

Burnout in the health, social care and beyond: Integrating individuals and systems

Edited by

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Burnout in the health, social care and beyond: Integrating individuals and systems

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Table of contents

- 05 **Editorial: Burnout in the health, social care and beyond: Integrating individuals and systems**
Simon Surguladze, Antigonos Sochos, Eka D. Chkonia and Anthony J. Montgomery
- 08 **The Rapid Implementation of a Psychological Support Model for Frontline Healthcare Workers During the COVID-19 Pandemic: A Case Study and Process Evaluation**
Sophia Appelbom, Aleksandra Bujacz, Anna Finnes, Karsten Ahlbeck, Filip Bromberg, Johan Holmberg, Liv Larsson, Birgitta Olgren, Michael Wanecek, Dan Wetterborg and Rikard Wicksell
- 17 **Job Demands and Resources, Burnout, and Psychological Distress of Employees in the Chinese Non-profit Sector**
Guosheng Deng, Chienchung Huang, Shannon P. Cheung and Congcong Zhang
- 24 **Covid-19 and Increased Risk of Physician Suicide: A Call to Detoxify the U.S. Medical System**
Sophia E. Kakarala and Holly G. Prigerson
- 31 **Emotional Exhaustion of Burnout Among Medical Staff and Its Association With Mindfulness and Social Support: A Single Center Study During the COVID-19 Pandemic in Japan**
Makiko Sampei, Ryo Okubo, Mitsuhiro Sado, Aurelie Piedvache, Tetsuya Mizoue, Koushi Yamaguchi and Naho Morisaki
- 41 **Burnout and Cognitive Functioning: Are We Underestimating the Role of Visuospatial Functions?**
Panagiota Koutsimani and Anthony Montgomery
- 47 **Understanding the Link Between Burnout and Sub-Optimal Care: Why Should Healthcare Education Be Interested in Employee Silence?**
Anthony Montgomery and Olga Lainidi
- 54 **Burnout and Cardiovascular Risk in Healthcare Professionals During the COVID-19 Pandemic**
Fayeza Alameri, Noura Aldaheri, Sarah Almesmari, Manea Basaloum, Nouf Abdulrahman Albeshr, Mecit Can Emre Simsekler, Nnamdi Valbosco Ugwuoke, Murat Dalkilinc, Mai Al Qubaisi, Luciana Aparecida Campos, Wael Almahmeed, Eman Alefishat, Hashel Al Tunaiji and Ovidiu Constantin Baltatu
- 62 **Gender Differences in Job Burnout, Career Choice Regret, and Depressive Symptoms Among Chinese Dental Postgraduates: A Cross-Sectional Study**
Li Yan, Xiaogang Zhong, Lu Yang, Huiqing Long, Ping Ji, Xin Jin and Li Liu
- 71 **Efficacy of a Workplace Intervention Program With Web-Based Online and Offline Modalities for Improving Workers' Mental Health**
Lawrence T. Lam, Mary K. Lam, Prasuna Reddy and Prudence Wong

- 79 **Job Demands, Resources and Burnout Among Polish Nurses During the Late Wave of COVID-19 Pandemic: The Mediating Role of Emotional Labor**
Grzegorz Wójcik, Antoni Wontorczyk and Ilona Barańska
- 92 **Relationship Between Person-Organization Fit and Teacher Burnout in Kindergarten: The Mediating Role of Job Satisfaction**
Lingling Zang and Yameng Chen
- 100 **Investigating the links between diagnostic uncertainty, emotional exhaustion, and turnover intention in General Practitioners working in the United Kingdom**
Anli Yue Zhou, Salwa S. Zghebi, Alexander Hodgkinson, Mark Hann, Christos Grigoroglou, Darren M. Ashcroft, Aneez Esmail, Carolyn A. Chew-Graham, Rupert Payne, Paul Little, Simon de Lusignan, Sudeh Cherachi-Sohi, Sharon Spooner, Andrew K. Zhou, Evangelos Kontopantelis and Maria Panagioti
- 109 **Cognitive functioning in non-clinical burnout: Using cognitive tasks to disentangle the relationship in a three-wave longitudinal study**
Panagiota Koutsimani and Anthony Montgomery



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Editorial: Burnout in the health, social care and beyond: Integrating individuals and systems

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Editorial on the Research Topic

[Burnout in the health, social care and beyond: Integrating individuals and systems](#)

This Research Topic aimed at widening our knowledge base on occupational burnout, with the emphasis on interdisciplinary studies. The Topic includes 13 papers from various fields (e.g., health services, service and hospitality sectors and education), that looked at links between individual vulnerabilities, systemic failures and burnout.

Systems and individuals

Three papers explored an interplay between systems and individuals by using Job Demands and Resources (JD-R) model.

[Zang and Chen](#) looked at the relationship between person-organization fit, job satisfaction and teacher burnout in kindergartens in China and found that these three variables were negatively correlated. The authors further demonstrated that compared with job resources, job demand was more significantly correlated with burnout, that is, individuals were more likely to suffer from burnout when job failed to meet their needs. A study of [Deng et al.](#) reported opposite results, that probably was due to differences in sample characteristics. This study investigated burnout in employees of non-profit sector in China. The study found that job resources (JR) and job demands (JD) had opposite effects on burnout and psychological distress. The differential magnitude of the estimates suggested that JR had a greater effect on burnout compared with the effect of JD. Based on this the authors emphasized the importance of JR (e.g., positive relationships with colleagues and/or supervisors or availability of job-related information) as potentially protective factor. The lack of JR could be more detrimental to the health of employees than high degrees of JD, e.g., workload, emotional workload, and changes in tasks.

Wójcik et al. investigated burnout in nurses in Poland during the late wave of COVID-19 pandemic. Apart from the job demands and resources (JD-R) exploration, the researchers were interested in such variables as interpersonal conflict and coping modes (deep coping vs. surface coping). The study found significant positive associations between organizational constraints, interpersonal conflict at work and burnout among nurses. Importantly, higher organizational constraints and conflicts at work were found to be associated with an increase in surface acting, which was in turn associated with an increase in burnout. The authors advocated for strengthening organizational support and adaptive coping strategies as potential factors to alleviate burnout. This was particularly important in the context of COVID-19 pandemic, during which many nurses perceived their workplace as potentially “harmful and dangerous”.

A *Perspective* article of Kakarala and Prigerson reviewed inadequacies of US medical system that underlie risks of burnout and high suicide risk of medical professionals. The authors listed a number of factors that in their view contribute to physicians’ burnout and suicide risk in US, e.g., documentation burden, declining professional autonomy, lack of confidentiality, work pressures imposed by insurance companies and financial incentives to increase revenue while cutting costs. On the other hand, mental health stigma and intrusive medical licensing applications remain barriers to physicians seeking help, which compound physicians’ work stress. The authors stated that COVID-19 has laid bare a longstanding problem: the US medical system undermines physicians’ needs while restricting their autonomy and options for self-help. The authors suggest that more research, especially comparative studies with other countries are needed to find the ways to “detoxify” US medical system.

Remediation programs

The paper by Appelbom et al. highlights the benefits of the long-term allocation of resources and establishment of relevant procedures toward the provision of psychological support to health care staff, during the COVID-19 pandemic. The authors report on the implementation of a psychological support model that at an intensive care unit in Stockholm, Sweden, during the first wave of the pandemic. The initiative aimed at promoting resilience among frontline staff and included education and training, peer support, group and individual sessions, on-boarding for transferred staff, and manager support. Findings suggested that the most effective components of the provision were peer support and daily group sessions, but only when these are structurally integrated in clinical practice.

In line with the rapid expansion of online technologies, a workplace web-based blended psychoeducation randomized controlled trial was offered to staff of industries that were considered to have a high level of work-related stress, such as the service and hospitality sectors (Lam et al.).

The program aimed at enhancing the mental wellbeing and mental health literacy of workers in the workplace. It comprised two main components, an individual-directed psychoeducation course, and an organization-directed consultation. This

psychoeducation course is a blended program, using the e-Learning approach, followed by a face-to-face group session at the end of the course. Comparisons of the outcome between the intervention and control groups were statistically significant in favor of the intervention group on most measures, e.g. 3 out of 4 measures of Mental health literacy, one (professional accomplishment) out of 3 measures of burnout and the measure of stress. It should be noted that the results reflected just a short-term (immediate) outcome, whereas the longer-term outcome is yet to be determined.

Underlying factors

Yan et al. highlighted a sex effect on vulnerability to burnout in a sample of dental post-graduates. The authors found that the prevalence of job burnout, career choice regret and depressive symptoms were higher in females compared with males. The career choice regret is experienced when the obtained career is not what the student expected or hoped for. The study indicated that career choice regret had a stronger association with burnout in female graduates but not in males. The authors suggested that career choice regret could induce an aversion to the chosen career, thereby increasing the risk of job burnout.

Sampei et al. investigated how the risk of emotional exhaustion was associated with mindfulness skills and social support in a single medical center in Japan. In their one-hospital study, the authors found that the factors associated with emotional exhaustion differed by whether the worker had high exposure to SARS-CoV-2. For example, higher social support was associated with a reduced odds of emotional exhaustion only among the highly exposed group. Among those highly exposed, participants with a lower level of mindfulness, compared to those with a higher level, had significantly higher odds of emotional exhaustion.

Montgomery and Lainidi explore another interesting factor potentially underlying healthcare workers’ burnout vulnerability—employee silence. Reviewing the relevant literature, the authors find evidence that organizations which discourage staff from speaking up and reporting concerns, face relatively high staff burnout and compromise patient safety and quality of care. The evidence also points out that a professional culture of employee silence starts developing in the first years of medical education and is maintained after graduation and thought one’s career. The authors emphasize the role of management in sustaining or challenging an organizational culture of silence and advocate the adoption of compassionate leadership, valuing openness and sharing.

Consequences of burnout

Two papers by Koutsimani and Montgomery (b) address the effect of burnout on cognitive functioning. In a longitudinal study aiming to clarify the direction of causality between non-clinical burnout and cognitive function as well as between burnout, depression, and anxiety, the authors did not find compelling evidence for the negative effects of burnout on

cognitive capacity. However, they did find that cynicism, rather than emotional exhaustion, had a negative impact on visuospatial abilities while a high sense of personal efficacy showed mutual associations with stronger executive functions. Moreover, burnout was different from but reciprocally associated with anxiety and depression. The findings of the study also highlight the role of perceived family support as protective against burnout and cognitive dysfunction. To explore further the impact of burnout on the relatively neglected area visuospatial functioning, the authors conducted a mini review of studies involving health professionals [Koutsimani and Montgomery (a)].

The evidence reviewed, appeared too sparse to allow clear conclusions, but it highlighted the need for further studies in this important area.

Alameri et al. looked at the associations between burnout and cardiovascular risk. The risk was measured by Fuster-BEWAT tool that included 5 main variables: blood pressure, exercise, weight, diet, and tobacco (<https://www.sciencedirect.com/science/article/pii/S0735109715070965?via%3Dihub>).

The authors reported that burnout and emotional exhaustion were associated with an elevated cardiovascular risk. Further, the model showed a positive association between personal accomplishment and cardiovascular health. Due to cross-sectional nature of the study, causality could not be determined.

High levels of burnout and job dissatisfaction have been commonly observed amongst General Practitioners (GPs). This could be related to diagnostic uncertainty of the community cases.

Zhou et al. examined the relationship between burnout and uncertainty among 70 general practices in England (randomly selected). Almost one-third of GPs reported experiencing >10% of diagnostic uncertainty in their day-to-day practice over the past year, greater diagnostic uncertainty had higher levels of emotional exhaustion, job dissatisfaction and turnover intentions.

Concluding remarks

The 13 papers in this Research Topic add to the growing evidence that the antecedents of burnout are rooted in the job demands and resources (and lack of fit) within the organizations studied. Future research needs to address the combined impact of individual (e.g., cognitive functioning, career regret), interpersonal (e.g., colleague relations) and organizational (e.g., administrative demands, financial targets) factors in designing interventions that prevent the development of burnout. Interventions need to be appropriately embedded in organizations, not *ad-hoc*, and part of a wider strategy of developing healthy workplaces. Burnout is symptom of organizational dysfunction, a starting point not an end point.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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The Rapid Implementation of a Psychological Support Model for Frontline Healthcare Workers During the COVID-19 Pandemic: A Case Study and Process Evaluation

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The COVID-19 pandemic highlighted the need for psychological support initiatives directed toward frontline healthcare workers, which can be rapidly and sustainably implemented during an infectious disease outbreak. The current case study presents a comprehensive model of psychological support that was implemented at an intensive care unit (ICU) during the first wave of the COVID-19 pandemic. The psychological support model aimed at promoting a resilient stress reaction among frontline staff by protecting physical, social, and psychological resources. The initiatives, targeting different groups of workers, included education and training, peer support, psychologist-supervised and unsupervised group sessions, on-boarding for transferred staff, manager support, and individual sessions for workers experiencing strong stress reactions. The results of the process evaluation of this rapid implementation suggest that peer support initiatives as well as daily group sessions were the most appreciated forms of psychological support. Psychologists involved in organizing and providing the support highlighted several aspects of a successful implementation of the support model: offering support during work hours (preferably after shift), positive attitude of line managers that framed support initiatives as a team effort, and involvement of experienced psychologists able to quickly adjust the content of the support according to the current needs. The study also identified two main problems of the current implementation: the lack of efficient planning due to the use of volunteer work and the need for more structural resources on the organizational level to ensure long-term sustainability of the support model and its implementation among all groups of healthcare staff. The current case study highlights the importance of establishing permanent structural resources and routines for psychological support integrated in clinical practice by healthcare organizations to improve both rapid and sustainable response to future crises.

Keywords: psychological support, implementation, process evaluation, COVID-19, healthcare workers, intensive care

INTRODUCTION

The COVID-19 pandemic highlighted an urgent need for early interventions to mitigate the psychological effects of extreme work demands that healthcare workers currently experience (1). Research regarding the mental health of nurses and physicians during the current pandemic paints a worrisome picture. Symptoms indicating possibly pathological stress reactions among healthcare workers are more prevalent during the current pandemic than they were before (2–5), with a pooled prevalence of about 26% of anxiety, 24% of depressive symptoms, and almost 45% of stress symptoms among frontline workers (3). Moreover, data from previous and the current coronavirus outbreaks point out the exposure level, such as working at the frontline, as a risk factor for the development of PTSD among health care workers (6). Possible reasons for the increase in stress symptoms include higher levels of known risk factors such as cognitive, emotional, and physical demands at work (7, 8); new stressors such as risk for moral injury and worry about personal safety (9); and diminished protective mechanisms, which include recovery opportunities and psychological detachment (10).

Even before the current pandemic, work environment at intensive care units (ICU) was experienced as demanding and stressful. Up to 70% of healthcare workers at the ICU were at high risk for burnout (11), which is more than double compared to, for example, palliative care (12). This difference is attributed to higher prevalence of stressors at the ICU, including high workload, interpersonal conflicts, and moral distress (11–16).

Consequently, healthcare staff working at the ICU were recommended to be given priority in access to psychological support during the current pandemic (17). When offered appropriate psychological support, a majority of those experiencing distress during a crisis will recover (18). However, uncertainty regarding the scale and progress of a pandemic caused by an unknown virus makes it difficult to plan for effective psychological support initiatives. For this reason, a rapid implementation of psychological support for healthcare workers has proved to be challenging, both during previous crises and the current pandemic (19–21).

In this paper, we present a case study of a rapidly implemented psychological support model provided to frontline healthcare workers at an ICU during the COVID-19 pandemic. We describe the guiding principles and key interventions including various initiatives and support formats, as well as a summary of quantitative and qualitative data collected to evaluate the implementation and feasibility of the psychological support model.

THE PSYCHOLOGICAL SUPPORT MODEL

Context and Population

During the spring of 2020, the Stockholm region was severely affected by COVID-19, as compared to other parts of Sweden and the surrounding Nordic countries. The official plan within the region was to direct patients with suspected or confirmed COVID-19 to hospitals in a specific order, and it was decided that Cärio S:t Görän, an emergency hospital in the outskirts of central

Stockholm, was the fifth option to use when the resources at the other large hospitals in the region were exhausted. However, due to geographical location of the hospital and the initial cluster spread pattern of the virus, many cases were presented at the Cärio S:t Görän hospital much earlier than expected. Consequently, the ICU at this hospital admitted COVID-19 positive patients with respiratory failure early on, with the first patient admitted on March 8, 2020. The magnitude and severity of these cases created an extreme demand for the ICU resources, including the need for more trained staff. During the last 2 weeks of March, additional beds had to be made available and parts of the operation theater were transformed into new intensive care units, resulting in an increase of available beds from 8 to 24 (an overview of the number of additional beds and the number of patients admitted to the ICU during this period is provided in the **Supplementary Figure 1**).

Due to the severity of the pandemic outbreak in the Stockholm Region, the employer organization and the unions decided on utilizing a time-limited crisis agreement for nurses, allowing for longer work hours to ascertain the supply of staff. In short, this agreement resulted in a work schedule based on two shifts (rather than the normal three), with weekly rotations of the schedule (i.e., every second week with 72/50 work hours). The crisis agreement was initiated by the Region on April 3 (22) and the two-shift work schedules were implemented by April 6. However, due to the increased number of patients during March, the staff was already working overtime. To meet the demand for ICU staff, nurses at other units (primarily anesthesiology and surgery) were transferred to the ICU from March 23.

The psychological support was offered to, and accepted by, the director of the anesthesiology department (including the ICU) a few days before the crisis agreement was initiated. A psychological support team was put together rapidly, consisting of three psychologists from the unit for rehabilitation of chronic pain and stress at the hospital, that operated the initiative, as well as four affiliated psychologists from Karolinska Institutet with relevant expertise. Participation was voluntary for all psychologists and provided in parallel to regular work schedules and commitments.

Model Principles

The psychological support model was developed based on a set of principles presented below.

First, the model was built based on current needs and feasibility rather than by implementing standardized interventions used in other contexts. Due to the time pressure, most of the initiatives were developed *ad hoc* and hastily implemented. This called for an agile approach to the development of the current model (23), which implies continuous modifications based on feedback and ongoing discussions with staff and managers. The day-to-day observations and frequent communication with managers guided the development of the support initiatives.

Second, the interventions provided at the ICU were integrated into the clinical routines. Guidelines regarding the organization of support during crises underline the necessity of close real-time monitoring for the early identification of at-risk populations and

individuals, which should be seeking professional support (24–26). Thus, the support was primarily provided face-to-face at the ICU with sessions scheduled during work hours.

Third, the development of the psychological support model was guided by well-established knowledge from organizational and occupational psychology (27) and a contextual behavioral theoretical framework (28). Models of healthy work environments highlight the importance of resources and recovery in the prevention of work-related stress problems. This is especially valid when the demands are high and difficult or impossible to reduce at a given time point (29–31).

Fourth, the concept of resilience has gained increasing attention as a factor explaining the variation in individual response patterns to common stressors (32). In occupational health, resilience has been promoted as an important factor describing the ability to adapt and function well despite high demands (33, 34). Thus, when implementing the psychological support model at the ICU, we aimed at promoting resilience (i.e., resilient stress reaction) among frontline staff by protecting the most important resources: physical (sleep and recovery), social (social support networks), and psychological (competence and autonomy).

Fifth, the support model was built around diverse initiatives described below, targeting distinct groups of workers (see online **Supplementary Figure 2**).

Education and Training

On April 3, a 90-min lecture was provided to staff from other units that were being transferred to the ICU as part of their on-boarding. The lecture focused on stress and psychological reactions, with an emphasis on the individual's ability to actively manage the stressors in an adaptive way.

Moreover, workshops were conducted with physicians working at the ICU, aimed at increasing the awareness of stress reactions and the willingness to share these experiences with colleagues to provide and receive peer support. The workshops also contained basic training in behavioral analysis to improve the understanding of their own and other's behaviors, which promotes self-management and the ability to provide peer-support (35).

Also, seminars for all staff were offered prior to the start of summer holidays, focusing on communication with family and friends about one's own reactions and needs. A support document (available in the online **Supplementary Document 3**) was provided to facilitate own reflections as well as discussion with family members. **Figure 1** provides a timeline over the different modules.

