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Occupational burnout and stress of nurses in Taiwan regarding COVID-19: An intervention with gong medication

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Abstract

Aims: This study aimed to explore the effectiveness of gong meditation on nurses' perceived stress and occupational burnout during the COVID-19 pandemic.

Background: Nurses play an important role in hospitals, and they currently encounter additional stress due to the COVID-19 pandemic.

Design and Methods: In this experimental study, participants were provided intervention with seven sections of gong meditation, and each session lasted for approximately 50–60 min. Data were collected from July 2020 to February 2021. Eighty nurses were randomly assigned to the experimental or control group, and 79 completed all the processes of our protocol. Generalized estimating equations (GEE) were used in data analysis.

Results: Compared with the control group, the experimental group experienced significant improvements in stress and occupational burnout.

Conclusions: Gong meditation can effectively alleviate stress and occupational burnout among nurses during the COVID-19 pandemic.

Implications for nursing management: Gong meditation can be provided by hospital managers to all nurses to reduce their stress, occupational burnout and subsequent mental health problems. Additionally, we suggest that gong meditation can be used as an effective intervention for individuals in other occupational fields, as it is accessible and inexpensive intervention.

KEYWORDS
COVID-19 pandemic, gong meditation, occupational burnout, perceived stress, smartwatch

1 | INTRODUCTION

The coronavirus disease (COVID-19) was first detected in Wuhan, China, in December 2019, and what began as an epidemic has since gradually progressed to a pandemic (World Health Organization, 2021). The rapid spread in European and American countries starting March 2020 has overwhelmed the global health care system. It was reported that there have been 239,903,302 confirmed cases, with 4,902,837 deaths. According to the data published by the Department of Disease Control as of October 2021, Taiwan has 16,337 confirmed cases and 846 deaths (Taiwan Centers for Disease Control, 2021). Generally, the COVID-19 pandemic exacerbated the physical and mental exhaustion among the medical staff. *Globally*, nursing is known as a *stressful job*. Past studies have found that approximately 66% of the nursing staff suffered from occupational burnout under high work stress, ranking highest among all

medical professionals (Liu et al., 2018; Liu & Aungsuroch, 2019). The COVID-19 pandemic made nursing care more challenging and exacerbated such circumstance with stress, anxiety, depression, post-traumatic stress disorder (PTSD) and sleep disorders among those health care providers on the frontlines (Giorgi et al., 2020; Pappa et al., 2020), and this phenomenon was also observed in Taiwan and documented in some studies (Huang et al., 2021; Shen et al., 2020).

Some studies have emphasized that nurses caring for confirmed or suspected COVID-19 patients are constantly worried about the risk of exposure to this viral infection in this pandemic (Wang et al., 2021, 2020). The possibility of getting infected this novel coronavirus and transmitting to their family members is of great concern among health care providers, and this increased distress may contribute to their occupational burnout (Chen et al., 2021). The sever acute respiratory syndrome (SARs) epidemic occurred in 2003 in Taiwan, and it was documented that the health care providers who cared for patients with SARs without any intervention still suffered from anxiety, depressive symptoms and PTSD 1 to 2 years after the SARs outbreak (Chong et al., 2004). Therefore, timely intervention should be provided health care providers to reduce their psychological problems. Many interventions are proved to be effective for nurses to reduce or develop job-related emotional or psychological problems, such as mindfulness-based interventions (Sanilevici et al., 2021), FOREST intervention (Internet-based CBT and mindfulness-based programme) (Jovarauskaite et al., 2021) and gratitude writing intervention (Fekete & Deichert, 2022). Gong meditation was also effective for alleviating stress (Quach & Lee, 2017) and several studies have showed that gong meditation made people relaxed, feeling calmer and happier (Goldsby et al., 2017; Pesek & Bratina, 2016). Gong meditation requires participants to 'clear their mind' or focus on something in particular, and it is regarded as a form of sound bath for physical and emotional relaxation (Goldsby et al., 2017; Pesek & Bratina, 2016). It has been applied in the ancient times for ceremonies and death rituals and continued for several centuries (Alperson et al., 2007; Pesek & Bratina, 2016). Gong meditation has been documented to allow an individual's brain to relax into an alpha-dominant or theta-dominant brainwave state, additionally making people feel calmer and happier (Quach & Lee, 2017). The sound of a gong can be strong and rich in harmonics, and it can stimulate dermatomes as the vibration travels to the body (Bajwa & Al Khalili, 2021). Some studies have pointed out the effectiveness of sound therapies in treating physical problems and emotional disorders (Wang & Agius, 2018; Witusik & Pietras, 2019), and investigations have shown a significant reduction in anxiety among participants who received gong intervention. Thus, sound therapies may lead to an impetus for work and better physical and mental well-being (Goldsby et al., 2017; Pesek & Bratina, 2016). However, there was no study that used gong meditation to reduce health care providers' stress and occupational burnout during the COVID-19 pandemic. In this study, we try to use gong meditation as an intervention and evaluate its effectiveness on nurses during the COVID-19 pandemic. Modern electronic devices are identified to be able to measure a wide range of physiological indies (Lyons et al., 2014), and more and more functions were developed in recent years. These devices, such as smartwatch and fitness bracelets, can accurately measure physical activity, breathing rate and heart rate, and analyse different sleep stages (Renevey et al., 2018). It was found that the accuracy, sensitivity and specificity on measuring participants' sleep by the Garmin smartwatch were 94.79%, 97.13% and 93.86%, respectively (Liu, 2020).

