Lipsitz O, Nasri F, Lui LMW, Gill H (2020) Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *J Affect Disord*, 277: 55-64.
20. Luo M, Guo L, Yu M, Jiang W, Wang H (2020) The psychological and mental impact of coronavirus disease 2019 COVID-19. on medical staff and general public - A systematic review and meta-analysis. *Psychiatry Res*, 291: 113190.
21. Salari N, Hosseini-Far A, Jalali R, Vaisi-Raygani A, Rasoulpoor S et al. (2020) Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Global Health*, 16: 57.
22. Salari N, Khazaie H, Hosseini-Far A, Khaledi-Paveh B, Kazemini M et al. (2020) The prevalence of stress, anxiety and depression within front-line healthcare workers caring for COVID-19 patients: a systematic review and meta-regression. *Hum Resour Health*, 18: 100.
23. JM (2020) Stress and burnout warning over COVID-19.
24. Zhang WR, Wang K, Yin L, Zhao WF, Xue Q et al. (2020) Mental Health and Psychosocial Problems of Medical Health Workers during the COVID-19 Epidemic in China. *Psychother Psychosom*, 89: 242-50.
25. Lu W, Wang H, Lin Y, Li L (2020) Psychological status of medical workforce during the COVID-19 pandemic: A cross-sectional study. *Psychiatry Res*, 288: 112936.
26. Lai J, Ma S, Wang Y, Cai Z, Hu J et al. (2019) Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA Netw Open*, 3: e203976.

27. Chew NWS, Lee GKH, Tan BYQ, Jing M, Goh Y et al. (2020) A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain Behav Immun* 2020, 88:559-65.
28. Tan BYQ, Chew NWS, Lee GKH, Jing M, Goh Y et al. (2020) Sharma VK: Psychological Impact of the COVID-19 Pandemic on Health Care Workers in Singapore. *Ann Intern Med* 2020, 173:317-20.
29. Harvey AG, Jones C, Schmidt DA (2003) Sleep and posttraumatic stress disorder: a review. *Clin Psychol Rev*, 23: 377-407.
30. Stachele T, Domes G, Wekenborg M, Penz M, Kirschbaum C et al. (2020) Effects of a 6-Week Internet-Based Stress Management Program on Perceived Stress, Subjective Coping Skills, and Sleep Quality. *Front Psychiatry* 2020, 11: 463.
31. Xiao H, Zhang Y, Kong D, Li S, Yang N (2020) The Effects of Social Support on Sleep Quality of Medical Staff Treating Patients with Coronavirus Disease 2019 COVID-19. in January and February 2020 in China. *Med Sci Monit*, 26: e923549.
32. Grey I, Arora T, Thomas J, Saneh A, Tohme P, Abi-Habib R (2020) The role of perceived social support on depression and sleep during the COVID-19 pandemic. *Psychiatry Res* 2020, 293:113452.
33. Zhao X, Lan M, Li H, Yang J (2021) Perceived stress and sleep quality among the non-diseased general public in China during the 2019 coronavirus disease: a moderated mediation model. *Sleep Med*, 77: 339-45.
34. Zhang X, Zou R, Liao X, Bernardo ABI, Du H et al. (2020) Perceived Stress, Hope, and Health Outcomes Among Medical Staff in China During the COVID-19 Pandemic. *Front Psychiatry*, 11: 588008.
35. Liu S, Yang L, Zhang C, Xiang YT, Liu Z et al. (2020) Online mental health services in China during the COVID-19 outbreak. *Lancet Psychiatry*, 7: e17-e8.
36. Zhou Y, Zhou Y, Song Y, Ren L, Ng CH et al. (2020) Tackling the mental health burden of frontline healthcare staff in the COVID-19 pandemic: China's experiences. *Psychol Med*, 2020: 1-2.
37. Martin KL (2021) Medscape Physician Lifestyle & Happiness Report.
38. Gao L, Xiao X, Che G, Zhang L (2019) Sudden Death of Physicians in China: A Red Alert. *Popul Health Manag*, 22: 191-2.
39. Glass RJ, Glass LM, Beyeler WE, Min HJ (2006) Targeted social distancing design for pandemic influenza. *Emerg Infect Dis*, 12: 1671-81.
40. Williamson V, Stevelink SAM, Greenberg N (2018) Occupational moral injury and mental health: systematic review and meta-analysis. *Br J Psychiatry*, 212: 339-46.
41. Brooks S, Amlot R, Rubin GJ, Greenberg N (2020) Psychological resilience and post-traumatic growth in disaster-exposed organisations: overview of the literature. *BMJ Mil Health* 166: 52-6.
42. NHCotPsRo C (2020) Press conference of COVID-19. 2020.