Daily Group Sessions

From April, daily group sessions were scheduled and supervised by psychologists. Each session lasted 30–45 min. Typically, the session started with a reminder that the session was about the own reactions of participants to stressful situations, and a brief statement from each of the participants regarding their current state of mind. Participants were also asked for any urgent concerns that they would like to address during the session.

When a topic (or topics) of general interest was identified, the session focused on that. Examples of frequently occurring topics:

- feelings of insufficiency in relation to patient's and patient relative's needs
- fatigue and worrying regarding own work capacity
- uncertainties regarding the development of the pandemic and implications for health care
- problems with work-life balance including feelings of guilt in relation to children and spouse
- problems with fatigue and recovering between work shifts
- concerns regarding own safety and risks of spreading the virus to own family
- issues related to communication and need for social support from colleagues

These topics were addressed and discussed within a contextual cognitive-behavioral framework, with the objective to promote resilience in individuals and groups (28, 36). Sessions were planned to balance between actively reflecting on the current topics, communicating within the group about thoughts and feelings, and education regarding, for example, psychological reactions to stress, avoidance vs. acceptance of unwanted thoughts and feelings, or pro-social behaviors. Some sessions were more oriented toward experiential exercises, such as relaxation or present-moment awareness, as an approach to manage negative thoughts or emotions.

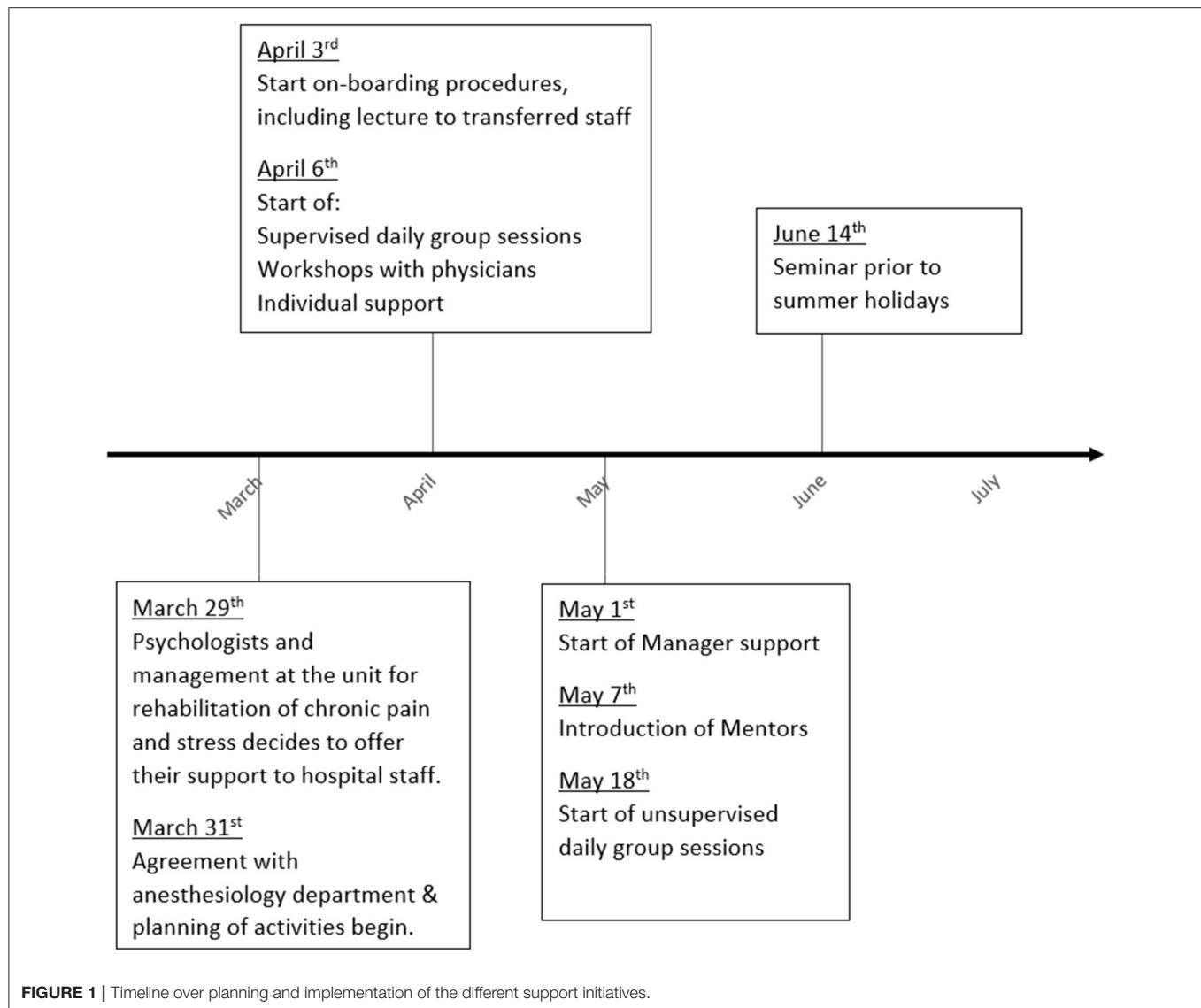
Mid May, psychologist-supervised group sessions were replaced by unsupervised group sessions, which used a similar predefined format and agenda. The daily sessions were prompted by the senior nurse in charge of each respective work shift. Normally, sessions were performed in small groups, sometimes in the lunchroom, but frequently in the wards due to time constraints and work demands. After each session, a standardized report was completed to keep track of the attendance and experienced meaningfulness of the sessions (see online **Supplementary Document 4**).

Peer Support

Starting in May, a small group of nurses involved at the ICU during the pandemic were named as mentors. Their role was to enhance the social resources by taking a proactive role, for example, facilitating communication between staff and managers, as well as providing active support to colleagues during their respective work shift. Mentors were provided a written role description (provided in **Supplementary Document 5**) with examples of specific behaviors, and received an introduction, where they also explicitly stated their willingness to serve as mentors.

On-boarding

To facilitate the transition of staff from other units to the ICU, an on-boarding procedure was gradually developed from early April that included (a) setting a clear time-frame for the introduction phase (3 weeks); (b) providing all managers, at both the ICU as well as the surgery and anesthesiology units, with a list of individuals who were transferred to make sure they were receiving sufficient attention; (c) subsequent to the introduction



of the mentor role, staff transitioning into the ICU were assigned to one of the mentors; (d) providing technical and procedural training in specific intensive care routines.

Manager Support

Starting from May, managers at all levels in the anesthesiology department were offered targeted management support. The primary focus of this initiative was to discuss strategies to improve resilience in the staff. Support was provided according to individual needs and conducted individually or in small groups, usually weekly or bi-weekly.

Individual Support Including Risk Assessment

Individual workers experiencing strong reactions such as fatigue or anxiety that impacted on their work performance, and/or that were at risk for developing more severe problems, as perceived by themselves or the first line manager, were

assessed by a psychologist in a clinical interview. The objective was to clarify the nature and level of the psychological reaction, for example, identifying work stressors, psychological symptoms, prior and co-occurring psychological concerns, stress management strategies, and social support, and to decide if additional support was needed in order to continue or return to work. Also, the individual assessment included an evaluation of potential risks (e.g., health care safety) of remaining on duty. Assessments were carried out continuously throughout the support period, normally within 3 days. For staff with work-related stress symptoms affecting the ability to perform clinical tasks, individual support was provided by a psychologist at the unit for rehabilitation of chronic pain and stress based on individual needs and a contextual behavioral framework, that is, cognitive behavioral therapy (CBT) and acceptance and commitment therapy (ACT).

IMPLEMENTATION AND ACCEPTABILITY

The rapidly implemented model of psychological support was evaluated by means of (1) a questionnaire administered to all staff and managers at the anesthesiology department (including ICU, surgery, and anesthesiology clinics), (2) an analysis of the reports completed during the unsupervised group sessions, and (3) interviews with psychologists participating in the support initiatives.

Participation in Different Initiatives

The questionnaire was administrated during late May and early June as a part of a broader research project examining psychological reactions among health care staff during the COVID-19 pandemic (37). The study was approved by the Swedish Ethical Review Authority (2020-01795). Since participation in all support initiatives was voluntary, although strongly recommended by managers, an important measure of successful implementation of the support was defined as the extent to which employees were aware of and chose to participate in the different initiatives.

Out of 329 invited (all members of staff at the ICU, including administrative and transferred staff from operation and anesthesiology), 123 members (37.4%) of the health care staff consisting of assistant nurses (26.0%), nurses (53.7%), and physicians (20.3%) answered the survey. We calculated a participation ratio, showing relative proportion of respondents aware of an initiative that engaged in the activity. **Table 1** shows participation ratio, awareness, and attendance of different types of support initiatives.

Based on questionnaire ratings, the most used support initiative was the daily group sessions with as many as 97 (78.9%) participants stating that they had been informed of the sessions, and out of these 82 (85.0%) also participated in the support at some point. A larger portion of the respondents were unaware of or chose not to participate in the educational support such as information on mental health ($n = 58$, 47.2%) or education on potentially traumatic events at work ($n = 75$, 61.0%). Looking at participation ratio, daily group sessions followed by peer support had the highest attendance ratings in relation to how many were aware of these initiatives.

Participation and Meaningfulness of Unsupervised Group Sessions

During the unsupervised group sessions, staff was instructed to complete a form stating the number of participants and perceived meaningfulness of the session assessed on a group level using a scale from 0 to 10. In sum, 96 sessions (two sessions per day) were carried out from May to August, with a mean attendance of 5 (ranging from 2 to 14) staff members per session. The level of meaningfulness was rated as follows: high (>7) = 36.5%, moderate ($4-7$) = 39.6%, and low (<4) = 10%. The remaining sessions were not rated.

In sessions considered to have been highly meaningful (i.e., ratings from 8 to 10), staff commented on the importance of a shared reflection at the end of the shift, cooperation, or general positive feelings within the group. While in sessions with low

meaningfulness ratings (0–3), staff comments included that the group sessions were no longer needed, and that few had attended due to colleagues prioritizing to go home and rest after the shift (particularly during sessions during late summer).

Psychologists' Reflections

All psychologists who were involved in daily support sessions and support to managers were interviewed regarding the content and implementation of the psychological support model. In total, five semi structured interviews were conducted over video call by one of the first authors (SA), and all interviewees provided their written consent. Interviews were then transcribed, anonymized, and analyzed by the same author (SA). Using a thematic analysis (38), all aspects of the data that provided information on the support efforts were coded and grouped into the three themes: *Utility*, *Challenges*, and *Keys to implementation*, and presented in **Table 2**.

DISCUSSION

In this paper, we have presented a psychological support model rapidly implemented among frontline healthcare workers at the ICU during the first wave of the COVID-19 pandemic. The model was built, and continuously modified, based on current needs and feedback from all the participating parties. All interventions were integrated into the clinical practice and carried out face-to-face at the ICU during work hours. The psychological support aimed at promoting a resilient stress reaction among frontline staff by protecting physical, social, and psychological resources. The initiatives, targeting different groups of workers included education and training, peer support, group sessions (both supervised by psychologists and unsupervised), on-boarding for transferred staff, support to managers, and individual sessions for workers experiencing strong stress reactions.

The early guidelines for psychological support initiatives during the current pandemic were largely in agreement regarding the content and focus of such support (20, 39, 40). However, the actual attempts to implement these guidelines resulted in a variety of formats, time frames, and practical solutions. This included both onsite and online format of support (41, 42), centralized nationwide top-down interventions (43) and local support models developed for a particular hospital or unit (21), as well as initiatives based on established protocols (24) and approaches where the topics of support were dynamically adjusted according to the current needs (19). This large variety of models and protocols for psychological support calls for more integrative and reflective analyses of different approaches, their advantages, and problems (44).

Reflecting on the appropriate format of the psychological support during the pandemic, experiences from this initiative suggest a rapid implementation when needs occur. This implies that a successful implementation builds on readily available resources at a particular site. Also, reflections by the psychologists highlighted the importance of early and continuous assessment of the needs of the staff and managers to tailor the support format for different groups and individuals, as well as gradually modify and improve the interventions over time, as needed.

TABLE 1 | Frequency of participation in different support efforts.

	Not offered or unaware of support <i>n</i> (%)	Been offered, not participated <i>n</i> (%)	Participated, <i>n</i> (%)	Not answered <i>n</i> (%)	Participation ratio ^a
Education and training: information on mental health	58 (47.2)	44 (35.8)	14 (11.4)	7 (5.7)	0.24
Education and training: on trauma	75 (61.0)	17 (13.8)	23 (18.7)	8 (6.5)	0.57
Peer support	45 (36.6)	22 (17.9)	47 (38.2)	9 (7.3)	0.68
Daily group sessions	20 (16.3)	15 (12.2)	82 (66.7)	6 (4.9)	0.85
Individual support ^b	36 (29.3)	42 (34.1)	36 (29.3)	9 (7.3)	0.46

^aParticipation ratio is calculated as attendance ratings in relation to how many were aware of the initiatives.

^bIn the survey, the term individual support included conversations with managers or other specialists, not just trained psychologist.

TABLE 2 | Summary of psychologists' reflections on content and implementation of the support efforts.

Topic	Reflections
Utility	<ul style="list-style-type: none"> Daily group sessions increased prosocial behavior and improved communication among staff. Aside from providing a space to share experiences, the psychologists provided knowledge on stress reactions and trained staff to identify and handle emotions in a constructive way. Separate support for managers enabled coaching and guidance in situations that were particularly challenging for managers, such as feelings of inadequacy and lack of control. Participation in supervised group sessions facilitated seeking individual support when needed. As reflected on by one psychologist: <p>I think that we have reduced the step toward actually receiving help. To not just think “how strange that I am feeling so bad and how weak I am”, but to look at it as something completely natural and that there is nothing strange about asking for some extra support from a psychologist. [...] We have fulfilled that function I think, to normalize and reduce some of the stigma from receiving this kind of help.</p>
Challenges	<ul style="list-style-type: none"> The timing of sessions appeared critical, as suggested by differences seen in discussions occurring during sessions at the beginning vs. the end of the work shift (easier at the end of the shift when situations were fresh in memory). Therapists and participants differed between sessions, which disabled planning and following up on topics from previous sessions. Instead, psychologists had to adapt to current needs, and create content as well as structure the sessions based on that. Due to the uncertainties of the pandemic, it was unclear how long the supervised support would be needed. Interventions were, thus, planned by psychologists week by week, which could, over time, be a strain and difficult to integrate with normal work routines and demands. One psychologist explained: <p>Everything was very much week by week and that worked fine in the beginning. Because I had nothing else going on and this was the absolute most important event in my life during March and April. And during May and June, I started to feel that we should make up a plan for how to continue during the coming months and that [plan] did not really exist. [...] It was also a bit complicated because it was not entirely in sync with my regular schedule either.</p>
Keys to implementation	<ul style="list-style-type: none"> Some staff groups were more challenging to engage in the support efforts. For example, only a few of the physicians chose to participate in the group reflections, and only on a few occasions. The easy access to support for the staff, e.g., sessions scheduled during the work shift, a combination of several types of support to match needs. Managers' engagement and commitment, which was reflected in the communication with staff. Framing participation in group reflection and other activities as a team effort, with utility for oneself as much as the group (both receiving and providing support). The use of experienced psychologists enabled a sensible approach, adapting to current needs with large groups of staff. Involving managers in both planning and implementation of the model enabled the support to be both flexible and adaptive toward the specific context of the ICU. One psychologist described the collaboration with managers: <p>The intervention was designed in collaboration with the managers. Just the fact that we did it during their [staff] working hours and that they [the managers] were deciding on what would work best for them. [...] So, they put together the schedule in a way and decided on all practical aspects. And they [the managers] allocated time and told their staff to take time off to do this [participate in support].</p>

The psychologists highlighted both the utility of providing support directed specifically toward different professions and the difficulty of reaching all groups (e.g., physicians, night shifts). Therefore, implementation requires support from first-line management and a proactive organization and planning of support efforts that are feasible and adequate to meet the needs of different groups of staff. If successful, providing support to all members of staff and managers may then trigger a positive spiral of support within the organization (45), improving self-management and the sustainability of the support.

On a related note, the results showed that support types integrated into the daily practice and work hours, such as group reflections and peer-support, were most successful in terms of participation rate. The integration of such support initiatives into daily routines requires full support and engagement not only from the managers but also from the leadership of the organization (46). Securing such formal support and resources from stakeholders at all organizational levels often involves a coordinated effort and procedural changes, which will unavoidably take time. Nonetheless, to ensure a long-term sustainability of psychological support initiatives, such process seems crucial.

A rapid implementation process of effective interventions with long-term sustainability presents the main challenge in planning for psychological support during a long-term crisis such as the COVID-19 pandemic. The rapidly implemented support initiatives, such as those presented in the current article, are built largely on volunteer work and *ad hoc* adjustments in clinical routines to meet the needs of the staff. However, due to conflicting demands from regular work roles and tasks, such initiatives may decline over time. Also, supporters may run out of emotional and physical resources necessary to provide extensive and continuous support (47). At the same time, health care staff will likely experience the psychological effects of the pandemic for a considerable time, perhaps years. This implies the need for health care organizations to have direct access to empirically supported and feasible psychological support programs, as well as the resources (e.g., psychologists) to run these (48). Furthermore, it is recommended for healthcare organizations to establish a professional support network of psychologists or other mental health professionals that are present at the sites and able to rapidly and sustainably allocate resources to implement psychological support when and where needed. Such a network could also support managers in how to respond to, and prevent, stress reactions among staff, and establish regular communication around work-related stress within the unit. This is especially important for units that, regardless of the COVID-19 pandemic, are exposed to a demanding work environment such as the ICU (11) or the Emergency Room (49).

The present study presents the development and rapid implementation of a psychological support model to healthcare workers during the health care crisis caused by the COVID-19 pandemic and provides preliminary support for the utility and feasibility of the model. However, the design and data available limit the conclusions that can be drawn on how both managers and members of staff have experienced the support and calls for more studies systematically tracking healthcare workers'

experience of psychological support during a health care crisis, such as the COVID-19 pandemic.

CONCLUSION

Already after previous infectious diseases outbreaks, recommendations for employers were presented to ensure that psychological support structures are in place for those healthcare workers who are at most risk, for example, those with most patient contact (50). The COVID-19 pandemic has certainly emphasized and broadened the perspective on this need. The current case study highlights the importance of establishing permanent structural resources and routines for psychological support integrated in clinical practice by healthcare organizations to improve both rapid and sustainable response to future crises.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by The Swedish Ethical Review Authority (2020-01795). The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

SA has contributed to the data curation, formal analysis, investigation, project administration, visualization, writing the original draft, reviewing, and editing the manuscript. AB has contributed to the conceptualization, funding acquisition, investigation, methodology, project administration, supervision, writing the original draft, reviewing, and editing the manuscript. AF has contributed to the conceptualization, funding acquisition, investigation, resources, methodology, and writing the original draft, reviewing, and editing the manuscript. KA has contributed to resources, validation, reviewing, and editing the manuscript. BO has provided resources and validation. FB, JH, LL, and DW have contributed to the investigation and resources. MW has contributed to the investigation, resources, validation, reviewing, and editing of the manuscript. RW has contributed to the conceptualization, funding acquisition, investigation, methodology, supervision, resources, writing of the original draft, reviewing, and editing the manuscript. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

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Job Demands and Resources, Burnout, and Psychological Distress of Employees in the Chinese Non-profit Sector

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The non-profit sector in China has expanded significantly in the past few decades. However, employees in non-profits experience high burnout rates, indicating a need to study non-profit work conditions and their effect on employees. This study applies the job demands and resources (JD-R) model and examines the effects of job demands (JD) and job resources (JR) on burnout and psychological distress experienced by non-profit employees, recruited via quota sampling, across China ($n = 233$). The findings from path analysis showed that JR had strong and negative effects on burnout and on psychological distress, while JD had strong and positive effects on burnout and on psychological distress. Burnout partially mediated the relations between JD-R and psychological distress. These results highlight the importance of JD-R in reducing burnout and psychological distress in non-profit employees in China. Research and practice implications are discussed.