1.1 | Aim

We thus provided gong meditation as an intervention for nurses to reduce *stress*. This study aimed to explore the effectiveness of gong meditation on the perceived stress and occupational burnout of nurses during the period of COVID-19 pandemic. We hypothesized that the intervention would be associated with greater improvements in the perceived stress and occupational burnout compared with the control group.

2 | METHOD

2.1 | Design and participants

This experimental study employed convenience sampling. Using a coin toss, participants were randomized into an experimental or a control group. The Occupational Burnout Inventory (OBI) and Perceived Stress Scale (PSS) questionnaires and physiological measurements using a Garmin smartwatch (Vivosmart 4 device) parameters were measured before and after gong meditation.

The sample size was calculated using the G power 3.1.1 version by the F test and its repeated measures with an effect size of 0.25, the significance level of .05, and a power $(1 - \beta)$ of 0.80. The sample size was calculated using the G power 3.1.1 version by the F test and its repeated measures with an effect size of 0.25, the significance level of .05 and a power $(1 - \beta)$ of 0.80, and the estimated minimum sample size was 68 participants (Faul et al., 2009). The estimated minimum sample size was 68 participants.

Eighty nurses were recruited from a medical centre. Prior to data collection, the principal investigator explained the purpose and process to the nurses in each ward and invited them to participate in this study. The inclusion criteria were nurses who (1) had worked for at least 3 months and (2) owned a smartphone. The exclusion criterion for this study was participants who had existing mental disorders such as depression and generalized anxiety disorder. Among all participants, only one participant of the control group did not complete all processes of the study and dropout rate 1.25%. Finally, 79 nurses met the inclusion criteria and completed the study.

2.2 | Gong meditation protocol

All participants were required to wear a smartwatch (Garmin Vivosmart 4) provided by the research team for physiological data

recording and to fill out the demographic characteristics, OBI and PSS questionnaires. One week after the experiment, they were requested to complete two questionnaires again. In the control group, we only gave them smartwatch for measuring their stress without any intervention, whereas in the experimental group, we provided them intervention with gong meditation. In the experimental group, participants were instructed at the beginning of a gong meditation to relax, enjoy the meditation. They were covered with blankets and comfortably lying on soft sleeping pads. Then they were guided into meditation by the qualified gong therapist with certificate who struck the gong with real-time adjusted rhythm which depended on the sense of emotional resonance among the participants and gong therapist. Participants underwent a series of gong intervention for seven times, recorded as T1 to T7, on two consecutive days at the same time interval (10:00–20:00 h) to minimize circadian effects (Conreaux, 1994; Pesek & Bratina, 2016; Zhang, 2019). Each session lasted for approximately 50–60 min (Goldsby et al., 2017), and every participant had a 60-min break between sessions. The control group did not receive any intervention and they can take a rest any time during the same period (Figure 1).