Keywords: job demands, job resources, burnout, psychological distress, non-profit

INTRODUCTION

Around the globe, individuals employed in human services experience significant burnout (1–3). This raises concern for the sustainability of these important professions, given that a multitude of cross-cultural studies have shown a positive association between burnout and turnover (4–6). High turnover in human services can lead to several negative outcomes for workers and clients alike. With a dwindling labor force, human service workers may be forced to take on greater workloads, which can further exacerbate burnout and turnover (7). Moreover, individuals who experience burnout are more likely to report high psychological distress (8), which can affect their interactions with clients and vulnerable community members. Despite the rapid growth of China's non-profit sector (9, 10), studies have shown that non-profit employees in China experience high burnout and turnover (11, 12), potentially due to mounting job demands (13). This has in turn led to rising recruitment pressure and organizational instability, along with decreasing service quality (11, 12), prompting a dire need for research on the work conditions and outcomes of non-profit employees. With better understanding of their employees' experiences, non-profit organizations can design interventions and solutions to mitigate turnover and retain their labor force. Thus, this study applies the job demands and resources (JD-R) model (14–16) to examine burnout and psychological distress in a sample of Chinese non-profit employees.

DEVELOPMENT OF THE NON-PROFIT SECTOR IN CHINA

In 2004, a shift in Chinese national policy allowed individuals to begin establishing foundations (17). With the promulgation of the Regulations on Foundation Management, foundations in China rapidly increased. In 2018, there were about 7,200 foundations in China, which was 7.4 times greater than the number of foundations that existed in 2005 (17, 18). While the unprecedented growth of foundations indicates the expanding role of philanthropy organizations in Chinese society, high rates of burnout and turnover (11, 12) may threaten the growth and sustainability of the philanthropy sector in years to come. In 2017, over one-quarter (27.6%) of philanthropy workers in non-profit organizations left their jobs. Similarly, Tsinghua University Philanthropy Research Institute (11) found that just over one-fifth (20.2%) of employees in non-profit organizations have the intention to resign (11).

THE JD-R MODEL, BURNOUT, AND PSYCHOLOGICAL DISTRESS

The JD-R model posits that the work conditions can be divided into job demands (JD) and job resources (JR), and workers' health and outcomes are differentially affected by each (15, 16). The former describes aspects of the job that require a sustained physical or mental effort from an individual. The required effort to meet these JD is thought to come with a physiological or psychological cost, leading to a state of exhaustion or fatigue. However, the presence of JR, job aspects that can help facilitate achievement of work goals, are thought to mitigate the different costs of JD. Through the energy-driven process and the motivation-driven process, JD-R can lead to or protect against employee burnout (14, 15).

Burnout is often positively associated with negative work outcomes such as turnover intentions and low job satisfaction (19–21). Burnout is generally recognized as an occupational hazard specific to human service professionals, whose occupations are characterized by chronically taxing emotional demands (15, 22, 23). Burnout can also lead to poorer individual well-being and functioning, including psychological distress, an emotional state of deep discomfort characterized by symptoms of depression and anxiety (24–26). Psychological distress in human services professionals has serious implications for employee health and agency outcomes. It can positively predict serious mental illness and alcohol and substance use, as well as work outcomes like absenteeism, turnover, and anxiety disorders (27–29).

Cross-discipline (6, 14, 16) and cross-cultural studies (23, 30, 31) applying the JD-R model have found strong associations between JD-R and work outcomes, including burnout, stress, work engagement, and health (32–35). These findings have been consistent with the dual process theorized by Bakker et al. (14). JD acts as significant stressors that upend individuals' health and functioning that lead to psychological distress (24–26). In fact, JD-R and psychological distress have been studied together

cross-culturally (36–38). These studies' results found a strong positive correlation between JD and psychological distress. For example, Ben-Ezra and Hamama-Raz found that work demands significantly and directly affected psychological distress ($r = 0.23$, $p < 0.001$) among over 600 social workers during the COVID-19 pandemic (36).

While psychological distress has been studied among samples in various occupations (39–42), to the authors' knowledge, no studies have investigated psychological distress among non-profit employees specifically, despite the growth of non-profit sectors around the globe [e.g., (43, 44)] and especially in China (17, 18). Thus, we seek to fill this gap in the literature by examining psychological distress among Chinese non-profit employees, including its relations with JD-R and their underlying mechanism. The results of this study can support the development of interventions that aim to reduce burnout and psychological distress of employees in the evolving non-profit sector in China, thereby aiding in the retainment of this important labor force.

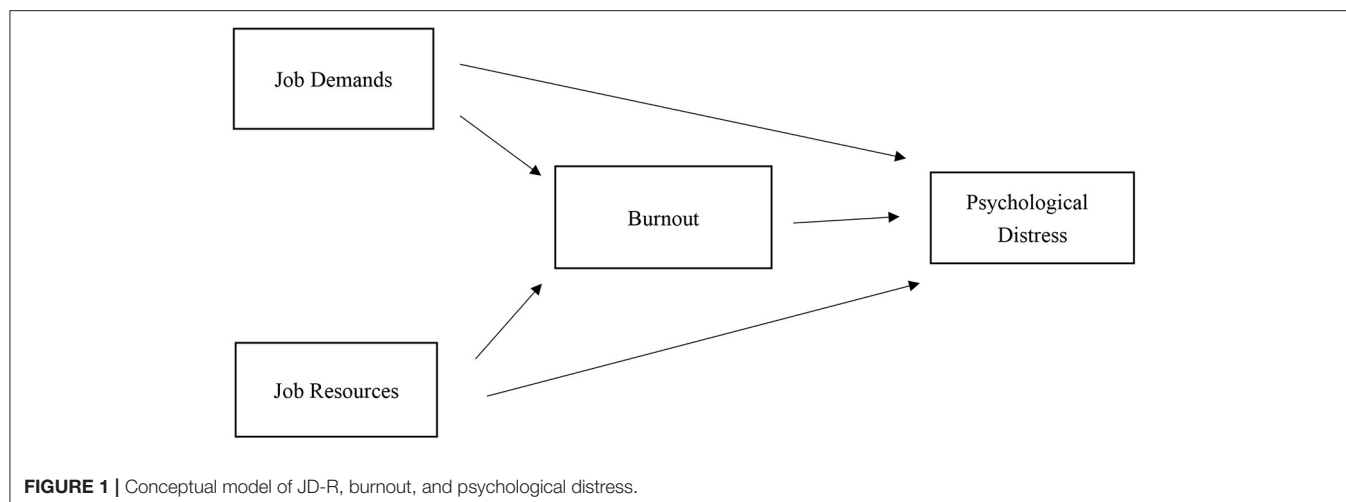
HYPOTHESES

Based on the JD-R model, we hypothesized a mediational pathway by which JD-R affects psychological distress via burnout, as shown in **Figure 1**. Our hypotheses are as follows: (1) JD-R will affect burnout differentially, with JD having a positive association with burnout and JR having a negative association with burnout. (2) JD-R will also have differential effects on psychological distress. JD and psychological distress will be positively associated, while JR and psychological distress will be negatively associated. (3) JD-R will indirectly affect psychological distress via burnout, indicating burnout's mediational effect on the relation between psychological distress and burnout.

METHODS

Data and Sample

Data were collected from foundation employees via an anonymous web-based survey that was hosted on the WJX platform (<https://www.wjx.cn/>), one of the largest and most reliable web-based survey platforms in China. The survey was administered by a research center at Tsinghua University's School of Public Administration, the Social Innovation and Rural Revitalization Research Center (SIRRRRC). SIRRRRC had collaborated with Guangdong Guoqiang Foundation and China Foundation Development Forum to provide trainings for employees that came from 270 local foundations in March 2021. SIRRRRC used quota sampling for the survey. Given that 95.8% of foundations in China are local foundations while 4.2% are national foundations (11), SIRRRRC randomly selected 12 additional national foundations to sample with the 270 local foundations that were receiving training at SIRRRRC, resulting in a final sample of 282. SIRRRRC sent out invitations, with a link to the survey hosted on WJX, to secretary-generals of the 282 foundations on May 20, 2021, and asked them to have their employees participate in the online survey. SIRRRRC sent



reminders to participate in the survey 7 and 14 days after the initial invitation was sent to the foundations. The survey was closed on June 20, 2021, and SIRRRC had received 233 responses by then. An informed consent process was implemented prior to the survey. Following participation in the survey, respondents randomly drew a red envelope which contained between 0 and 18 RMB (5 RMB on average, or 1 USD). The research protocol was approved by the research review committee by the Huamin Research Center at Rutgers University (HRCProtocol #2021002) and by SIRRRC on April 21, 2021.

Measures

The dependent variable, psychological distress, was assessed via the K6 (45, 46), which consists of six questions that ask respondents about past 30-day prevalence of emotions that indicate psychological distress: nervousness, hopelessness, restlessness, depression, and worthlessness. Participants identified how frequently they felt each of these emotions on a 4-point Likert scale. Zero indicated “none of the time,” while four indicated “all of the time.” An additional item asked respondents the frequency at which they perceived that “everything was an effort.” Psychological distress was calculated by taking the sum of all item responses. Thus, total psychological distress scores had a possible range of 0–24. As in past studies [e.g., (29, 38, 47)], the K6 showed high reliability in our sample of foundation employees. The Cronbach’s alpha of the 6 items was 0.91.

Burnout was assessed by the Oldenburg Burnout Inventory [OLBI; (48)], a 16-item scale divided into two subscales, exhaustion and disengagement from work. Each subscale contains 8 items, which are worded in the positive direction (4 items) and negative direction (4 items). Exhaustion encompasses both cognitive and physical fatigue. Disengagement describes the phenomenon of an individual experiencing distance from their work, work object, and work content. Responses followed a 4-point Likert scale, and participants were instructed to indicate the degree to which they strongly agreed (4) or strongly disagreed (1) with each item. Responses to the 8 positively worded items

(4 in each subscale) were reversed to ensure that higher scores represented greater burnout. Burnout was calculated by taking the average of all item responses. In this study, the Cronbach’s alpha of OLBI was 0.83.

We adapted subscales from Questionnaire sur les Ressources et Contraintes Professionnelles [QRCP; (31)] to measure JD-R in our sample. Based on the nature of non-profit work, we prioritized the adaptation of three JD dimensions and three JR dimensions. The JD dimensions measured in this study were as follows: workload, emotional workload, and changes in tasks. For JR, we measured relationship with colleagues, relationship with supervisor, and information on job performance. In the QRCP (31), each dimension is measured via 4 items, and item responses follow a 7-point Likert scale that ranges from 1 (never) to 7 (always). Higher scores indicate that the respondent experiences greater JD or has more JR at their disposal. JD and JR scores were calculated by taking the average of item responses. Lequeurre et al. (31) reported high reliability for each dimension, with all yielding a Cronbach’s alpha value over 0.80. In this study, the Cronbach’s alphas were 0.82 and 0.93 for JD and JR, respectively.

Analytical Approach

Analysis began with descriptive analyses to observe sample characteristics. We also conducted correlation analyses to examine the relations among JD-R, burnout, and psychological distress. Then, in order to test whether burnout had any mediating effect on the relations between JD-R and psychological stress, we conducted path analysis. Path analysis was selected over regression analysis because it allows for simultaneous examination of direct and indirect effects through mediating variables. All analyses were conducted using STATA software 16.0. Finally, we conducted regression analyses of models that included covariates such as individual demographic information and organizational characteristics. The estimates of regression analyses were similar to those of our path analysis. These results are not displayed in the current paper but are available from the corresponding author upon request.

TABLE 1 | Descriptive statistics and correlations of key variables.

	Mean (S.D.)	1	2	3	4
1. Psychological stress [0–24]	5.4 (4.5)	—			
2. Burnout [1–4]	2.3 (0.4)	0.55***	—		
3. Job demands [1–7]	4.6 (0.8)	0.27***	0.39***	—	
4. Job resources [1–7]	5.2 (0.9)	−0.52***	−0.43***	−0.03	—

N = 233. Numbers in brackets show ranges of the variables. ****p* < 0.001.

RESULTS

We display the results of descriptive analyses in **Table 1**. The study sample had moderate burnout ($M = 2.3$; $SD = 0.4$) and psychological distress ($M = 5.4$; $SD = 4.5$). The sample reported relatively high JD ($M = 4.6$; $SD = 0.8$) and JR ($M = 5.2$; $SD = 0.9$). Pearson's correlation analysis indicated a positive correlation between JD and burnout as well as between JD and psychological distress. By contrast, JR had a negative correlation with burnout and psychological distress. Burnout was significantly correlated with psychological distress. Finally, JD and JR had no significant correlation with each other.

In **Figure 2**, we present the standardized estimates from path analysis. JD-R had significant associations with burnout. JR was negatively associated with burnout ($\beta = -0.42$, $p < 0.001$), while JD was positively associated with burnout ($\beta = 0.38$, $p < 0.001$). These findings support hypothesis 1. Both JD ($\beta = 0.13$, $p < 0.05$) and burnout ($\beta = 0.34$, $p < 0.001$) had significant and positive associations with psychological distress. JR, on the other hand, had a significant and negative association with psychological distress ($\beta = -0.37$, $p < 0.001$). These findings confirm hypothesis 2.

JD had a total effect of 0.26 ($p < 0.001$) on psychological distress. JD had an indirect effect of 0.13 on psychological distress through burnout ($p < 0.001$). Burnout mediated 0.50 (0.13/0.26) of JD's effect on psychological distress. JR, on the other hand, had a total effect of -0.51 on psychological distress ($p < 0.001$) and an indirect effect of -0.14 on psychological distress through burnout ($p < 0.001$). This indirect effect accounted for 0.27 of the total effect ($-0.14/-0.51$). These findings are consistent with our hypotheses, suggesting that burnout partially mediated the associations between JD-R and psychological distress. These findings are consistent with hypothesis 3.

DISCUSSION

The descriptive findings indicate that Chinese non-profit employees faced high JD but also had many JR available to them, compared to previous study (31). Estimates from path analysis were consistent with our hypotheses, which applied previous findings on JD-R's dual process and posited that JD-R would differentially affect burnout in our sample of non-profit employees from China (hypothesis 1). The first process, the health-impairment or energy depletion process, was indicated

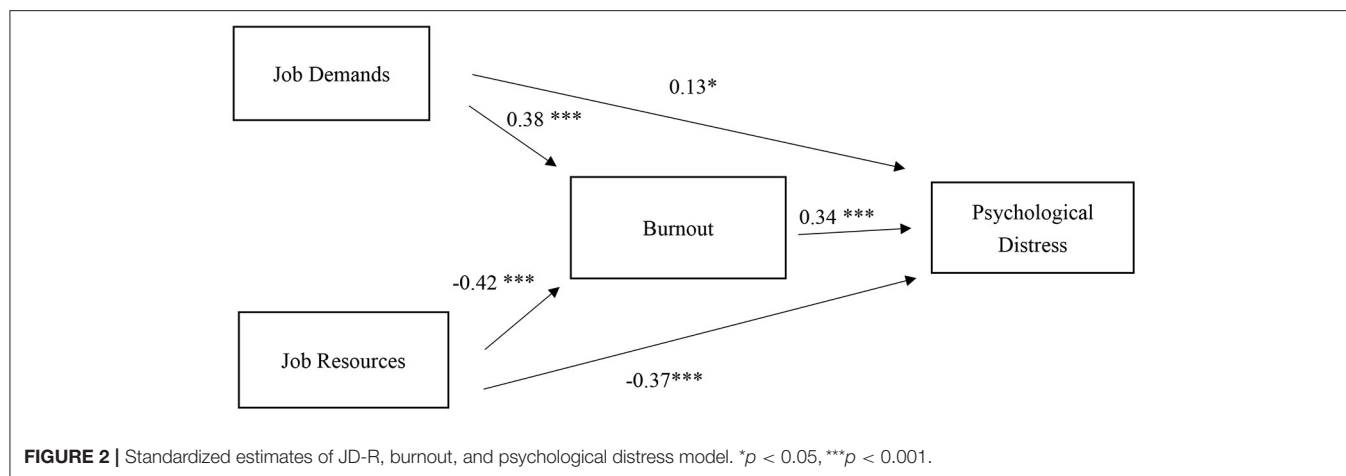
by the significant positive association between JD and burnout. Meanwhile, the second process, the motivation process, was indicated by the negative association between JR and burnout. Thus, non-profit employees who can utilize their organization's JR may mitigate their risk of experiencing burnout. The magnitude of the estimates produced by our analyses suggests that JR have a greater effect on burnout in Chinese non-profit employees than do JD. Based on this, it is likely that the lack of JR, such as positive relationships with colleagues and/or supervisors or availability of job-related information, can be highly detrimental to the health of non-profit employees in China, more so than JD like workload, emotional workload, and changes in tasks.

The findings are consistent with previous studies in this area. Compared to employees in the private and public sectors, non-profit employees tend to have low extrinsic rewards (e.g., fair pay and financial well-being) and high JR (e.g., helpful coworkers and supervisors) (49–52). Studies found that non-profit employees were more sensitive to JR than employees in public and private sectors (50, 52, 53). For example, Stater and Stater used 2002–2014 data from the General Social Survey (GSS) and found that having helpful coworkers and supervisors both had larger effects on job satisfaction for non-profit workers than for private sector and public sector workers. Helpful supervisors were related to less turnover intent to a greater extent in the non-profit sector than in the for-profit and public sectors (52).

In the current study, our sample of 233 non-profit employees reported having relatively high JR available to them, but these numbers must be understood within the context of the growing non-profit sector of China. Resource availability generally varies by foundation type (9, 11, 18). A small local foundation, for example, may be limited in the JR that they can provide to their employees. By contrast, national foundations, with more access to resources, may be better equipped to provide supportive JR to their employees. Given this limitation, future research may examine other antecedents of burnout and psychological distress in non-profit employees so as to investigate other interventions points that may inspire less costly ways of supporting the well-being of non-profit employees, particularly those working in smaller local foundations.

Still, increasing JR does not necessarily mean that non-profit agencies may simultaneously continue to project significant JD on their employees. Employers must be wary of their employees' JD. After all, path analysis showed that both JD and JR important predictors of psychological distress in non-profit employees (hypothesis 2). These relations were in line with previous findings from other studies' application of the JD-R model to samples of professionals from other occupational groups, showing that JD-R are important predictors of burnout and health outcomes (14, 16, 33). Our study results extend past literature by providing support for the application of JD-R in studying burnout and subsequent psychological distress in non-profit employees in China, a relatively understudied but fast-growing occupational group.

The significant indirect effects of JD-R on psychological distress via burnout (hypothesis 3) and the strong positive direct effect of burnout on psychological distress suggest that reducing burnout can also reduce psychological distress and its



associated risks, such as mood and anxiety disorders (27, 29). Our results therefore underscore a need to buffer the effects of JD on burnout and psychological distress. Rather than relying on resource-constrained non-profit agencies to increase JR, less costly interventions may be considered. Scholars have hinted at the cost-effectiveness of administering stress-reducing worksite interventions, such as mindfulness-based interventions (MBI's) (54, 55). Bartlett et al.'s (54) systematic review and meta-analysis found that there is certainly potential in the use of workplace mindfulness trainings to reduce psychological distress and promote well-being of employees. Many studies have emphasized the effectiveness of mindfulness-based stress reduction (MBSR), mindfulness-based cognitive therapy (MBCT), and MBI's to reduce psychological distress and increase well-being (56–58), and MBSR and MBCT have both shown promise as workplace interventions for occupational groups like physicians, teachers, and psychotherapists [see (59) for review]. In consideration of the resource constraints of local foundations in China, it will be necessary to garner empirical evidence in support of the cost-effectiveness and efficacy of MBI's to promote non-profit employee well-being, which, ultimately, may mitigate burnout, psychological distress, and turnover.