2.3 | Data collection and ethical considerations

This study was approved by the Institutional Review Board (no. KMUHIRB-E (II)-20200304) of the Kaohsiung Medical University Hospital prior to its conduct. The principal investigator approached eligible participants individually, invited them to participate, and explained the purpose of the study. Participants were also informed that their participation was voluntary and that they had the right to terminate their participation at any time, and no reason is necessary. All participants were assured of data confidentiality and anonymity. Written informed consent was obtained from all the participants.
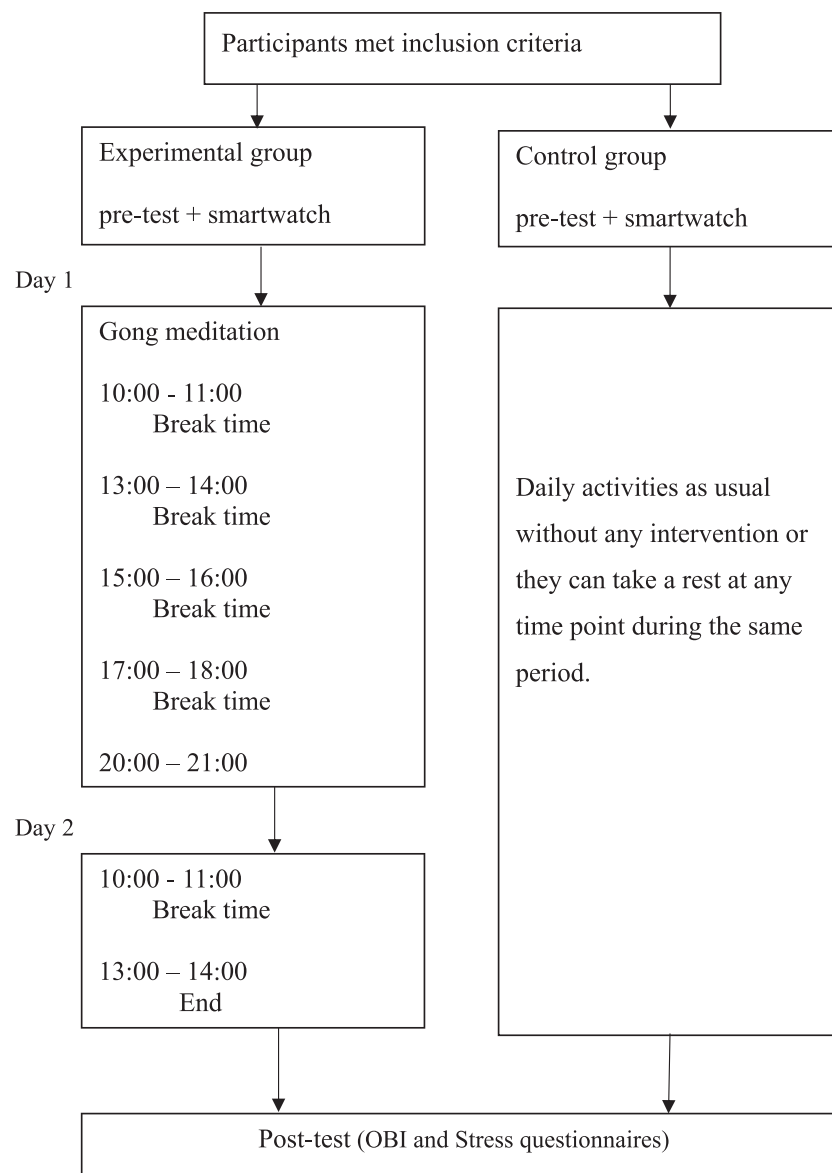

FIGURE 1 Study process

Self-reported questionnaires were collected during the pretest and posttest. For all participants, physiological stress indices were recorded using a Garmin smartwatch throughout the study. For the experimental group, we collected the data at baseline and the seven sections of gong meditation on the 2 days, and the detailed time of all sections were as follows: 10:00–11:00, 13:00:1400, 15:00–16:00, 17:00–18:00 and 20:00–21:00 (first day) and 10:00–11:00, 13:00–14:00 (second day), after each experiment session (Conreaux, 1994). We collected the mean values of stress during each period of gong meditation therapy. We also collected the mean values of stress of the control group at the same time point and interval as the experimental group. All data were recorded by the Cloud service and collected from July 2020 to February 2021.

2.4 | Instruments

Demographic basic information, the OBI and PSS questionnaires, and the physiological index were assessed prior to intervention.

2.5 | Physiological measurements

We used a smartwatch 'Garmin Vivosmart 4' smartwatch (Garmin Ltd., Taiwan) with a Connect TM application named Wearable Metronome was used to evaluate participants' objective stress level in this study. 'Garmin Vivosmart 4' smartwatch has step, calorie, staircase, sleep, heart rate, emotion and stress tracking and also uses their heart rate data to estimate your VO2 max and fitness age. The application 'Garmin Connect' was installed in every participant's smartphone and the application data were uploaded to the Cloud automatically via Bluetooth. All participants' measurements were monitored and checked through the Garmin Connect Cloud service. A wrist-worn.

Wrist-worn devices were confirmed to be accurate on measuring an individual's stress levels by analysing physiological signals (Can et al., 2020), and the Garmin smartwatch was confirmed to be a useful tool to monitor stress levels by detecting changes in heart rate (Can et al., 2020; Regula et al., 2014). Wearable devices can measure and monitor levels of stress signals in the body, and we used it as a tool to measure our participants' stress for analysis.

2.6 | Occupational burnout inventory

We adopted the Chinese version of the Occupational Burnout Inventory (OBI), which was translated from the Copenhagen Burnout Inventory (Siegrist et al., 2004) and the effort-reward imbalance model (Yeh et al., 2007). It included subscales as follows: personal burnout, work-related burnout, client-related burnout, and over-commitment to work. This scale consists of 21 items and each item uses a five-point Likert scale to access levels of agreement to each statement. Each item is rated on a five-point Likert scale, from 0 (strongly disagree) to 4 (strongly agree). Ratings range 0–100 for each subscale, and the total

score ranges 0–400 points. The total score positively correlated with the frequency of occupational burnout. The Cronbach's alpha values for the four subscales were as follows: personal burnout, .92; work-related burnout, .91; over-commitment to work, .84; and client-related burnout, .90. The Cronbach's alpha of the overall scale was .94 (Yeh et al., 2007).

2.7 | The perceived stress scale

The PSS is a widely used and reliable tool for measuring psychological stress. The values of Cronbach's alpha were .84, .85 and .86 for three studies (Cohen et al., 1983). The Chinese version of the PSS, translated by Dr. Chu and Kao (2005), is a 14-item scale with seven positive items and seven negative items rated on a five-point Likert scale, ranging from 0 (never) to 4 (very often). The total scores in the Chinese version of the PSS ranged from 0 to 56. Higher scores indicate higher levels of perceived stress. Cronbach's alpha for this scale was .85.

2.8 | Data analysis

We used SPSS (version 21.0; IBM Corp., Armonk, NY, USA) for data analysis. A descriptive analysis was generated from the demographic characteristics to describe the participants' age, education, marital status and religious beliefs. After controlling the confounding factor of age, the generalized estimating equation (GEE) was used to assess the physical measurements, perceived stress and occupational burnout from baseline to the end of intervention in the two groups (Hardin & Hilbe, 2002). All tests were two-tailed, and $p < .05$ was considered significant.

3 | RESULTS

3.1 | Demographics and outcomes at baseline

Seventy-nine nurses met the inclusion criteria and completed all of the processes of our protocol. All participants were divided into experimental or control groups. We compared the demographic data between the experimental and control groups. The results of the t test or Chi-square test showed statistically significant differences in age and seniority between the two groups (Table 1).

3.1.1 | Changes in stress and occupational burnout from baseline to the end of intervention

We used a specific smartwatch to monitor stress levels, and it indicated a significant reduction in stress after intervention with gong meditation (T1, $\beta = -59.33$; T2, $\beta = -35.81$; T3, $\beta = -48.26$; T4, $\beta = -46.18$; T5, $\beta = -31.51$; T6, $\beta = -39.02$; T7, $\beta = -28.72$) compared with baseline (T0) (Table 2). We controlled the confounding

TABLE 1 Demographic characteristics of participants (N = 79)

Variables	Experimental group (n = 40)		Control group (n = 39)		t/X^2	p
	Mean ± SD	n (%)	Mean ± SD	n (%)		
Ages, years	42.30 ± 8.49		32.51 ± 8.24		5.19	.000***
Seniority, years	18.67 ± 8.38		10.47 ± 8.11		4.41	.000***
Level of education					4.05	.130
Junior college, n (%)		5 (12.5)		1 (2.6)		
Above college, n (%)		35 (87.5)		38 (97.5)		
Marital status					7.25	.085
Single/divorced		19 (47.8)		26 (66.7)		
Married		21 (52.2)		13 (33.3)		
Child (number)					5.23	.156
0		20 (50)		28 (71.8)		
1		5 (12.5)		4 (10.3)		
2		13 (32.5)		7 (17.9)		
3		2 (5)		0 (0)		
Religion beliefs					3.13	.077
Yes		31 (77.5)		23 (59)		
No		9 (22.5)		16 (41)		