Lastly, the results of this study must be taken with the context of a few limitations. Since we collected and analyzed cross-sectional data, our results may approximate associative relations among JD-R, burnout, and psychological distress rather than causal relations. This limitation may be addressed by the collection and analysis of longitudinal data. Second, unobserved variables, such as personal experience and traits, could also affect JD-R, burnout, and psychological distress. For example, studies have shown that burnout might be related to post-traumatic stress symptoms, temperament, alexithymia, and resilience (60, 61). Because these were not included in our model, they may have unknown effects on the estimates from our analysis. Another limitation of this study is that all data on our key variables were reliant on foundation employees' self-reports and are therefore subject to reporting errors. Future studies may address this limitation through the use of data triangulation, perhaps gathering additional data from multiple employees from the

same foundations as well as from people with a range of job positions and employees' family members. Finally, the sample in this study was drawn mostly from individuals who were largely participants of an online training hosted by Tsinghua University in 2021. As such, these employees may share similar unobserved characteristics that may affect the estimates produced by our analysis, and the generalizability of our results to all foundation employees in China is unknown. A future study may seek to study a more representative sample to better draw conclusions about JD-R, burnout, and psychological distress in all non-profit sector employees in China.

CONCLUSION

The findings in this study indicate that JD significantly increase burnout, and JR significantly decrease burnout in a sample of non-profit employees in China. Importantly, JR appeared to have larger effects on burnout than did JD, indicating a need to focus on improving the accessibility of JR to non-profit employees in China. We further expand the literature on JD-R and health outcomes by providing empirical evidence of the mediational effects that burnout has on the relations between JD-R and psychological distress. In doing so, we provide support for interventions that protect against the deleterious effects of JD while also promoting JR's protective effects on non-profit employees' health.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Research Review Committee, Huamin Research Center at Rutgers University. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

GD and CH: conceptualization, resources, investigation, and data curation. GD, CH, SC,

and CZ: methodology, software, validation, formal analysis, and writing—original draft preparation. All authors contributed to the article and approved the submitted version.

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Covid-19 and Increased Risk of Physician Suicide: A Call to Detoxify the U.S. Medical System

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Suicide among physicians is a longstanding problem, with risk factors exacerbated by the coronavirus disease 2019 (COVID-19) pandemic. In this article, we explore suicidal thoughts and behaviors among physicians and risk factors created or intensified by the work environment, such as overwork and loss of autonomy. We discuss the ways in which the COVID-19 pandemic has made the medical work environment more stressful (e.g. greater exposure to traumatic experiences and employment insecurity) and, consequently, elevated physician suicide risk. We also review evidence that the medical system in the United States has not adequately protected physicians' mental health. Lack of confidentiality, stigma, cost, and time, as well as intrusive medical licensing applications, remain barriers to physicians seeking help. Work pressures imposed by insurance companies and financial incentives to increase revenue while cutting costs compound physicians' work stress. We conclude that system-wide changes to the practice of medicine and policies regarding healthcare delivery are needed to improve physicians' work environments, as is research addressing the impact of the interventions to reduce their suicidal risk. The proposed changes, and greater access to timely and confidential mental health services amid and in the aftermath of the pandemic, may prove promising approaches to reduce physicians' suicide risk.

Keywords: physician suicide, COVID-19, physician burnout, Post-Traumatic Stress Disorder, medical licensing, physician mental health

INTRODUCTION

The longstanding problem of physician suicide has drawn renewed attention during and in the wake of the COVID-19 pandemic. Popular belief has long held that physicians die by suicide more often than the general population, at a rate up to twice as high (1). An analysis of violent deaths in the United States (U.S.) between 2012 and 2016 contradicts this (2), but is consistent with prior studies which find that work stressors are more often linked to suicide in physicians (3). There is, thus, both opportunity and urgent need to address aspects of the work environment that influence physician suicide risk. Reform is particularly pressing in the wake of a pandemic that has seen physicians and other medical workers exposed to greater levels of danger, including provision of care to patients who have not yet received COVID-19 vaccines (4), upheaval (5), and immense suffering (6), as well as, in some cases, workplace closures and job instability, which itself poses elevated suicide risk. The American system of privatized medicine has made its hospitals and practices uniquely vulnerable to the economic vicissitudes of the pandemic (7). In this article, we

discuss how the work environment in the U.S. and the COVID-19 pandemic together have posed alarming threats to the mental health and increase the suicide risk of practicing physicians.

This article will focus on the suicide risk factors experienced by physicians in the U.S., who, according to one 2019 meta-analysis, were more than 1.3 times as likely than physicians anywhere else in the world to kill themselves (8). It is our aim to note the factors that exacerbate suicide risk among physicians and point to potentially promising ways to reduce this risk. Physician mental health is a pressing concern globally (8), and we by no means wish to suggest that the U.S. is exceptional in the pressures placed on medical workers. However, many risk factors and barriers to care are modifiable only on a country-by-country basis. We focus attention on the salient, and possibly modifiable, suicide risks to physicians posed by their workplace environment and exacerbated by the corporatization of healthcare (9). We argue that systemic reform is needed to prioritize physicians' mental health and, thereby, reduce their risk of suicide.

SYSTEMIC RISK FACTORS AMONG U.S. PHYSICIANS

The prevalence of job-related stress among physicians who die by suicide accords with robust research showing that a medical career can create or exacerbate mental health problems. While certain personality traits, such as maladaptive perfectionism, are associated with physicians developing mental health problems (10), the conditions of medical training appear to cultivate psychological distress among many physicians. An erosion of trainee's mental health begins within months of starting medical school (11). The often extreme deprivations and stresses of medical training, including emotional abuse (12) and unhealthy long shifts (13), erode mental health and inculcate self-blame, which heighten suicide risk (14).

Graduating medical students enter an increasingly corporatized work environment (9). Simultaneously, mental ill-health linked, or potentially linked, to work is on the rise among physicians. One international meta-analysis found that self-reported depression among medical residents increased between 2006 and 2015, with between 20.9 and 43.2% experiencing depression or depressive symptoms (15). Burnout, an occupational problem comprising exhaustion, cynicism, detachment and feelings of ineffectiveness (16), also rose among U.S. physicians between 2011 and 2014 (17). The problem of physician burnout is global, with physicians worldwide working in increasingly unforgiving conditions (18). Though some studies find it is not directly linked to suicide (19), burnout has symptomatic and conceptual overlaps with depression (2, 20), and is associated with medical error (19), itself a physician suicide risk factor (21).

In particular, burnout rates are elevated among physicians in emergency, family, and general internal medicine (17) – specialties in which physicians are seeing increasing patient volume due to misaligned financial incentives (22). Dissatisfaction with work-life balance among U.S. physicians is also increasing (17). Documentation burden, which has grown

with Medicare, insurance, and hospital reporting requirements, is also a strong predictor of burnout (23). According to one study of psychiatry residents, documentation burden was a greater factor in burnout than clinical rotation, sleep, or other lifestyle factors (24). Further, declining professional autonomy (9), often a byproduct of healthcare consolidation in the U.S. (25), undermines a sense of control over one's own schedule and practice environment, which has been found to be the single strongest predictor of physicians' job satisfaction (26). A study of physicians working in the U.K.'s National Health System supported the connection between lack of autonomy and high levels of burnout, with emotional exhaustion and depersonalization mediating the relationships between autonomy and psychological symptoms (27). It is concerning, therefore, that in recent decades, U.S. physicians have experienced a loss of autonomy, combined with increasing time pressure and a comparatively heavy clerical burden (28, 29).

Physicians' increasing exposure to risk factors for burnout and other work-related syndromes is disconcerting in light of the need to reduce suicide risk. According to Joiner's interpersonal theory of suicidality, a suicide attempt results from three aspects: lack of belonging, perceived burdensomeness, and the acquired capability for suicide (30). These align with the primary aspects of burnout, including depersonalization (resulting in withdrawal) and a reduced sense of personal accomplishment (16), which may well precede social alienation and perceived burdensomeness. (31) validated the link between work dissatisfaction and feelings of ineffectiveness and physician suicidality, as mediated by anhedonia. These conditions may be exacerbated by modern trends in healthcare, such as the lack of autonomy discussed above (9) and the increased use of impersonal quality metrics (32) to evaluate physicians' performance.

MENTAL HEALTH RISKS POSED BY THE PANDEMIC

Existing suicide risk factors for physicians are compounded by the COVID-19 pandemic. A 2015 study of suicidality in physicians found that experiencing traumatic medical events predicted the acquired capability for suicide (33), supporting the theory that physicians' exposure to pain and horror meets one of Joiner's pre-conditions for suicide (30, 34). The effect may be especially stark for physicians who are not accustomed to treating critically ill patients, such as those redeployed to critical care settings from non-acute specialties during the COVID-19 pandemic. In addition, exposure to dangerous working conditions and the emotional impact of providing futile care (35) may fuel feelings of cynicism and detachment, possible precursors to the thwarted belonging and self-perceived inefficacy that complete the triad of pre-conditions posing risk for suicide (30). Indeed, one international study found that depressive symptoms were elevated among healthcare workers who were redeployed to the ICU (36). Other proven psychiatric risk factors during the pandemic include inadequate personal protective equipment (PPE), which was shown to be associated with both depression and anxiety (36, 37); and being a healthcare

worker in the U.S. or U.K., which was also associated with depression (36). Symptoms of Post-Traumatic Stress Disorder (PTSD) were common among healthcare workers who treated COVID-19 patients in China and Italy (38, 39), and a survey at one New York City institution in April 2020 classified 57% of staff as suffering acute stress (40), a prodrome to PTSD, which itself is a risk factor for suicide (41).

Early data have not shown an increase in overall suicide deaths due to the COVID-19 pandemic (42). However, data are not yet available on suicide rates for physicians, some of whom have worked in crisis conditions since the beginning of the pandemic and continue to do so with emergence of new COVID-19 variants (43). Moreover, both the mental health consequences and practical changes wrought by the pandemic will persist. For example, medical workers who treated SARS patients during a 2003 outbreak in Beijing reported elevated depressive symptoms up to 3 years later (44). In practical terms, COVID-19 intensified financial pressure on U.S. rural and independent hospitals and practices (45) and accelerated the vertical consolidation of healthcare practices by corporations (46). The employment-related fallout of COVID-19 was evident in a September 2020 poll in which 30% of 2,334 physicians surveyed reported feeling hopeless due to the pandemic's effects on their employment (47) – an effect specific to the vulnerabilities of privatized medicine.

BARRIERS TO ACCESS AND ATTEMPTS TO OVERCOME THEM

The stigma of mental illness in the medical profession (48) is reinforced by medical license, job, and malpractice insurance applications (49), which may scrutinize a physician's entire psychiatric history. Physicians who report a past or present mental illness risk being subjected to monitoring of their behavior or barred from practicing altogether (50). The effect of invasive applications is profound. Half of physician respondents to one survey believed that they had met criteria for a mental illness but had not sought help; 44% of those cited fear of reporting to a licensing or hospital board (50). Despite increased attention to physician mental health during the pandemic, a national poll of emergency physicians in October of 2020 found that 57% would fear for their jobs if they sought mental healthcare, and 73% agreed there was stigma around doing so (51). Physicians are forced into circuitous tactics, such as seeking treatment in a different city, self-prescribing, or paying cash to avoid insurance claim records (50). These tactics may be prohibitively expensive for medical students and residents (52). Finally, and significantly, scheduling constraints may make it difficult to get timely or regular treatment (53). Barriers to help-seeking combine with tragic results: physicians who die by suicide are half as likely as suicide victims in the general population to have been receiving mental health care prior to their deaths (3).

Suicide prevention programs at medical schools and hospitals have tried, with varying success, to address privacy, time, and cost barriers to therapy. Proven approaches include recruiting outside providers to provide free or discounted therapy sessions without filing insurance claims (54) and storing users' records outside

of the hospital's electronic health record (55). The Interactive Screening Program (ISP), designed by the American Foundation for Suicide Prevention, encrypts user's identities to allow them to correspond anonymously with counselors (56). A program at the University of California, San Diego's medical school based on the ISP has proven successful at identifying and referring at-risk persons (57). However, response and referral uptake from large-scale screening can be low (57), highlighting the need for multiple avenues to treatment. Significantly, although time to pursue and receive help has been found to be the greatest barrier to physician help-seeking (53), we did not find a single hospital that has provided protected time for physicians to access mental health care.

FUTURE RESEARCH DIRECTIONS

While privatized medicine is frequently discussed in terms of its impact on medical spending (58) and patient access (59), rarely is it examined with relation to physician mental health or suicide risk. There is a need for research to compare physician suicide risk in the U.S. with that in other healthcare systems to identify ways that these systems affect the mental health of medical care providers. For example, physician burnout rates may be more than three times higher in the U.S. than in Europe (18). While many papers recommend organizational fixes to reduce burnout by improving the working environment (60), before-and-after studies of such organizations are rare.

Further, despite a long history of interest in physician suicide in the medical literature, data are still lacking and some subgroups of U.S. physicians who face unique challenges to their mental wellbeing remain overlooked. As one example, female physicians have a relatively high suicide rate (61), but little is known about why this gender disparity exists. Future research is needed to elucidate the roots of sex differences in the rates of physician suicide. The fact that physicians more often complete suicide when they attempt it (62) suggests a need for safeguards against access to lethal means such as fire-arms and self-prescribed medications. In addition, non-white physicians report experiencing racism from patients and colleagues (63). These work conditions may undermine feelings of self-worth and pose risks that should be explored in future research. And, because physicians who are immigrants from another country experience unique stressors—including a visa process that restricts their employment options, xenophobia, and having their professional qualifications questioned (63), immigration status should be included in studies on physician mental health. Future research should focus on the ways in which physicians' work environment affects their mental health in general and their risk of taking their lives, more specifically.

Workplace circumstances that undermine autonomy and control over one's work conditions and restrict personal time to care for parents, children, or spouses; long shifts; substantial administrative or clerical load; and parental burden (64) may heighten physician suicide risk. The COVID-19 pandemic further highlighted the importance of working conditions and workplace culture to healthcare workers' wellbeing. Many

healthcare workers reported both inadequate PPE and threats of retribution for calling out unsafe working conditions (65); the aftereffects of these conditions on job satisfaction and feelings of belonging should be examined. Healthcare workers may also have been troubled by the feeling that they were providing futile care, which is associated with burnout (35) and evocative of the helplessness symptomatic of PTSD (66). Given that healthcare workers who were redeployed to the ICU during COVID-19 and who perceived their training as inadequate have been found to be at higher risk of depression (36), the relationships between secondary traumatization, self-perceived medical errors, moral distress (67) and suicide risk factors should be examined. In addition, examining job-related suicide risk factors among physicians whose practices were financially damaged during COVID-19 and those in workplaces that were consolidated is warranted. Such studies could make use of the Beck Depression Inventory to measure perceived burdensomeness and thwarted belonging among a wide sample of physicians (31) to determine the mediating and/or moderating role of burdensomeness and belonging on physician suicide risk. Given high rates of burnout and quitting among medical workers (68), studies should make a special effort to include those who retired or changed jobs after experiencing the pandemic and explore their reasons for leaving the workforce.

DISCUSSION

Research on physician suicide is hampered by the impossibility of knowing the events that led up to any one death, and the danger of tritely attributing suicides to a specific cause. Nevertheless, some facts are clear: COVID-19 has intensified a wide range of stressors for medical workers; physicians' mental health problems go undertreated; and systemic changes to the medical workplace over the past few decades are adversely affecting physicians' mental health. Female physicians (61), those who work in rural areas (51), and those in under-resourced practices or hospitals (45) may be at particularly elevated risk.

Employment circumstances that create stress and burnout, which already contribute to physicians' suicide risk (69), must be addressed to prevent their lethal combination with the stressors of the pandemic. Physician wellbeing experts recommend the use of clinician float pools to allow adequate time-off, supporting the careers of part-time physicians, and including physician wellbeing in institutional metrics (70). Mental health screening or counseling programs must eliminate privacy concerns and cost barriers (55). Changes to working conditions should reduce documentation requirements (71), lengthen the time spent with patients (72); bolster physicians' independence (26, 70, 73, 74) and reduce overscheduling, which may be the greatest barrier to accessing mental health care (53).

Such measures, on the surface, run contrary to the profit motives that drive healthcare (9). Hospitals and other employers tend to lean instead on generic "wellness" programs that target individual health behaviors without concomitant organizational change (75, 76). Given this pattern – and the shift of many physicians' roles to employee (9), intensified by mergers and acquisitions in the wake of the pandemic (46) – physicians might benefit from joining unions (77, 78), which are shown to improve employees' health and control over working conditions (79). Membership in a union or physicians' advocacy organization may also counteract feelings of isolation or alienation, one of the conditions of suicidality according to Joiner's theory (30). The legislation needed to ban licensing applications from including questions that deter help-seeking (80, 81) may be attainable only through collective self-advocacy. So too may restorative changes to physicians' working lives.

Occupational health research frequently presents physician mental illness as a detriment to profit or productivity (82, 83). Solutions focused on treatment or wellness put the onus on workers to adapt themselves to the changing demands of the workplace. We suggest that the U.S. healthcare system should adapt its model for the practice of medicine so that it prioritizes and supports physician's wellbeing. A return to the pre-pandemic status quo, in which mental illness risk factors for physicians were high (73), could be catastrophic. COVID-19 has laid bare a longstanding problem: the U.S. medical system undermines physicians' needs (84) while restricting their autonomy and options for self-help. It is tragic that those who spend years training to care for others are so often themselves neglected when it comes to their mental health. In the turmoil resulting from the pandemic, there exists a rare opportunity to raise awareness of, advocate for, and implement policies that promote physicians' occupational and mental health. Doing so may be the best medicine to reduce the risk of physician suicide.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

SK researched and wrote the manuscript. HP conceived of the manuscript, edited it, and contributed writing. Both authors contributed to the article and approved the submitted version.

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Emotional Exhaustion of Burnout Among Medical Staff and Its Association With Mindfulness and Social Support: A Single Center Study During the COVID-19 Pandemic in Japan

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Background: Although higher rates of burnout have been reported during the COVID-19 pandemic, the contribution of the modifiable factors is lesser-known. We investigated how the risk of emotional exhaustion was associated with mindfulness skills and social support in a single medical center in Japan.

Methods: We conducted a cross-sectional web survey on mental health for all staff of a national medical hospital from February to March 2021. We examined the association between self-rated emotional exhaustion and levels of mindfulness and social support using multivariate logistic regression.

Results: Of the 830 participants, signs of emotional exhaustion were observed in 261 (31%) individuals. Among those highly exposed to the virus at work, individuals with low levels of mindfulness and social support had significantly higher odds of emotional exhaustion [OR 3.46 (95% CI; 1.48–8.09), OR; 3.08 (95% CI; 1.33–7.13), respectively] compared to those with high levels. However, among those not highly exposed to the virus, individuals with both low and moderate levels of mindfulness had significantly higher odds of emotional exhaustion. [OR 3.33 (95% CI; 2.22–5.00), OR; 2.61 (95% CI; 1.73–3.94), respectively].

Conclusion: We found that factors associated with emotional exhaustion differed by exposure to SARS-CoV-2. Building mindfulness skills can help reduce the high burden placed on the staff. Additionally, increasing social support may be useful especially for workers highly exposed to SARS-CoV-2.

Keywords: burnout, social support, mindfulness, healthcare worker, emotional exhaustion

INTRODUCTION

The current COVID-19 worldwide pandemic has continued to impose a tremendous burden on healthcare workers (1, 2), whether or not they treat COVID-19 patients directly (3–5). Previous studies have suggested that possibly one-third of the healthcare workers may have reached the point of emotional exhaustion or burnout (5, 6). Burnout is marked by any or all of the following characteristics: energy depletion or exhaustion, depersonalization or increased mental distance from one's job, reduced professional efficacy, or a decreased sense of personal accomplishment (7, 8). During a pandemic, sustaining the healthcare system is vital. Thus, identifying factors and measures that reduce the risk of burnout and emotional exhaustion among healthcare workers should be critical.

In the midst of the pandemic in which the rapid response to the environment, which continues to change drastically, is required, it would be difficult to sufficiently modify a work environment in order to reduce the major stressors for healthcare professionals, which have been reported to be causes of emotional exhaustion: increased workload, personal risk of infection, fear of transmission to family members, illness or death of friends and colleagues, and loss of many patients (3, 9–11). In addition, it is also impossible to alter personal characteristics, such as ethnicity and pre-existing psychiatric history, even though studies have shown these may influence one's risk of experiencing emotional exhaustion. Therefore, identifying factors modifiable through education or skill-building which could prevent emotional exhaustion is more reasonable. Previous studies indicate that some factors: mindfulness (12–14), social support (10, 15–17), may ameliorate the risk of emotional exhaustion and mental health.

Mindfulness is a mental state defined as “paying of purposeful non-judgmental attention to the present moment (18–20). Knowledge of the previous intervention studies which showed that mindfulness-based interventions are effective for reducing the risk of emotional exhaustion (12–14) implies that the mental state of mindfulness is linked to the risk of burnout. However, we should be aware that caution is raised for these findings in terms of the quality of the previous studies, etc., (21). Therefore, the relationship between mindfulness and the risk of emotional exhaustion in the midst of pandemics is still unclear. Social support is defined as “the provision of assistance or comfort to others, typically to help them cope with biological, psychological, and social stressors” (22). Several studies have shown that social support may reduce stress and the risk of emotional exhaustion among nurses under the COVID-19 pandemic; however, such studies have not been conducted among other professionals (10, 17, 23, 24).

In addition, effective interventions may differ among workers who whether or not have experience of high-exposure work to SARS-CoV-2. However, we could not identify any studies that focused on the same.

Thus, in this study, we investigated the association between the risk of emotional exhaustion and mindfulness and social support among workers with and without high-exposure work to SARS-CoV-2 in a single medical center in Japan.

MATERIALS AND METHODS

Participants and Procedure

In this cross-sectional study, we sent an email to all staff members of the National Research Institute for Child Health and Development, including the medical doctors, nurses, other workers such as medical technicians, and administrative or management staff, and invited them to participate. Clicking on the URL in the email opened the web questionnaire response page, where participants could answer the questions. We sent reminder e-mails three times: one in early March, one in 2 weeks before the end of the application period, and one 3 days before the end of the application period. Participants who consented to the study were asked to complete an online questionnaire using “Microsoft Forms,” an online software for surveys provided by Microsoft. The survey questions included those pertaining to emotional exhaustion, mindfulness, social support, and high-exposure work to SARS-CoV-2. If the participant also consented and allowed the use of their personal information, which was otherwise anonymized in the research ID from the hospital administrative department, we obtained demographic data such as age and gender. The reason behind getting these data is to reduce the burden on the participants (medical staff during the pandemic) by answering fewer questions on the questionnaire. The National Research Institute for Child Health and Development has 490 hospital beds and a research center. It is one of the national centers in Japan and is located in the western part of Tokyo. It usually provides specialized treatment for all diseases in children. Due to increasing COVID-19 infected patients, the center started accepting COVID-19 infected inpatients from October 2020. The survey was conducted from February 15th to March 19th, 2021. This period was during the third wave of the pandemic in Japan, and the number of infected people increased daily.

Exclusion and Inclusion Criteria

Inclusion criteria were that (1) they are a staff member who works at the National Research Institute for Child Health and Development, either paid or unpaid. (2) they have a unique email address given by the institution.

Exclusion criteria were not willing to participate in our study, and those with missing responses for emotional exhaustion, mindfulness, and social support responded were excluded.

MEASUREMENTS

Emotional Exhaustion

Emotional exhaustion was measured using the single-item measure of burnout (SMB), “Overall, based on your definition of burnout, how would you rate your level of burnout?” (25) The SMB's possible responses were (1) “I enjoy my work. I have no symptoms of burnout,” (2) “Occasionally I am under stress, and I do not always have as much energy as I once did, but I do not feel burned out,” (3) “I am definitely burning out and have one or more symptoms of burnout, such as physical and emotional exhaustion,” (4) “The symptoms of burnout that I'm experiencing won't go away. I think about frustration at work a lot” or (5) “I feel

completely burned out and often wonder if I can go on. I am at the point where I may need some changes or may need to seek some sort of help.”

The SMB was generated by choosing the one-item of the Mini-z (26–28), a questionnaire that measured burnout among healthcare workers, developed by the American College of Physicians (ACP). The Japanese version was created and validated by the ACP Japan group (29). We used the single-item version which Rohland et al. (25) validated against the Maslach Burnout Inventory (MBI), which has three subscales as emotional exhaustion, personal accomplishment, and depersonalization, which is currently understood to be the gold standard burnout measurement (30, 31). Rohland reports the single-item to be correlated at $r = 0.64$ ($p < 0.0001$) with emotional exhaustion and the ANOVA yielded an R^2 of 0.5 ($p < 0.0001$). Thus, in this paper, we capture the emotional exhaustion of burnout.

We followed the definition of previous studies (26, 32) and defined burnout for the descriptive report by answering either (3), (4) or (5), (3) “I am definitely burning out and have one or more symptoms of burnout, such as physical and emotional exhaustion”; (4) “The symptoms of burnout that I’m experiencing won’t go away. I think about frustration at work a lot”; or (5) “I feel completely burned out and often wonder if I can go on. I am at the point where I may need some changes or may need to seek some sort of help.” We treated the burnout scale as an ordinal variable and used multiple ordered logistic regression in the main analysis.

Mindfulness

Mindfulness, defined as “the awareness of one’s internal states and surroundings,” is a concept that has been applied to various therapeutic interventions. These include mindfulness-based cognitive behavior therapy, mindfulness-based stress reduction, and mindfulness meditation that help people avoid “the destructive or automatic habits and responses by learning to observe their thoughts, emotions, and other present-moment experiences without judging or reacting to them” (33).

The Mindful Attention Awareness Scale (MAAS) (34), a unidimensional scale, was used. The scale comprised 15 items, with each item rated on a 6-point Likert scale, ranging from 1 (almost always) to 6 (almost never), and measured mindfulness in everyday experience. Some examples were, “I could be experiencing some emotion and not be conscious of it until sometime later” and “I tend not to notice feelings of physical tension or discomfort until they really grab my attention.” The total scores ranged from 15 to 90, and a higher score reflected a higher level of mindfulness. We used the Japanese version of the MAAS (35). For this analysis, the variable was transformed into three categories based on terciles of the total score distribution.

Social Support

Social support is defined as “the provision of assistance or comfort to others, typically to help them cope with biological, psychological, and social stressors. Support may arise from any interpersonal relationship in an individual’s social network, involving family members, friends, neighbors, religious institutions, colleagues, caregivers, or support groups. It may

take the form of practical help (e.g., doing chores, offering advice), tangible support that involves giving money or other direct material assistance, and emotional support that allows the individual to feel valued, accepted, and understood” (22).

The Multidimensional Scale of Perceived Social Support (MSPSS) (36), developed and validated by Zimet et al., consists of 12 items rated on a 7-point Likert scale (1 = very strongly disagree; 7 = strongly agree), designed to measure perceived social support from three-domain for family, friends, and significant other. The Japanese 7-item version that chose seven of the original 12 items was translated and validated by Iwasa et al. (37). The seven items were: “There is a special person who is around when I am in need”; “There is a special person with whom I can share my joys and sorrows”; “My family really tries to help me”; “I get the emotional help and support I need from my family”; “My friends really try to help me”; “I have friends with whom I can share my joys and sorrows”; or “I can talk about my problems with my friends.” The total scores ranged from 7 to 49, and higher scores implied a greater level of perceived social support. For this analysis, the variable was transformed into three categories based on terciles of the total score distribution.

Potential Exposure to the SARS-CoV-2

We asked participants if they conducted specific tasks at work that would potentially expose them to SARS-CoV-2 (response items were yes/no). Such specific tasks were defined as the following: “Intubation and extubation of respirators for COVID-19 patients, and/or worked in close proximity to them,” “Collected specimens from the COVID-19 patients from the nasal cavity and pharynx, and/or worked in close proximity to them,” “Performed operations on patients and/or worked in close proximity to them,” and “Other work in spaces where there was a possibility of high levels of SARS-CoV-2.” Those who found any of the above list applicable were to select “Yes”. In this study, we defined participants who responded “yes” as “the highly exposed” group, and “no” as “the not highly exposed” group.

Sociodemographic and Other Characteristics

The participants self-reported their demographic characteristics such as education, job type, years of current work, marital status, and whether they had children. Data on age and sex were retrieved from the hospital administrative data. For analysis, we categorized age and years of current work, referring to previous studies (3, 38, 39).

Statistical Analysis

We reported, for descriptive purposes, the means and standard deviations for age and years of current work but used them as a category in the main analysis. Additionally, we calculated the proportions for the categorical variables for all samples and each emotional exhaustion group and no emotional exhaustion group. We assessed the difference between these two groups with a chi-square test. We conducted a test using the Benjamini–Hochberg method to reduce the risk of making Type I error. Cronbach’s alpha coefficients were calculated to test internal validity for the Mindful Attention Awareness Scale (MAAS) and

Multidimensional Scale of Perceived Social Support (MSPSS) (see **Supplementary Document**).

Next, we examined the distribution of the participants' emotional exhaustion responses and examined the association between emotional exhaustion and mindfulness and social support using a multiple ordered logistic regression model. It was conducted overall and stratified by whether or not the participant had high exposure to SARS-CoV-2. Also, we conducted the analysis stratified by job type. Since we used the emotional exhaustion scale that only included one item, we conducted a sensitivity analysis that we performed ordered logistic regression using PHQ-9 (40, 41), a conceptual measure of depression, as the outcome. Based on a previous study (42), we treated it as an ordered variable by severity and showed the distribution of participants who responded to PHQ-9 (**Supplementary Table 3**). All analyses were conducted using STATA/MP 17.0 software (Stata Corp Drive, College Station, TX, USA). *P*-values <0.05 were defined as statistically significant.

Ethical Considerations

We obtained informed consent from all respondents in our study. Our study was approved by the ethics committee of the National Research Institute for Child Health and Development (2020-266). The study was conducted following the code of ethics set by the Declaration of Helsinki and all its future amendments or comparable standards.

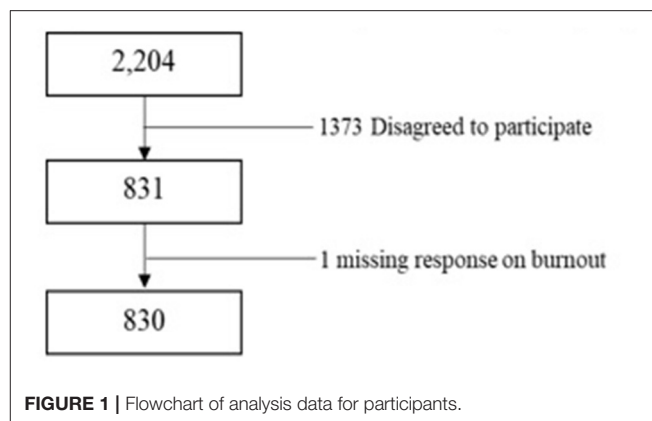
RESULTS

Characteristics of the Participants and Emotional Exhaustion Prevalence, Distributions

Out of the 2,204 people who received the study invitation email, 831 (38%) completed the survey. One person having missing information on emotional exhaustion was excluded (**Figure 1**). Thus, 830 samples were included in our analysis. The participants were aged 41 on average (Standard Deviation; SD; 11), and had worked at the institute for around 4.7 years (SD; 3.7). Most respondents were females (74.7%), and the occupation distribution was as follows: 23.7 % medical doctors, 34.0% nurses, 13.1% other medical staff, and 29.2% office workers or researchers (**Table 1**).

Among the participants, 21.3% reported being highly exposed to SARS-CoV-2. The overall prevalence of emotional exhaustion was 31%, with 36% and 30% in the highly exposed and not highly exposed groups, respectively. By profession, nurses (41%) had the highest prevalence of burnout compared to doctors (23%), other medical staff (28%), and office workers (29%) ($p < 0.05$).

Participants who had no symptoms of emotional exhaustion, defined as those who selected "No symptoms" and "Do not feel burned out" was 69% of the study population. Participants who had signs of emotional exhaustion, defined as those who selected "Have one or more symptoms of emotional exhaustion," "Have symptoms always," and "Feel completely burned out" were 31% of the study population (**Table 2**).



Relationship Between Emotional Exhaustion and Modifiable Factors

Table 3 shows the association between the odds of burnout and the degree of mindfulness and social support using multiple ordered logistic regression analyses.

In the total sample, we observed significant associations between burnout and tertiles of mindfulness and tertiles of social support in the univariate ordered logistic regression. We judged that the results we got were not coincidental because the test results using the Benjamini–Hochberg show that all *p*-value is significant even after multiple adjustments.

In the adjusted analysis (**Table 3**), compared to those with a higher level of mindfulness, moderate and lower levels of mindfulness had significantly higher odds of emotional exhaustion [Odds ratio; OR; 2.20 (95% CI: Confidential Interval; 1.53–3.17), OR; 3.39 (95% CI; 2.36–4.87)], respectively. Compared to those with a higher level of social support, those with lower levels had significantly higher odds of emotional exhaustion [OR; 1.89 (95% CI; 1.31–2.73)]; however, the odds were not significantly different for those with a moderate level of social support [OR; 1.27 (95% CI; 0.89–1.80)]. Coefficients for all variables included in the model are shown in the **Supplementary Table 1**. The results of the relationship between depression and modifiable factors for sensitivity analysis were similar. Moderate and lower levels of mindfulness had significantly higher odds of depression compared to those with a higher level of mindfulness. Compared to those with a higher level of social support, those with lower levels had significantly higher odds of depression (**Supplementary Table 3**).

Relationship Between Emotional Exhaustion and Modifiable Factors, Stratified by Exposure to SARS-CoV-2

The association between the risk of burnout and the degree of mindfulness and social support stratified by exposure to SARS-CoV-2 is shown in **Table 3**. Among those highly exposed, participants with a lower level of mindfulness, compared to those with a higher level, had significantly higher odds of emotional exhaustion [OR; 3.46 (95% CI; 1.48–8.09)]; however, the risk was not significantly different for those with a moderate level [OR;

TABLE 1 | Demographic characteristics all of the participants and by emotional exhaustion.

		Total	Emotional exhaustion		P
		N (%)	No (N = 569) N (%)	Yes (N = 261) N (%)	
Age (years)	22–35	306 (36.9)	207 (68)	99 (32)	0.13
	36–50	346 (41.7)	229 (66)	117 (34)	
	>51	178 (21.5)	133 (75)	45 (25)	
Years of current work*	<3 years	372 (44.8)	270 (73)	102 (27)	<0.01
	≥3 years	446 (53.7)	287 (64)	159 (36)	
	Missing	12 (1.5)	12 (100)	0 (0)	
Sex	Male	210 (25.3)	147 (70)	63 (30)	0.60
	Female	620 (74.7)	422 (68)	198 (32)	
Job type*	Doctor	197 (23.7)	151 (77)	46 (23)	<0.01
	Nurse	282 (34.0)	166 (59)	116 (41)	
	Other medical staff	109 (13.1)	79 (72)	30 (28)	
	Office worker or researcher	242 (29.2)	173 (71)	69 (29)	
High dose exposure to SARS-CoV-2	No	653 (78.7)	455 (70)	198 (30)	0.18
	Yes	177 (21.3)	114 (64)	63 (36)	
Married*	No	344 (41.5)	217 (63)	127 (37)	<0.01
	Yes	486 (58.6)	352 (72)	134 (28)	
Have children	No	518 (62.4)	352 (68)	166 (32)	0.63
	Yes	312 (37.6)	217 (70)	95 (30)	
Mindfulness*	Lower	292 (35.2)	169 (58)	123 (42)	<0.01
	Moderate	267 (32.2)	175 (66)	92 (34)	
	Higher	271 (32.7)	225 (83)	46 (17)	
Social support*	Lower	278 (33.5)	160 (58)	118 (42)	<0.01
	Moderate	294 (35.4)	215 (73)	79 (27)	
	Higher	258 (31.1)	194 (75)	64 (25)	

N, number %, proportion; p, chi-squared test p-value.

*Chi-squared test $p < 0.05$.

TABLE 2 | Distribution of the participants' emotional exhaustion responded.

	Frequency	Percent
No symptoms ^a	73	8.8
Do not feel burned out ^b	496	59.8
Have one or more symptoms of burnout ^c	158	19.0
Have symptoms always ^d	94	11.3
Feel completely burned out ^e	9	1.1
Total	830	100

^a"I enjoy my work. I have no symptoms of burnout".

^b"Occasionally I am under stress, and I do not always have as much energy as I once did, but I do not feel burned out".

^c"I am definitely burning out and have one or more symptoms of burnout, such as physical and emotional exhaustion".

^d"The symptoms of burnout that I'm experiencing won't go away. I think about frustration at work a lot".

^e"I feel completely burned out and often wonder if I can go on. I am at the point where I may need some changes or may need to seek some sort of help".

1.47 (95% CI; 0.62–3.44)]. Compared to those with a higher level of social support, those with a lower level had significantly higher odds of emotional exhaustion [OR; 3.08 (95% CI; 1.33–7.13)];

however, the odds were not significantly different for those with a moderate level [OR; 1.70 (95% CI; 0.79–3.69)]. P for trend was significant for both mindfulness and social support levels.

In the not highly exposed group, both the moderate and low mindfulness groups had significantly higher odds of burnout [OR; 2.61 (95% CI; 1.73–3.94), OR; 3.33 (95% CI; 2.22–5.00), respectively] compared to those with a higher level of mindfulness.

Compared to those with a higher level of social support, those with a lower level had significantly higher odds of emotional exhaustion [OR; 1.65 (95% CI; 1.09–2.50)]; on the other hand, the odds were not significantly different for those with a moderate level [OR; 1.12 (95% CI; 0.75–1.68)]. We observed a significant trend (p -value < 0.01).

Relationship Between Emotional Exhaustion and Modifiable Factors, Stratified by Job Type

The association between the risk of emotional exhaustion and the degree of mindfulness and social support stratified by job type is shown in Table 4.

TABLE 3 | The association between odds of emotional exhaustion and the degree of mindfulness and social support among the participants and by exposure to SARS-CoV-2 using ordered logistic regression.

		All samples			The virus-exposed			The no-exposure		
		OR	95%CI	p for trend	OR	95%CI	p for trend	OR	95%CI	p for trend
Mindfulness	Lower	3.39	2.36–4.87	<0.01	3.46	1.48–8.09	<0.01	3.33	2.22–5.00	<0.01
	Moderate	2.20	1.53–3.17		1.47	0.62–3.44		2.61	1.73–3.94	
	Higher	Reference			Reference			Reference		
Social support	Lower	1.89	1.31–2.73	<0.01	3.08	1.33–7.13	0.02	1.65	1.09–2.50	0.01
	Moderate	1.27	0.89–1.80		1.70	0.79–3.69		1.12	0.75–1.68	
	Higher	Reference			Reference			Reference		

Adjusted age, sex, years of current work, job type, married, have children, High dose exposure to SARS-CoV-2 (for only all samples).

OR, odds ratio; 95%CI, 95% confidence interval.

Among medical doctors, emotional exhaustion risk was significantly higher in both the low and moderate groups than in the high group for both mindfulness [Odds ratio; OR; 4.30, 95% CI: Confidential Interval; 1.93–9.59), OR; 3.17 (95% CI; 1.42–7.06)] and social support [OR; 4.07, 95% CI; 1.65–10.02), OR; 2.36 (95% CI; 1.04–5.34)], respectively. These dose-response relationships measured by *p*-value for trend were also significant. Among nurses, burnout risk was significantly higher in both the low and moderate groups compared to the high group for mindfulness [OR; 2.89, 95% CI; 1.55–5.37), OR; 2.19 (95% CI; 1.17–4.08)], however, the increase in risk was not significant for social support [OR; 1.32, 95% CI; 0.71–2.46), OR; 1.02 (95% CI; 0.58–1.81)], and we failed to observe a significant dose-response relationship.

Among other medical staff, there was a significant higher risk of burnout in the low mindfulness group compared to the high mindfulness group [OR; 5.27 (95% CI; 1.76–15.80)], but no significant increase in risk was observed in the moderate group [OR; 2.21 (95% CI; 0.72–6.82)]. Similar to nurses, we failed to observe a significant relationship between social support and emotional exhaustion [OR; 0.83, 95% CI; 0.27–2.56), OR; 0.65 (95% CI; 0.22–1.91)], or a significant dose-response relationship.