TABLE 2 Changes of stress from baseline to the end of intervention

Parameter	Stress			
	β	Mean (EG-CG)	SE	p
T7 versus T0	−14.15	−23.22	4.57	<.001***
T6 versus T0	−23.65	−10.14	8.03	.002*
T5 versus T0	−33.33	−12.85	9.81	<.001***
T4 versus T0	−53.57	−19.81	8.24	<.001***
T3 versus T0	−53.10	−21.78	6.23	<.001***
T2 versus T0	−39.34	−15.62	7.49	<.001***
T1 versus T0	−64.09	−26.10	6.10	<.001***
Age	0.06		0.32	.846
EG * T7 versus CG * T7	−28.72	−27.82	3.59	<.001***
EG * T6 versus CG *T6	−39.02	−38.12	3.81	<.001***
EG * T5 versus CG *T5	−31.51	−42.98	3.80	<.001***
EG * T4 versus CG *T4	−46.18	−55.05	3.75	<.001***
EG * T3 versus CG * T3	−48.26	−52.07	3.28	<.001***
EG * T2 versus CG * T2	−35.81	−38.97	3.41	<.001***
EG * T1 versus CG * T1	−59.33	−29.17	3.25	<.001***
EG * age	0.42		0.58	.473

Note: control group = CG; experimental group = EG; standard deviation = SD; Std. error = SE; time = T.
*p < .05. **p < .01. ***p < .001.

factor of age, and we found that there was a significant difference in the PSS score ($\beta = 3.38$, $p < .001$) and the OBI subscale 'personal burnout' score ($\beta = 4.85$, $p = .004$) between the experimental and control groups. Additionally, there were significant pretest to posttest reductions in perceived stress ($\beta = -2.53$, $p = .002$), personal burnout ($\beta = -7.70$, $p < .001$), work-related burnout ($\beta = -6.15$, $p = .011$) and client-related burnout ($\beta = -37.10$, $p < .001$). Particularly in the experimental group, there were significant post-intervention reductions in perceived stress ($\beta = -4.20$, $p < .001$) and in all OBI subscales as follows: personal burnout ($\beta = -6.53$, $p < .001$), work-related

burnout ($\beta = -5.85$, $p < .001$), client-related burnout ($\beta = -3.98$, $p < .001$) and over-commitment to work ($\beta = -3.69$, $p < .001$) (Table 3).

4 | DISCUSSION

Our results showed a significant reduction in physiological index of stress by smartwatch in the T1-T7 sections in the experimental group, compared with the baseline. In addition, compared with the control group, there was a significant improvement in both PSS and physiological index of stress levels after intervention with gong meditation. Furthermore, the experimental group demonstrated considerable improvements in the 'personal burnout', 'work-related burnout', 'client-related burnout' and 'over-commitment to work' subscales of the OBI.

In addition to significant reduction of perceived stress after gong meditation that was similar to a previous study which reported that gong meditation was capable of relieving tension and improving stress perception (Pesek & Bratina, 2016), a significant reduction in physiological index of stress by smartwatch was also obtained in our research. No research using smartwatch and questionnaire simultaneously to measure the effectiveness of the intervention with a gong meditation was available in the past. Our results also indicated that objective measurement of stress levels by smartwatch was compatible with the subjective measurement by perceived stress scale.

One study pointed out that meditation could decrease the activity of the sympathetic nervous system and increase the activity of the parasympathetic nervous system (Cahn & Polich, 2006), thereby reducing an individual's feeling of stress. In addition, regular meditation practice has proven effective in increasing left frontal lobe activity, which is related to positive emotions (Davidson et al., 2003). It can also alleviate the feeling of stress by eliciting insights and cultivating attention, allowing people to understand the situation and stay objective more easily when facing emotional and moral dilemmas. According to Landry (2014), this simple form of meditation may have the capacity to lower blood pressure and heart rate and potential benefits in cardiovascular health (Landry, 2014). Our results that

intervention with gong meditation provides promise for a form of stress reliever that does not require an individual to learn a disciplined process for relaxation, and this type of meditation could be taught to health and counselling professionals to offer such intervention in an almost unlimited number of settings to reduce stress and other potentially stress-related pathologies.

We measured occupational burnout at baseline and after all sections of gong meditation, and it presented that there was a significant reduction of burnout in the experimental group. In terms of occupational burnout, our results were consistent with previous researches (Chanda & Levitin, 2013; Goldsby et al., 2017; Irman et al., 2020) which reported that gong meditation could alleviate tension, anxiety and depression. This is especially relevant in the traditionally family-oriented Chinese culture (Hwang, 1988) that parents and children often have a strong connection and rely closely on one another with the core value of family ethics and filial piety, and most nurses in Taiwan must play several roles in their families as well as their professional roles in the workplace. The diversity of these roles that nurses play are sources of stress for them, the COVID-19 pandemic deteriorated such circumstance with more susceptibility to others' emotional influences, including those from their colleagues in the workplace. Gong meditation help them focus on their physical reaction, especially breathing regulation and enhance their self-awareness for the value of different roles, such as arousing their empathy towards patients and their family members, as well as their sense of ambition at work. These factors also contributed to the overall improvement in occupational burnout levels.