Among administrative and research staff, emotional exhaustion risk was significantly higher in both the low and moderate groups compared to the high mindfulness group [OR; 2.55, 95% CI; 1.29–5.05), OR; 2.12 (95% CI; 1.07–4.18)]. There was a significant relationship with emotional exhaustion in the low social support group compared to the high social support group [OR; 2.33 (95% CI; 1.19–4.55)], but no significant relationship was observed in the moderate group [OR; 1.25 (95% CI; 0.64–2.45)].

DISCUSSION

In this one-hospital study, we found that the factors associated with emotional exhaustion differed by whether the worker had high exposure to SARS-CoV-2 and if medical doctor. Lower levels of mindfulness were associated with higher odds of emotional exhaustion regardless of exposure; however, lower levels of social support were significant odds only among those with high exposure to SARS-CoV-2. Lower levels of social support were

associated with higher odds of emotional exhaustion among only medical doctors.

The overall prevalence of emotional exhaustion was 31% in our study. A meta-analysis on emotional exhaustion among healthcare workers during the COVID-19 pandemic reported that the prevalence was 34.4% (2), similar to our study, and 31.4%, as reported at the early stages of the pandemic in Japan (5). It is noteworthy that in our research and previous Japanese studies (5), nurses had the highest prevalence compared to doctors and other professionals. In non-pandemic settings, a meta-analysis estimated that burnout among nurses (11%) was low compared to those reported from medical and surgical residents (15.4–51%) (43) and among emergency medicine physicians (35–40%) (44–47). This difference may be due to the specific situation of the pandemic, where the additional measures required, such as the use of unfamiliar personal protective equipment, application of zoning, and increased workload due to infection prevention work addition, altered the work environment of nurses the most.

In our study, social support and mindfulness, mindfulness was the sole factor that showed a significant association on the odds of emotional exhaustion in both groups. While our result is the first to indicate that high levels of mindfulness possibly have a protective effect on emotional exhaustion during the COVID-19 pandemic, the results were consistent with previous studies, showing the effectiveness of mindfulness interventions on mental health and emotional exhaustion in non-pandemic situations (14, 48).

High levels of mindfulness can improve metacognition, a decentered awareness mode where negative thoughts and feelings could be seen as passing events (49–51), helping externalize one's thoughts and emotions and observe one's status objectively. In a pandemic setting, where job and personal stress may increase, a health worker can be exhausted easily by endless contemplation about various difficulties, such as the patient's severe condition and the inability to provide usual care to their patients. Additionally, they anticipate the risk of infection, the possibilities of their infecting other patients or their family members, including their children, the risk of their children being discriminated against due to their job, or economic difficulties of oneself or family. Furthermore, the uncertainty of the convergence of the pandemic boosts distress, leading to

TABLE 4 | The association between odds of emotional exhaustion and the degree of mindfulness and social support among the participants and by job type using ordered logistic regression.

	Medical doctor			Nurse			Other medical staff			Office worker or researcher		
	OR	95%CI	p for trend	OR	95%CI	p for trend	OR	95%CI	p for trend	OR	95%CI	p for trend
Mindfulness	4.30	1.93–9.59	<0.01	2.89	1.55–5.37	<0.01	5.27	1.76–15.80	<0.01	2.55	1.29–5.05	<0.01
	3.17	1.42–7.06		2.19	1.17–4.08		2.21	0.72–6.82		2.12	1.07–4.18	
		Reference			Reference			Reference			Reference	
Social support	4.07	1.65–10.02	<0.01	1.32	0.71–2.46	0.73	0.83	0.27–2.56	0.48	2.33	1.19–4.55	0.02
	2.36	1.04–5.34		1.02	0.58–1.81		0.65	0.22–1.91		1.25	0.64–2.45	
		Reference			Reference			Reference			Reference	

Adjusted age, sex, years of current work, married, have children, high dose exposure to SARS-CoV-2.
OR, odds ratio; 95% CI, 95% confidence interval.

enhanced rumination. Such ruminations can wear out a person and lead to emotional exhaustion (52, 53). By mindfully accepting experiences instead of perseverating on them, rumination decreases, and one is more likely to notice conditions (e.g., tiredness, exhaustion, etc.). Therefore, it becomes easier to include adaptive or healthier activities into our lives, such as adjusting the schedule, avoiding unnecessary information, and getting enough rest to evade ruminations (54). Such behavior change possibly prevents people from emotional exhaustion. Both reducing negativity and improving positivity, mindfulness skills have proved to improve psychological positivity (55). It could work as the protective factor for burnout for broadening the scope of attention to encompass pleasurable and meaningful events and thereby build motivation toward purposeful engagement in life (56). As mindfulness skills can be taught, our results suggest intervention benefits to personally enhance mindfulness among medical professionals not only in normal times but also during disasters, like the COVID-19 pandemic.

We also observed that higher social support was associated with reduced odds of emotional exhaustion only among the highly exposed group. Previous studies have suggested that social support is protective against emotional exhaustion among nurses working during the COVID-19 pandemic (10, 17) and non-pandemic situations (15, 16). While it is unclear whether our results differ from previous studies, several possibilities are explaining this disparity. One possibility is the difference in the population. Previous studies included only nurses, while in this study, the highly exposed group had more nurses than the not highly exposed group, which included administrative and management staff. Nurses, who were the target population of the previous studies, may have had more opportunities to work with support from team members than other healthcare professionals because they have more opportunities to work with patients in teams than other medical staff. Alternatively, “social distancing” required to prevent the spread of COVID-19 may have inhibited the protective effect of social support on maintaining the mental health of other professionals. Another possibility is reverse causality (57), that is, in our study, people who had more social support were those who possessed worse mental health and higher needs (58).

In our analysis stratified by job type, medical doctors with lower social support showed higher risk of emotional exhaustion compared to those with high social support, an association which was insignificant for other staff. The mechanism for this is unclear in this study, but may be related to differences in job characteristics between medical doctors and other staffs. Medical doctors play a greater role in explaining to and discussing about medical conditions and treatments options with patients and their families, and in deciding on which treatment to use compared to other staffs. Taking on such a role in an unprecedented infectious disease such as COVID-19, is likely a large burden for medical doctors. As higher social support may lead to easier information sharing consultation with peer medical doctors, it may have had a greater impact on reducing risk of emotional exhaustion among medical doctors compared to other staff. Further

research in a multi-institutional setting is required to further investigate this hypothesis.

Limitations and Strength

Our study has several limitations. Firstly, there was a possibility of sampling bias as only one hospital was included, with a participation rate of just 38% due to voluntary participation. Therefore, we admit that limitations might remain relevant to the external validity of the results obtained. We, however, compared percentages of each characteristic (e.g., age, sex, and job type) across the institute with those of the participants and found the two groups were very similar. Furthermore, the purpose of this study is to examine the association of mindfulness and social support with the risk of emotional exhaustion. Since the possible confounders for this association were adjusted for in the multivariate analysis, the low response rate was not considered fatal to the study's internal validity. Second, those at higher risk for emotional exhaustion may have been less likely to participate in our study. Hence, the results may have been underestimated, as the participants with high odds of burnout were possibly not included. Third, this study was a cross-sectional investigation and did not compare the results with those before the COVID-19 pandemic. Therefore, we do not know whether the associations are causal. Fourth, the measurements in this study are by self-report similar to a previous mindfulness intervention study (21). As all questions were asked in one survey, we cannot exclude the possibility of common methods bias (59). However, detrimental bias was not detected in the correlation matrix procedure. A more appropriate approach would have been to implement the instrumental variable (IV) technique (59). However, we were unable to as we did not have a variable that would meet the requirements to be a strong IV to properly examine the association of mindfulness and social support with emotional exhaustion (59).

The strengths of our study are the relatively large sample size and the investigation of modifiable factors which could guide future interventions for emotional exhaustion in health care workers during the pandemic situation.

CONCLUSION

We found that the factors associated with emotional exhaustion differed by exposure to COVID-19. Interventions building mindfulness seem promising in reducing the high burden

placed on the staff; however, an increase in social support may also be beneficial, especially for workers exposed to high doses of the COVID-19 virus. Future research should consider longitudinal studies where data is collected by random sampling.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethics Committee of the National Research Institute for Child Health and Development. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

MS and NM initiated the idea. MS, RO, and NM designed the study. MS, NM, and KY performed the investigation. AP prepared the data. MS analyzed the data and wrote the draft of the study. All authors provided the input to the draft and contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsy.2022.774919/full#supplementary-material>

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Burnout and Cognitive Functioning: Are We Underestimating the Role of Visuospatial Functions?

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Job burnout is a psychological syndrome which results from chronic occupational stress and cognitive impairments are among its negative consequences. The demands of the COVID-19 pandemic have challenged the healthcare system increasing the risk of job burnout among healthcare professionals. The studies conducted so far have mainly focused on the effects of job burnout on executive functions. Visuospatial functions are a cognitive domain which plays an important role in healthcare workers' optimal performance. Healthcare workers are constantly relying on their visuospatial abilities in order to care for their patients as they are required to use techniques that involve manipulation of medical instruments, they need to have excellent hand-eye coordination and great perception of spatial anatomy, factors that can affect healthcare workers' performance is of significance and can put patient safety at risk. However, our understanding of how visuospatial functions are being affected in job burnout is limited. The scope of this mini-review is to examine the evidence concerning the relationship of job burnout with visuospatial functions. The sparsity of the relevant empirical evidence does not allow for definite conclusions. However, given the implications of diminished visuospatial abilities in patient safety we highlight the need for studies exploring the effects of job burnout on visuospatial functions. Limitations of studies are discussed.

Keywords: job burnout, cognitive functions, visuospatial functions, healthcare workers (HCW), patient safety, mini-review

INTRODUCTION

Job burnout is common in healthcare (1) affecting not only healthcare professionals' physical and mental health but also patient safety (2). The increasing demands of patient care along with the uncertainty regarding the ways on how to handle the COVID-19 pandemic has led undoubtedly to an increased risk of job burnout. Thus, early detection and treatment of job burnout are of great importance.

Job burnout is a psychological syndrome characterized by three dimensions, namely exhaustion, cynicism and reduced personal efficacy (3). A growing body of research suggests that cognitive impairment is also a prominent job burnout characteristic [e.g., (4, 5)]. Importantly, the relevant prospective studies indicate the long-lasting negative effects of job burnout on cognition (4, 6, 7). Observations that led Desart et al. (8) to propose the inclusion of two additional components in the job burnout definition; emotional and cognitive loss of control.

In their systematic review, Delgikaris et al. (9) argued that executive functions is the cognitive domain that appears to suffer most in burnout. Recent studies also corroborate this observation as they have also detected executive functions deficits amongst burned-out employees (5, 10, 11). Executive functions allow the performance of complex tasks that require skills such as planning, decision making, cognitive flexibility, focused attention, inhibition, and interference control (12). These skills are necessary for healthcare professionals and deficits in this cognitive domain could put at risk patient safety. Even though a considerable amount of evidence supports the adverse effects of job burnout on executive functions, it is of significance to note that executive functions are also the most studied cognitive domains in the job burnout research (9); possibly due to the fact that they have a key-role in employees' efficiency in meeting work demands (e.g., deadlines, making correct decisions under pressure). The studies assessing a broader range of cognitive functions indicate that other cognitive domains are affected in job burnout as well. Jonsdottir et al. (13), for instance, apart from executive functioning deficits also observed impairments in episodic memory and learning in a group of clinical job burnout patients. Memory problems have been observed in more recent studies as well (14).

A cognitive domain that has not been studied extensively is visuospatial functions. Visuospatial functions concern one's ability to mentally visualize objects and spatial relations, and enable us to perceive, synthesize and combine visuospatial relationships (15). Thus, visuospatial functions are those cognitive functions that allow us to navigate through space and interact with the surroundings of our environment. The ability to perceive the relationships between structures as well as the use of surgical instruments is of crucial importance among healthcare workers and especially among medical care professionals (i.e., surgeons, nurses). Healthcare workers are constantly relying on their visuospatial abilities in order to care for their patients as they are required to use techniques that involve manipulation of medical instruments (16), they need to have excellent hand-eye coordination (17) and great perception of spatial anatomy (18). Furthermore, considering the constant technological advances that necessitate the ability of healthcare workers to learn new technical skills, visuospatial abilities can be of importance for acquiring these skills (19). Therefore, the examination of those factors that can affect healthcare workers' optimal visuospatial performance is of significance as it can put patient safety at risk.

Notably, a recent scoping review emphasized the importance of visuospatial abilities in surgical performance. Specifically, from their literature review the authors observed that individuals with greater visuospatial skills (as measured by standardized neuropsychological tests) showed greater surgical performance (either in surgical simulation tasks or in clinical environments) while they were faster learners comparing to their peers with lower visuospatial skills (20). The authors also highlighted the need for further studies examining whether performance on visuospatial cognitive tasks can predict surgical performance in clinical environments (20). Visuospatial functions are of importance in healthcare and deficits in this cognitive domain could have detrimental effects on patient safety.

The effects of job burnout on the performance of healthcare workers have not received adequate attention (21) while the emotional and physical strains that were posed to the healthcare workers during the COVID-19 pandemic potentially has increased the risk of job burnout (22, 23). The aim of the present mini-review is to summarize and discuss the evidence concerning the effects of job burnout on visuospatial skills with the purpose of outlining the implications of diminished visuospatial abilities in healthcare quality; and highlight the need for further research which will help toward the elucidation of the relationship between job burnout and visuospatial functions. Acknowledging the job burnout effects on healthcare professionals this will enable policymakers to develop more focused prevention strategies and targeted intervention programs leading to the advancement of both healthcare quality and patient safety.

STUDIES ON THE RELATIONSHIP BETWEEN JOB BURNOUT AND VISUOSPATIAL FUNCTIONS

To the best of the authors' knowledge the number of studies examining the visuospatial skills of burned-out employees is scarce as only five studies were identified (see **Supplementary Material** for search strategy). Specifically, Morgan et al. (24) examined the effects of job burnout on the visuospatial skills of special operation military personnel in a two-wave study. The results showed that neither exhaustion nor cynicism predicted visuospatial abilities. However, greater levels of personal efficacy led to an increase of visuospatial skills. This finding suggests that one's confidence on their abilities to resolve efficiently work-related tasks can enhance their visuospatial functions during stressful situations. Although these results do not reflect an effect of job burnout on visuospatial functions *per se*, they suggest a potential significance of personal efficacy in predicting visuospatial abilities.

In a similar vein, Österberg et al. (25) measured the long-term effects of clinical job burnout in a group of former burnout patients. Even though the participants did not show visuospatial impairments in the baseline assessment, 20 months after their initial sick leave the participants (who were actively working at the time of the follow-up assessment) showed slightly lower visuospatial abilities. The researchers concluded that this observation might not represent a true effect of job burnout on visuospatial skills mainly due to the lack of empirical evidence supporting visuospatial deficits in job burnout. Indeed, one cannot overlook the fact that this observation might reflect a chance finding or that another factor may have mediated this relationship (e.g., visuospatial deficits could constitute a result of sick leave). Nonetheless, we should not ignore the possibility that visuospatial deficits might develop later as job burnout progresses and remain apparent even after recovery. The lack of longitudinal studies however, do not allow sufficient evidence to support this argument.

A recent study observed diminished performance on cognitive tasks measuring visuospatial skills among employees who

reported high cynicism levels (26). The researchers also observed that the employees who scored high on cynicism showed worse visuospatial performance comparing to the employees who scored high on exhaustion. Job burnout is mainly regarded as an exhaustion disorder and the basic conceptual model holds exhaustion as the first dimension to develop (27). However, more recent research posits cynicism as an early job burnout phase (28). Thus, these results suggest that visuospatial deficits could occur early in job burnout. Nevertheless, the cross-sectional design of the study does not provide information on how the two variables develop over time.

Jonsdottir et al. (13) compared the cognitive performance between job burnout patients and healthy employees by assessing a wide range of cognitive functions, namely processing speed, attention, working memory, learning and episodic memory, executive functions, visuospatial functions, and language. The researchers found that job burnout patients performed worse on tasks tapping executive functions but no differences were noted in the performance between the patient and the healthy group in terms of visuospatial abilities; indicating that job burnout is not associated with visuospatial functions.

Similarly, Sandström et al. (29) assessed for differences in the cognitive performance between a group of chronic job burnout patients and a group of healthy individuals. Interestingly, the findings of the study showed that the job burnout group showed deficits in visuospatial short- and long-term memory but not on visuospatial constructional abilities. Chronic stress can have negative effects on the hippocampal neural activity (30) leading to memory and visuospatial functioning impairments. Thus, although the researchers did not observe deficits in visuospatial skills, their results suggest that chronic job burnout can impair both the short-term and long-term visuospatial memory. Visuospatial short-term memory is concerned with the maintenance and the manipulation of visual and spatial information when this information is not any more available in the environment thus, it is a critical function as it helps to create and maintain a structured portrayal of the visual world (31). Long-term memory is recruited for guiding visuospatial attention in one's environment and hence, enables the detection of scene changes (32). Applied to the healthcare environment, deficits in short- and long-term visuospatial memory of healthcare workers could disrupt their ability to effectively recall crucial information such as performing spatially complex technical skills (e.g., surgical knot tying) as well as their ability to discern alterations in the immediate surroundings (e.g., the location of medical instruments, perception of anatomy changes during surgical operations).

Taken together, few studies provide some—but not robust—support on the associations of job burnout with visuospatial functions. The relevant studies are limited and the existing ones provide mixed results hence, definite conclusions cannot be drawn.

LIMITATIONS OF THE REVIEWED STUDIES

In this mini-review three studies were identified depicting the significant associations between burnout and visuospatial functions. However, the current evidence cannot be considered

vigorous enough and the limitations of the studies further impede the possibility on drawing accurate conclusions. Specifically, Morgan et al. (24) showed the positive effects of personal efficacy on visuospatial functions while Österberg et al. (25) observed lower visuospatial skills in a former group of job burnout patients after their recovery but not on the baseline. Koutsimani et al. (26) found significant associations only between cynicism and visuospatial abilities. Considering that job burnout is an exhaustion disorder one would expect clearer evidence in support of its consequences on visuospatial skills such as a potential negative impact of the exhaustion dimension on this cognitive domain.

One limitation is that of the five studies identified only two (24, 25) examined the association of job burnout with visuospatial functioning longitudinally. Thus, no safe conclusions can be drawn regarding both the causality and the predictive relationship of the two variables. Moreover, the two prospective studies explored the effects of burnout on visuospatial abilities across two different time points. Although two-wave studies provide some insights regarding a studied relationship, the form of change of two variables over time cannot be established by measuring an event at only two time points (33). Therefore, more prospective studies with at least three waves of data would be more suitable to help researchers further understand the relationship between job burnout and visuospatial functions.

The heterogeneity of the studied populations further limits our understanding of the burnout-visuospatial functions association as some studies examine clinical job burnout while others focus on non-clinical job burnout. Taking into consideration the evidence that point to the negative associations between non-clinical job burnout and visuospatial abilities (26) and the fact at non-clinical job burnout levels employees are still able to maintain their job performance by adopting coping strategies (34), the authors emphasize the significance of examining the job burnout effects on employees who are at the initial burnout stages. To the best of our knowledge, the visuospatial abilities of healthcare workers suffering from burnout has not been examined so far.

Another limitation involves the inconsistency among the tools being used for assessing job burnout. The Maslach Burnout Inventory (35), for instance, takes into consideration all three burnout dimensions while other questionnaires, such as the Shirom-Melamed Burnout Questionnaire (SMBQ) (36), assess only the exhaustion dimension. Additionally, although some researchers use the total job burnout scores, others use the scores on each job burnout dimension; and others detect job burnout levels based on clinical interviews. Thus, it is possible that the inconsistencies among the research tools could result in an underestimation of the visuospatial skills in job burnout. A general consensus on the diagnostic job burnout tools is of importance in order to reach to more valid conclusions. In the studies that were identified in this review, Koutsimani et al. (26) and Morgan et al. (24) assessed each job burnout subscale by administering the General Survey version of the MBI (MBI-GS) (37), Jonsdottir et al. (13) used the total job burnout score on the SMBQ; Österberg et al. (25) included patients who were previously diagnosed with job burnout through both

clinical interviews and the score on the MBI-GS exhaustion dimension and Sandström et al. (29) assessed job burnout levels via clinical interviews.

DISCUSSION

The research studies investigating the effects of job burnout on cognitive performance mainly show that executive functions are the most prominent cognitive domain that is being impaired in job burnout (9). However, they are also the most examined ones. Failure to explore for other cognitive domains raises the question on whether executive functions are indeed the cognitive domain that suffers most in job burnout; or if the lack of studies examining a broader range of cognitive domains have led researchers to reach fallacious conclusions. Studies assessing a wide range of cognitive domains on burned-out employees have revealed impairments in other cognitive functions as well (13, 26, 38). A cognitive domain that has been largely overlooked in the relevant literature is visuospatial functions. Visuospatial functions are an important cognitive domain as it allows us to navigate in our environment and to comprehend visuospatial relationships. Thus, impairments in visuospatial abilities can negatively affect not only one's personal life (e.g., driving) but also the job performance of those employees who largely depend on this cognitive domain.

So far, only a limited number of studies has examined the associations between job burnout and visuospatial functions and the existing evidence are not vigorous enough to allow accurate conclusions, emphasizing the need for further investigation. This mini-review identified five studies examining the relationship between job burnout and visuospatial functions providing mixed and unclear support for the relationship between job burnout and visuospatial functions. Specifically, Österberg et al. (25) showed the presence of slight deficits in visuospatial abilities and only after recovery from job burnout. The absence of a respective baseline association and the potential unaccounted factors that could mediate this relationship weaken the evidence in favor of the effects of job burnout on visuospatial functions. Indeed, the researchers also observed a reduced performance on tasks tapping attention. Hence, participants' attention deficits could underlie the observed effects of job burnout on visuospatial functions; i.e., not focusing on the details of the visuospatial task.

Koutsimani et al. (26) showed that cynicism was related to lower visuospatial deficits. Nonetheless, due to the cross-sectional nature of the study causality cannot be inferred. Moreover, even though the researchers examined moderators that might explain this association (i.e., depression, anxiety, perceived family support), they did not account for other potential confounding factors such as daily stress beyond the workplace. The results of Morgan et al. (24) also do not provide direct evidence on the impact of job burnout on visuospatial functions as the researchers found that greater levels of personal efficacy—but not inefficacy—predicted greater visuospatial abilities. Hence, concluding that a

negative view of one's work performance can result in diminished visuospatial functions would be inaccurate.

The studies that failed to observe any significant associations between job burnout and visuospatial functions also suffer from limitations that could affect the results. The study of Jonsdottir et al. (13), for instance, was underpowered ($N = 33$) increasing the risk of missing a true effect. Additionally, Sandström et al. (29) examined only women. Moreover, although the researchers did not find deficits in visuospatial constructive and perceptual abilities, they observed impairments in visuospatial short-term and long-term memory. Visuospatial functions are mainly clustered in three components; visual perception, construction, and visual memory (39). Thus, these results could indicate an impact of job burnout in certain visuospatial dimensions. Moreover, a recent three-wave Ph.D., study showed a negative effect of cynicism on visuospatial performance (40), suggesting a potential impact of certain job burnout aspects on visuospatial functions.

Overall, the literature lacks a comprehensive examination on the effects of job burnout to visuospatial functions. Moreover, the lack of a general consensus on the tools assessing burnout and the complexity of visuospatial functions requiring their exhaustive examination in order for all visuospatial aspects to be accounted for emphasize the need for thorough examinations. Importantly, in view of the fact that deficits in the visuospatial skills of healthcare workers can have detrimental effects on patient safety and healthcare quality, investigation of the potential impact of job burnout on visuospatial functions is of significance.

The challenges that healthcare workers face in their everyday clinical practice increase their risk of becoming burned-out, affecting both healthcare quality and patient safety. Integral visuospatial abilities are of significance for patient safety and they can be compromised even at the initial burnout levels. The assessment of visuospatial functions of burned-out healthcare workers and if/ how they are affected from job burnout is a prominent avenue of research which will advance our understanding of the job burnout effects and will help toward the implementation of targeted prevention and intervention strategies.

AUTHOR CONTRIBUTIONS

AM conceptualized the research topic, reviewed the initial draft, and suggested changes. PK was responsible for searching for and identifying the studies to be reviewed and prepared the initial draft. AM and PK contributed to the preparation of the final manuscript. Both authors contributed to the article and approved the submitted version.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsy.2022.775606/full#supplementary-material>

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Understanding the Link Between Burnout and Sub-Optimal Care: Why Should Healthcare Education Be Interested in Employee Silence?

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Evidence on the association of burnout with objective indicators of performance is scarce in healthcare. In parallel, healthcare professionals ameliorate the short-term impact of burnout by prioritizing some tasks over others. The phenomenon of employee silence can help us understand the evolution of how culture is molded toward the prioritization of some tasks over others, and how this contributes to burnout. Silence in healthcare has been associated with concealing errors, reduced patient safety, and covering up errors made by others. Conversely, there is evidence that in organizations where employees are encouraged to speak up about concerns, and where concerns are responded to appropriately, better patient outcomes such as improved patient safety and patient experience occur. Interventions to promote “speaking-up” in healthcare have not been successful and are rooted in a professional culture that does not promote speaking out. In this paper, we review the evidence that exists within healthcare to argue why healthcare education should be interested in employee silence, and how silence is a key factor in understanding how burnout develops and impacts quality of care. The following key questions have been addressed; how employee silence evolves during medical education, how is silence maintained after graduation, and how can leadership style contribute to silence in healthcare. The impact of withholding information on healthcare professional burnout, patient safety and quality of care is significant. The paper concludes with a suggested future research agenda and additional recommendations.

Keywords: employee silence, burnout, Quality of care (QoC), healthcare education and training, wellbeing

INTRODUCTION

Burnout is accepted as a significant problem in healthcare, and there is a plethora of research to demonstrate the links with patient safety and quality of care. However, evidence on the association of burnout with objective indicators of performance (as opposed to self-report) is scarce in all occupations, including healthcare (1, 2). But, the research that does exist indicates an important relationship between burnout and sub-optimal care. For example, intensive care units in which staff reported high levels of emotional exhaustion had higher patient standardized mortality ratios, even after objective unit characteristics such as workload had been controlled for Welp et al. (3). Thus, we have a challenge in identifying the links that connect burnout and performance in healthcare (4).

An under-researched area in the literature is the way that healthcare professionals maintain performance during stressful conditions. For example, there is some evidence that even when staff lacks mental or physical energy (5) they use “performance protection” strategies to maintain high priority clinical tasks and neglect low priority secondary tasks (such as reassuring patients) (6). The simplest example of this is the existence and frequent use of “work arounds” in healthcare, whereby staff develop creative solutions to resource and/or staff shortages (7). The drive for healthcare professionals to “keep going” and “get the job done” has a dark side referred to as pathological altruism (8), which refers to behaviors that attempt to promote the welfare of another but can have pernicious long-term consequences for the care giver. Healthcare exploits the professional ethic of healthcare professionals which results in a form of dysfunctional professionalism that support maladaptive healthcare structures in education and practice (9). The gap between what our healthcare workers would need to balance maintaining quality of care with their wellbeing and the reality of their day-to-day experience is significant—as is evidenced by increasing levels of burnout. Self-care equals safe care, but that is not happening as burnout and the associated mental health problems are not dealt with until a tipping point is reached.

The phenomenon of employee silence in healthcare can help us to understand how culture is molded toward the prioritization of some tasks over others. Indeed, a common phenomenon among healthcare staff is a feeling that they are unable to share their concerns, and their managers are anxious about even seeking them or having honest informal conversations. Thus silence is the result of such “protective hesitancy” as both may not feel it is “psychologically safe” to have such discussions (10, 11). Understanding what healthcare workers consider to be a priority can be understood via what they speak-up about and keep silent about at work. Remaining silent about important issues is a complex phenomenon in healthcare that is rooted in early educational experiences and career development. Silence is connected with low levels of psychological safety (12), which in turn is connected with burnout and poorer care (13, 14). From this perspective, burnout and sub-optimal care are symptoms of a dysfunctional system. Such systems are difficult to analyze directly, but employee silence provides an important bridge into how healthcare workers make sense of their work via what they choose to speak-up about and what they remain silent about. Moreover, viewing this phenomenon through the educational journey of healthcare professionals delineates the evolution of what is acceptable/not acceptable to discuss which is directly linked to employee wellbeing, patient safety and quality of care.

In this paper, we review the evidence that exists within healthcare to argue why healthcare education should be interested in employee silence. We will focus on the experience of physicians, given their pivotal role in healthcare delivery, but the conclusions we reach are relevant for healthcare education generally. The following key questions have been addressed; how employee silence evolves during medical education, how is silence maintained after graduation, and how can leadership style contribute to silence in healthcare. The paper concludes with the future research agenda and some recommendations.

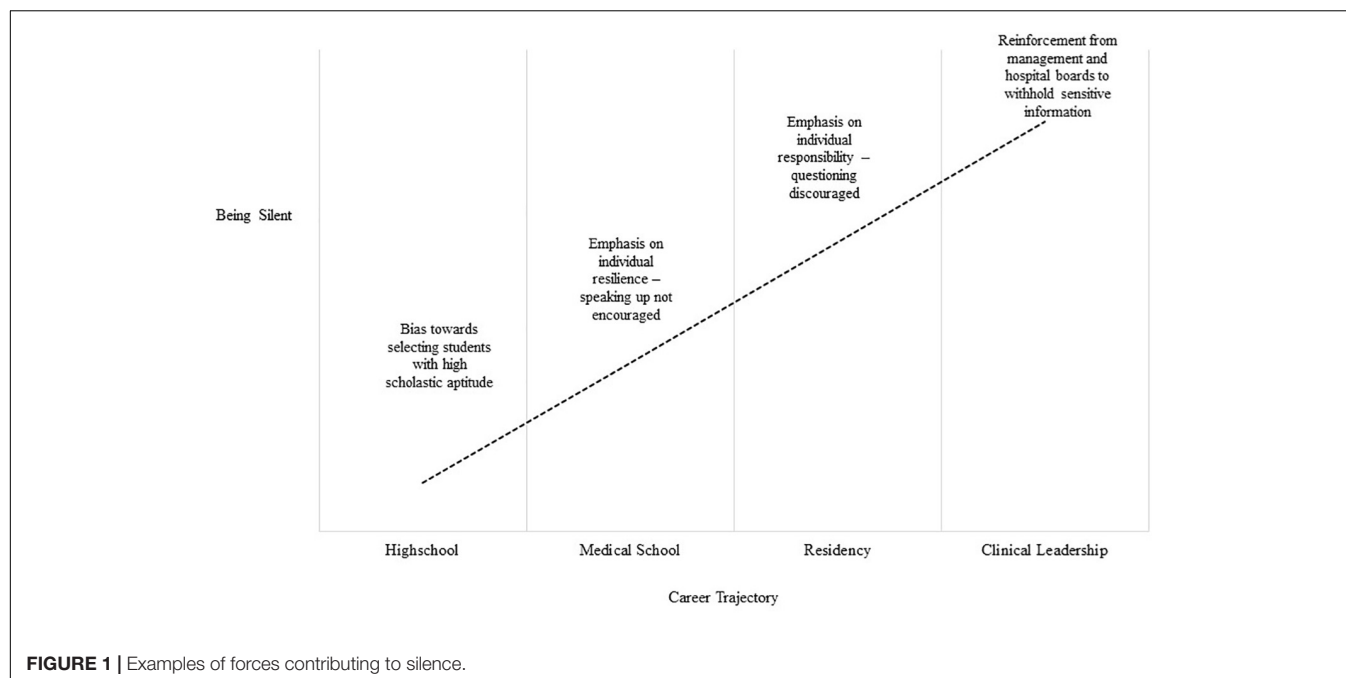
WHAT IS EMPLOYEE SILENCE AND WHY IS IT IMPORTANT?

Employee silence denotes the withholding of genuine expressions about employees’ evaluations of personal, social, and/or organizational circumstances at work to persons who are capable of effecting change at work (15). Employee silence in healthcare falls into two broad categories; voluntary and involuntary forms of silence. Silence in healthcare can take a number of forms that include being silent about patient safety concerns and covering up errors (16–18), ethical issues (19), discrimination issues (20), inappropriate behavior (21, 22), neglected care (23), and lack of resources (24). Conversely, there is evidence that in organizations where employees are encouraged to speak up about concerns, and where concerns are responded to appropriately, better patient outcomes such as improved patient safety and patient experience occur (25). The need for us to address employee silence in healthcare has been highlighted by a recent systematic review which concluded that speaking-up interventions in healthcare are largely ineffective, due to a global pervasiveness and dominance of professional cultures that are inimical to speaking-up interventions (26).

In the following, we will argue that the phenomenon of employee silence has its roots in medical education systems that reflect the prevailing values within society that valorize competitiveness and status. Prompts toward silence and the need to protect the in-group (i.e., physicians) starts in medical school and is entwined in the continuous forms of education that healthcare professionals attend to during their career. Physicians are educated to be clinicians first, and their role as a leader, team member, or manager is secondary (27). This system results in a formal culture that values professionalism, but a hidden one that valorizes performance and competitiveness above collaboration (28, 29). **Figure 1** highlights examples of forces that contribute to employee silence during the career of a physician. In the first part of the paper, we will review the evidence indicating how employee silence evolves and is maintained. In the second part of the paper, we will identify avenues for future research and make recommendations as to what can be done to address employee silence.

HOW DOES EMPLOYEE SILENCE EVOLVE DURING MEDICAL EDUCATION?

There is significant evidence that medical training is plagued by difficulties with the delivery of undesirable information regarding the assessment of students (30), which represents a lost opportunity in terms of modeling the sharing of information. A systematic review on selection methods used in medical education highlights the fact that outcome measures used to evaluate selection methods most often focus on indicators of attainment and maximal performance (e.g., medical school achievements, performance in licensure examinations) rather than indicators relating more directly to clinical practice (31).



This begs the question as to whether healthcare education is building a culture of performance first; where individual wellbeing and asking difficult questions is far down the list of priorities (8, 9). The fact that such high percentages of physicians consistently report symptoms of burnout (32) suggests that there is a significant problems with the job and its ability to adequately support individuals to meet its demands (33), and this problem will not be ameliorated if the response of healthcare organizations is to focus predominately on individual-focused solutions (e.g., extended leave, mediation, psychotherapy) (34). A “performance first” culture does not encourage speaking-up. For example, a BMJ blog written by two new United Kingdom medical students argues that there is unhealthy focus on individual resilience which results in them compensating for a flawed system, and sounds more like compliance than resilience. The students conclude by arguing that junior doctors need to be empowered to build more resilient systems, by whistleblowing, advocating, and speaking out against wrong (35).

The profile of the “average” medical student is someone with high scholastic performance and high levels of adaptive perfectionism (36). Unfortunately, the “average” medical student commonly reports symptoms of depression (37) and burnout (38) as a consequence of the demands of medical training. The inhibition of emotion that results from having to remain silent can have a huge psychological toll (39). If junior healthcare staff believe that certain forms of silence based on loyalty or “not breaking ranks” is expected of them, they run the risk of underestimating the impact on their own wellbeing. Moreover, staff can carry this rumination home making recovery from work less effective (40)—with medical education being the first exposure to this phenomenon. The challenge for medical education is to avoid promoting the value of self-sacrifice as the characteristic of a good healthcare professional, as the ideal of

sacrifice can dovetail in a dysfunctional way with being loyal, and not speaking up.

The significant literature on the hidden curriculum suggests that the induction period for many young physicians is characterized by a toxic performance culture, whereby adversity is viewed as “character building” and emotional repression is valorized (41, 42). Moreover, evidence indicates that medical students report inaction in the face of emotionally challenging situations (43, 44), and dysfunctional emotion regulation strategies can be a risk factor for burnout (i.e., emotional exhaustion, and cynicism) (45). Ultimately, it appears that young physicians learn early on that certain dysfunctional behaviors are valued (e.g., working long hours without appropriate breaks as an indicator of “commitment”).

HOW IS SILENCE MAINTAINED POST RESIDENCY?

As young physicians begin their careers, there are many prompts from their environments that reinforce the tendency toward withholding information. As already noted, the use of “work arounds” is frequent in healthcare. Work arounds could be viewed as an organic response to acquiescent silence (i.e., apathy)—resulting from a belief that problems need to be “worked around” because change is not forthcoming. Ultimately, such adaptations may not be spoken about because they grow out of the situation the staff is in, and they are seen as natural necessities rather than as true innovations. Thus, there is acceptance that being “silent” about gaps in care is practical and solution-focused. Congruently, open discussions of medical errors are sensitive due to the legal ramifications of sharing information that may identify the malpractice of a coworker, thus

limited sharing of such information can be viewed as critical to maintaining work team cohesion.

Policies or interventions to give healthcare professionals opportunities to voice may not effectively reduce silence, and therefore fail to reduce burnout, if employees still withhold issues they do not feel comfortable sharing (46). Researchers and practitioners cannot assume that physicians who frequently speak up are not withholding other issues (47). For example, in 2016 the UK National Health Service (NHS) introduced the “Freedom to Speak Up Guardian” (FTSUG) role, with the objective of improvements in the way staff concerns were handled and responded to (especially with regard to patient safety). Interestingly, thousands of NHS staff have spoken up to FTSUGs, but the majority of concerns raised were about bullying and harassment behaviors by colleagues, rather than direct patient safety concerns (48). The challenge for healthcare education is enable physicians to speak about professional behavior more directly. Additionally, there is a secondary issue as to whether bullying/harassment is a “strategy” to encourage employee silence. For example, in the paper of Edwards et al. a step-by-step analysis of the case of “Dr. Death” at the Bundaberg Hospital in Australia revealed that numerous allegations of harassment and bullying were filed prior to the official inquiry starting (49). The inquiry concluded that 13 patients died due to negligence, and highlighted how harassment and bullying behaviors were used to intimidate junior staff into silence.

Thus, the challenge for continuous professional development (CPD) is to understand the processes that result in organizations consisting of people who promote silence as a norm, and understand how CPD can be used to equip healthcare professionals with tools to promote the appropriate sharing of information. A good place to start is to explore how CPD can contribute to building an inclusive workplace, meaning workplaces and teams where the differences and uniqueness that staff bring are valued, as organizations are more likely to be “psychologically safe” workplaces where staff feel confident in expressing their true selves, raising concerns and admitting mistakes without fear of being unfairly judged (50).

HOW CAN LEADERSHIP STYLE CONTRIBUTE TO SILENCE IN HEALTHCARE?

Healthcare professionals often fear blame, loss of jobs, legal issues or breaking the hierarchy as they hesitate to speak about errors and transgressions. There is considerable anecdotal evidence in healthcare that the silence norm is top-down. For example, the chairs of medicine and surgery departments report it is common for faculty not raise or talk about important problems (51). What are the types of behaviors modeled by leadership and line-management that promote silence? The evidence indicates that toxic supervisors, who avoid adopting subordinate’s ideas, can lead employees to be more silent (52). If the aforementioned behaviors are characteristic of clinical leaders, they will feed into the group climate of the unit and/or the department. Large power discrepancies are ingrained in medical

culture and adversely affect “low power” members’ perception regarding their willingness to speak up, which inhibits productive communication (24, 53).