From our results, we observed a trend showing that further reduction of stress after each section of gong meditation. Especially, the most significant reduction of stress was obtained after the first section of gong meditation, and the later sections still kept reducing participants' stress. It indicated that every intervention with gong meditation contributed to the reduction of stress. We suggested that people who feel stressed about job in any fields can receive gong meditation for reducing their stress and prevent mental health problems.

In summary, this study found that gong meditation is a feasible intervention with significant beneficial effects on perceived stress and

TABLE 3 Changes of perceived stress and occupational burnout from baseline to the end of intervention

Parameter	EG versus CG				T2 versus T1				EG * T2 versus CG * T2			
	β	Mean	SE	p	β	Mean	SE	p	β	Mean	SE	p
PS	3.38	−3.26	0.73	<.001***	−2.53	−4.49	0.83	.002*	−4.20	29.46	0.59	<.001
OB												
PB	4.85	−4.82	2.35	.039*	−7.70	−4.49	2.10	<.001***	−6.53	51.42	1.26	<.001***
WRB	2.22	−3.88	2.18	.309	−6.15	−1.58	2.42	.011*	−5.85	47.37	1.37	<.001***
CRB	2.40	−0.66	1.96	.221	−37.10	−26.42	3.09	<.001***	−3.98	19.96	1.69	.019*
OCW	1.41	−3.32	2.01	.483	1.74	1.27	2.74	.525	−3.69	49.49	1.49	.013*

Note: CRB = client-related burnout; OB = occupational burnout; OCW = over-commitment to work; PB = personal burnout; PS = perceived stress; WRB = work-related burnout.
*$p < .05$. **$p < .01$. ***$p < .001$.

occupational burnout among nurses during the COVID-19 pandemic while they have to manage the existing work stress and worry about the risk of viral transmission to their family members. Therefore, it is important to offer psychological interventions to prevent or relieve the possible mental health problems among the nursing staff. Prospectively, a gong meditation service may be provided for all employees to reduce stress and occupational burnout. Our findings also suggested that a smartwatch may be used for real-time detection of clinical or subclinical stress. In addition to sustained gong meditation services, we recommend that hospital managers provide nurses with relevant resources to reduce their occupational stress and burnout. Furthermore, we suggest that policy makers re-assess nursing management policies and practice-related factors to establish a safer environment, properly allocate resources, enhance support systems and improve nursing shortages and, thus, enable nurses to live a healthy lifestyle without excessive workload and occupational stress.

5 | CONCLUSION

Based on the subjective and objective outcome measures, our results suggest that gong meditation may be useful in reducing stress and occupational burnout among nurses, and it can be extended to workers in other fields.

6 | LIMITATION

Our study had certain limitations. First, in the control group, they could do daily activities as usual without any intervention, and they could take a rest at any time point without any restriction during the same period. Second, we only had pretest and posttest and we did not have long-term follow up on the delay-retention effect of gong meditation. Third, a more rigorous and blinded study design with larger populations and long-term follow-up is indicated to reduce potential bias and confirm the effects of gong meditation on reduction of stress and occupational burnout.

7 | IMPLICATIONS FOR NURSING MANAGEMENT

Nurse managers should also prioritize reducing personal job-related stress and occupational burnout among front-line nurses during COVID-19 pandemic. By alleviating stress and occupational burnout, nurse managers can better provide gong meditation among nursing staff, which is essential when dealing with workplace adversity and stressful work situations such as disease outbreaks or pandemics.

Under the current pandemic, adequate equipment, necessary assistance, educating and training about professional skills for keeping up with the times are all necessary essential for nurses' safety. In addition to job safety, a powerful leadership is also required to provide nurses interventions to improve their mental health with a better resilience, mindfulness, reduced stress and occupational burnout, especially those nurses who are working against COVID-19. Our study pointed out the influential mechanism of alleviating occupational burnout and perceived stress by gong meditation among nurses during COVID-19 pandemic, and this intervention for nurses can be widely and regularly performed by the leadership for its feasible advantage.

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