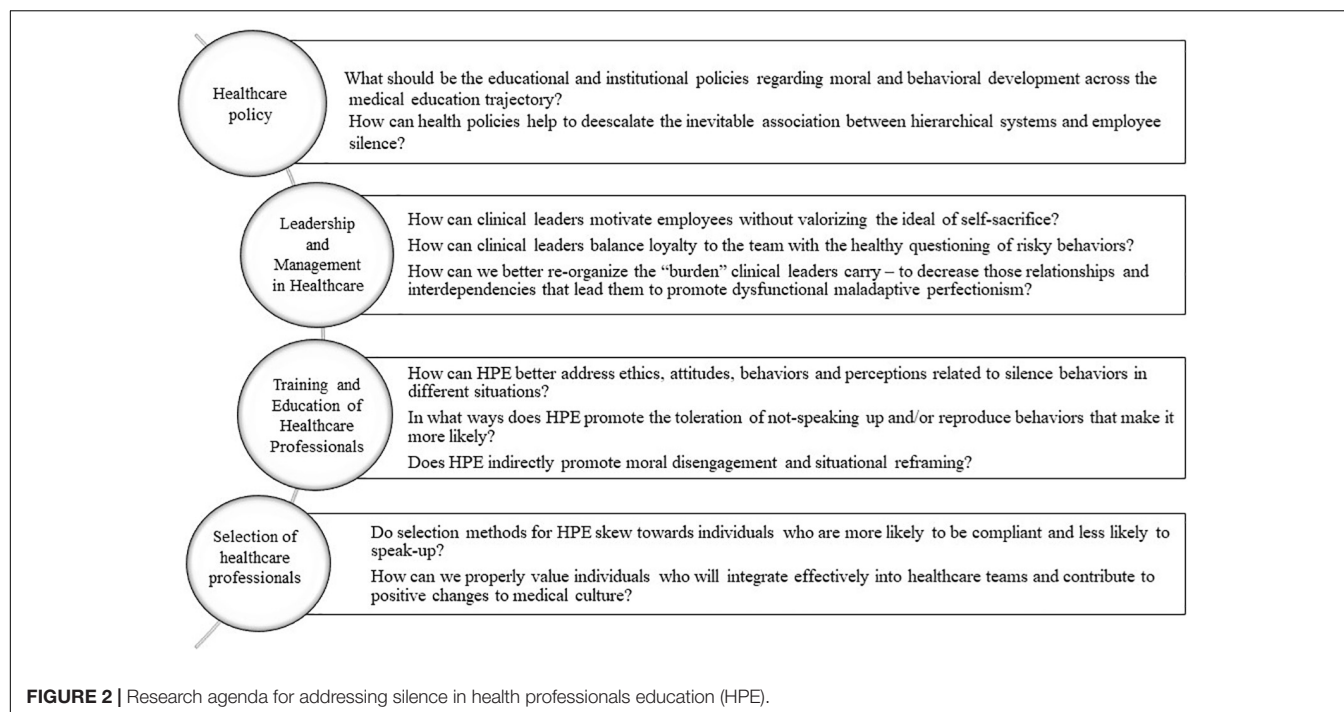
We can view employee silence as an “appropriate” reaction to certain leadership styles, group dynamics and/or as a vehicle for participation in the organization rather than a withdrawal from it. Given the widespread nature of employee silence in the health sector, the complexity of medical healthcare provision and the augmented stress that characterizes healthcare professions, we should also consider that the extent to which employee silence can be identified in the healthcare sector might also be a type of participative group climate (or intragroup norm), in particular if we take into account all plausible motivations for being silent about medical errors and mental health issues faced by healthcare professionals or other problems in the sector. Group climate is characterized by shared employee perceptions and it has been suggested through research findings that group-level perceptions related to psychological safety can predict individual voice behaviors (54). In this case, if speaking up is perceived as a threat to the psychological safety on a group level, then the tendency to be silent—or speak up less—as an individual, could be an expression of a participative climate.

CHARTING THE FUTURE RESEARCH AGENDA

Future research in the field of health professional education needs to meaningfully reflect the influence of individual factors, group factors, and context on learning, performance, and wellbeing. Education is an *organized* activity, and shouldn’t be treated as a value-free preparation for professional life. Issues that are related to group dynamics, like collaboration, competitiveness, leadership, effectiveness, decision making, organizational culture and development—which are the focus of the medical profession—should also be the focus of medical education. In this context, behaviors that are considered individual choices—e.g., to speak up or to remain silent—can be also studied as “organizational phenomena,” and in healthcare some of those organizational phenomena are very likely to also have their roots in education. Medical education needs to move from a focus on individual attainment to collective effectiveness, which is more likely to promote individual wellbeing and thus patient safety. **Figure 2** outlines suggested questions that future research needs to address.

FURTHER THOUGHTS AND RECOMMENDATIONS

Evidence from industries outside of healthcare is instructive. For example, Shaukat and Khurshid (55) found that burnout mediated the relationship between employee silence and employee performance, leading to withdrawal behaviors and turnover intention among telecom engineers. Thus, if supervisors do not encourage employees to share their work-related concerns, silence functions as a workplace stressor that starts



a loss of resources process, in agreement with the resource depletion principle predicted by the Conservation of Resources (COR) theory (56). In this context, one could argue that the more pervasive silence is, the more intense is the effect on the experience of burnout, specifically emotional exhaustion (57).

The concept of organizational memory is very useful. For example, research on the dark side of policing highlights the norms that can support police silence and which are integrated into organizational memory (58). Such norms include; not “ratting” on another officer, not implicating your colleagues if you’re caught doing something, not interfering with the activities of other police offices, not trusting new people until they have been socialized into the norms, and not volunteering information about any event that could implicate a colleague. The important point is that such behaviors are learned early in the educational experiences. Not surprisingly, corrupt decisions that result in positive outcomes are included in organizational memory, and provide guidelines for future behavior. The police force and military represent good comparison industries in the sense that mistakes have a high legal cost and hiding and/or covering up problems can be a common strategy.

Employee silence in healthcare may simply reflect the social psychological need of individuals to identify with their organization. This is referred to as the “Abilene paradox,” which involves a common breakdown of group communication in which each member mistakenly believes that their own preferences are counter to the group’s and, therefore, does not raise objections (59). The Abilene Paradox is a desire not to “rock the boat.” So, how can we counter this desire? Obviously, leaders increasing psychological safety as a deterrent against employee silence should be the goal in the long-term, but the short to mid-term goals can include clinical leaders

modeling desired behaviors such as humble inquiry, minimizing assumptions, and developing rapport (60). Employee silence is maintained at both the hospital board and senior management levels, in that the messages about work practices that compromise safety can be viewed as unwelcome. This results in perverse organizational dynamics—where people (i.e., clinical leaders as safety gatekeepers) are used as a means to an end, as tools and commodities rather than respected citizens (61). However, more contact between senior leaders and day-to-day operations at the ward level has the potential to reduce the gap between abstract policy and the reality of managing patient demands. Moreover, the emergence of kindness and compassionate leadership have the potential to create environments where information is shared earlier and more openly (62)—preventing larger problems that eventually need whistleblowers to illuminate them (63). The challenge for medical education is to figure out how it can stop healthcare professionals recycling the dysfunctional “rites of passage” behaviors that they have suffered under, if kindness and compassion are to be adopted.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

AM and OL contributed equally to the conceptualization of the idea and contributed to writing the manuscript. Both authors contributed to the article and approved the submitted version.

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Burnout and Cardiovascular Risk in Healthcare Professionals During the COVID-19 Pandemic

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Introduction: The objective of this study was to investigate the psychosocial and cardiovascular markers in healthcare professionals during the COVID-19 pandemic.

Methods: This was a STROBE compliant, blended exploratory study. Residents, staff physicians, nurses, and auxiliary healthcare professionals from both inpatient and outpatient medicine services were recruited using a planned random probability sample. The Maslach Burnout Inventory (MBI), Fuster-BEWAT score (FBS), and socio-demographic factors, as well as sleep quality, were studied. The correlations between burnout severity and cardiovascular risk were examined using multivariable linear regression models adjusted for confounding variables, such as sociodemographic and anthropometric characteristics.

Results: The regression analysis with FBS as the outcome showed a negative association between cardiovascular health and emotional exhaustion [Coef.(95%CI): -0.029 (-0.048, -0.01), $p = 0.002$]. The higher the emotional exhaustion the lower the cardiovascular health. Further, the model showed a positive association between personal accomplishment and cardiovascular health [Coef.(95%CI): 0.045 (0.007, 0.082), $p = 0.02$]. Emotional exhaustion was significantly positive correlated with REM sleep and light average (Spearman's rank correlation: 0.37 and 0.35, respectively, with $P < 0.05$).

Conclusion: The data from this study show that healthcare practitioners who are with burnout and emotional exhaustion have an elevated cardiovascular risk, however, causality cannot be determined. As an adaptive response to stressful situations, REM sleep increases. The findings of this study may be relevant in creating preventive strategies for burnout and cardiovascular risk reduction or prevention.

Clinical Trial Registration: [www.ClinicalTrials.gov], identifier [NCT04422418].

Keywords: cardiovascular risk (CV risk), emotional exhaustion (EE), depersonalization (DP), work stress, REM sleep, sleep alterations

INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic has presented healthcare systems with new and unanticipated obstacles. This quickly changing scenario has a significant impact on healthcare professionals (1). During the epidemic, all healthcare modalities encountered similar obstacles, such as limited expert staff availability and the possibility of periprocedural transmission of SARS-CoV-2 between patients and staff (2). Managing the unforeseeable scenario of the COVID-19 pandemic posed an unprecedented challenge to healthcare leadership, who had to act quickly to restructure and deliver the key resources and information staff required to manage throughout this health crisis (3).

The COVID-19 pandemic resulted in high incidence of anxiety, depression and burnout syndrome, and mental health disorders among nurses and physicians (4–7). The severe COVID-19 outbreak has had a significant impact on the mental health of medical and nursing professionals (8). A recent study in the Middle East Region found that healthcare professionals experienced psychological distress during the outbreak (9). These factors contribute to physician burnout, which is already a significant problem in the healthcare industry (10, 11).

Long-term job stress can cause burnout, persistent weariness, anxiety symptoms, and health problems (12, 13). According to Maslach and Leiter (14), “Burnout is a psychological syndrome emerging as a prolonged response to chronic interpersonal stressors on the job” (14). According to Karasek and Theorell Job Demands Control Support Model (15), there is a relationship between cardiovascular risk factors and burnout, which is mediated by life and job stressors (16). Occupational stress and burnout can cause persistent fatigue symptoms, as well as an increased risk of cardiovascular disease (17). Furthermore, total occupational burden has been linked to cardiovascular risk in physicians (18). Stress and unfavorable psychosocial working conditions may exacerbate cardiovascular disease in the physician occupational group (19). Overwork-related mortality can be linked to cerebrovascular illnesses (17), whereas induced Takotsubo cardiomyopathy has been linked to work-related stress (20, 21).

The goal of this project was to investigate the relationship between burnout and cardiovascular disease in healthcare professionals using multivariable linear regression models that were adjusted for relevant confounding variables such as socio-demographics and anthropometrics, as well as traditional CVD risk factors.

MATERIALS AND METHODS

Ethics

Ethical approval was obtained from the Abu Dhabi COVID19 Research IRB Committee of the Department of Health-Abu Dhabi (DOH/NCVDC/2020/1052) and Emirates IRB for COVID Research Committee (DOH/CVDC/2020/1246). Informed consent was obtained before accepting to complete the online questionnaires (22, 23).

Design and Setting

This was an exploratory observational cross-sectional study that covered Hospitals in Abu Dhabi capital of the United Arab Emirates. The study was carried out from July to November 2020, during the second wave of the COVID-19 pandemic, when medical countermeasures were being implemented (24, 25). The STROBE–The EQUATOR Network guidelines were followed to design the protocol of this study (26).

Study Participants Recruitment and Sample Size

The online survey was distributed to a cohort of healthcare professionals from Abu Dhabi hospitals and healthcare institutions via institutional mass email addressed by either a campus office or the researcher (27, 28). Inclusion criteria were all residents, staff physicians, nurses and auxiliary healthcare professionals from both inpatient and outpatient medical services who agreed to be a part of the study. Exclusion criteria is not willing to complete a written consent form. Potential participants in the study were recruited through institutional mass email, which is sent by either a campus office or the researcher (27). The study uses random probability sampling with each population member having a non-zero chance of being selected. Since our study was sponsored by academic and governmental agencies, we expected to have good response rates for mass email recruitment (29). Electronic surveys are widely used for collecting data in an efficient and timely manner (30) and therefore were used for Maslach Burnout Inventory (MBI), Fuster-BEWAT score (FBS) and socio-demographic characteristics.

Outcomes

Primary outcomes were (I) Burnout through MBI emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA) subscale scores; (II) Cardio-vascular risk through FBS (31, 32). The MBI is the most commonly used standard for assessing burnout in healthcare professionals. This validated instrument contains 22 elements that include an overall measure of burnout as well as three distinct burnout domains: personal accomplishment, emotional exhaustion, and depersonalization (33). The FBS is a cardiovascular health metric consisting of 5 modifiable risk factors: blood pressure, exercise, weight, alimentation, tobacco. Notably, the Fuster-BEWAT and the AHA cardiovascular risk scores predicted the presence and extent of subclinical atherosclerosis (32) and left ventricular hypertrophy classification (34) with similar accuracy. The FBS is a simplified method that does not require laboratory tests and therefore can be applied in primary care settings or communities. Secondary outcomes were (III) sleep quality through wearable monitoring technology (Polar Ignite) (35).

Data Integration and Management

The collection and management of data consisted of 3 distinct steps, as described in the published protocol (28): (a) data collection, (b) data handling and linkage and (c) data visualization. All participant information, and data generated during this study was kept confidential in accordance with the

HIPAA (Health Insurance Portability and Accountability Act of 1996) (36) on subject privacy and will not be used for any purpose other than conducting the study. Participant data was coded and matched to random numbers to ensure protection of data.

Statistical Analysis

Descriptive statistics, including the observed frequency counts and percentages for healthcare professionals' socio-demographic characteristics and cardiovascular risk factors included in the FBS [e.g., blood pressure (B), exercise (E), weight (W), alimentation (A), and tobacco (T)], were performed. Further, the Chi-square statistical test (at a significance level of 0.05) was applied to compare the distribution of responses to the gender. Following this, descriptive statistics (including means, standard deviations and ranges) were calculated for FBS and three MBI scales, namely emotional exhaustion (EE), personal accomplishment (PA) and depersonalization (DP). Further, a correlation analysis was carried out between FBS and all possible predictors, including MBI scales and socio-demographic information, to examine the statistical properties and test each coefficient's significance using *p*-values.

Following the descriptive statistics, linear regression analysis was conducted to investigate the association between the outcome variable (FBS) and MBI scales adjusted with the socio-demographic factors. As socio-demographic information may be potential confounders of FBS, no variable selection approach (e.g., stepwise regression analysis) was applied. Considering potential effect of correlation among predictors, different models were created. To select the best fitting regression model, Akaike information criterion (AIC) was used as an estimator to compare the relative quality of statistical models. The variance inflation factor (VIF) diagnostic was also calculated in each model to prevent unreliable estimates of coefficients with possible high correlations among predictors. In the regression model, results are reported as coefficients with 95% confidence intervals (CIs) and *p* < 0.05 indicating statistical significance. Analyses were performed with STATA 16.1 (Stata Corp., LLC, United States).

RESULTS

By completing the online surveys, 537 healthcare professionals were recruited in the cohort. After cleaning up the data from incomplete or invalid questionnaires, the recruited cohort included 396 (73.7%) participants who completed socio-demographic characteristics, 396 (73.7%) who completed the MBIs' subscale scores depersonalization (MBI-DP), 392 (73.0%) who completed personal accomplishment (MBI-PA), 389 (72.4%) who completed emotional exhaustion (MBI-EE), and 388 (72.2%) who completed the FBS. Of the 110 participants who used wearable sleep monitoring, 47 (42.73%) who had sleep reports that could be associated with the burnout and cardiovascular health scores were included in the study.

The socio-demographic characteristics of the participants are summarized and compared regarding the gender. As shown in **Table 1A**, it was noted that there is a difference in the distribution

of responses to the gender among some comparison groups, such as age (*p* = 0.003), marital status (*p* = 0.002), specialty (*p* < 0.001), education (*p* < 0.001), and working hours (*p* = 0.025).

Table 1B shows there is statistically significant difference in the distribution of responses to the gender among some FBS components, such as blood pressure (*p* < 0.001), exercise (*p* < 0.001), and tobacco (*p* < 0.001).

Table 2 provides the descriptive results, while **Table 3** shows the Spearman's rank correlation coefficients for FBS, MBI scales and socio-demographic information.

Statistically significant correlation has been observed among FBS, MBI components and some socio-demographic variables. In particular, high correlation among MBI components, such as between MBI-EE and MBI-DP (coef: 0.59, *p* < 0.05, **Table 3**).

Table 4 presents the results of the regression analysis with FBS as the outcome. Considering high correlations, different regression models were created to investigate the role of MBI components individually (model 1–3) and in combination with each other (model 4–7) adjusted with the socio-demographic factors. Seven models were built and AIC was employed to select the best fitting regression model.

TABLE 1A | Participant socio-demographic characteristics.

Socio-demographic characteristics	Male	Female	Total	<i>P</i> -value
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
Age range, year			396 (100%)	0.003
< 30	17 (10.49)	46 (19.66)	63 (15.91)	
30–39	65 (40.12)	104 (44.44)	169 (42.68)	
40–49	50 (30.86)	65 (27.78)	115 (29.04)	
50 +	30 (18.52)	19 (8.12)	49 (12.37)	
Marital status			394 (100%)	0.002
Single	19 (11.73)	50 (21.55)	69 (17.51)	
Married	142 (87.65)	172 (74.14)	314 (79.7)	
Others ^a	1 (0.62)	10 (4.31)	11 (2.79)	
Specialty			381 (100%)	
Non-surgical specialty	55 (35.71)	76 (33.48)	131 (34.38)	< 0.001
Surgical specialty	12 (7.79)	4 (1.76)	16 (4.20)	
Nurses	22 (14.29)	101 (44.49)	123 (32.28)	
Allied health	31 (20.13)	15 (6.61)	46 (12.07)	
Others ^b	34 (22.08)	31 (13.66)	65 (17.06)	
Education			397 (100%)	< 0.001
Diploma	7 (4.29)	40 (17.09)	47 (11.84)	
Bachelor	62 (38.04)	111 (47.44)	173 (43.58)	
Master	23 (14.11)	36 (15.38)	59 (14.86)	
PHD	5 (3.07)	6 (2.56)	11 (2.77)	
GP	13 (7.98)	11 (4.7)	24 (6.05)	
Specialist	23 (15.34)	20 (8.55)	45 (11.34)	
Consultant	28 (17.18)	10 (4.27)	38 (9.57)	
Working hours			395 (100%)	0.025
< 30 h	9 (5.56)	10 (4.29)	19 (4.81)	
30–40 h	53 (32.72)	108 (46.35)	161 (40.76)	
> 40 h	100 (61.73)	115 (49.36)	215 (54.43)	

^aOthers refer to divorced, widow and others.

^bOthers refer to participants who do not belong to one of the four specialties: non-surgical specialty, surgical specialty, nurses, allied health.

TABLE 1B | Fuster-BEWAT score (FBS): participant characteristics and descriptive statistics by gender ($N = 388$).

FBS components	Male	Female	Total	P-value
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
Blood pressure (B)				< 0.001
[0] (SBP \geq 140 and/OR DBP \geq 90 MMHG)	8 (5.00)	5 (2.19)	13 (3.35)	
[1] (SBP 130–139 and/OR DBP 85–89 MMHG)	40 (25.00)	30 (13.16)	70 (18.04)	
[2] (SBP 120–129 and/OR DBP 80–84 MMHG)	63 (39.38)	66 (28.95)	129 (33.25)	
[3] (SBP < 120 and DBP < 80 MMHG)	49 (30.63)	127 (55.70)	176 (45.36)	< 0.001
Exercise [E]				
[0] (< 10 moderate to vigorous activity min/week)	46 (28.75)	118 (51.75)	164 (42.27)	
[1] (< 75 moderate to vigorous activity min/week)	38 (23.75)	61 (26.75)	99 (25.52)	
[2] (75–149 moderate to vigorous activity min/week)	39 (24.38)	34 (14.91)	73 (18.81)	0.374
[3] (\geq 150 moderate to vigorous activity min/week)	37 (23.13)	15 (6.58)	52 (13.40)	
Weight (W)				
[0] (\geq 30 KG/M ²)	33 (21.02)	35 (15.63)	68 (17.85)	
[1] (25 to < 30 KG/M ²)	65 (41.40)	95 (42.41)	160 (41.99)	0.789
[3] (< 25 KG/M ²)	59 (37.58)	94 (41.96)	153 (40.16)	
Alimentation (A)				
[0] (< 1 fruit/vegetable servings daily)	54 (33.96)	89 (38.86)	143 (36.86)	< 0.001
[1] (1–2 fruit/vegetable servings daily)	65 (40.88)	86 (37.55)	151 (38.92)	
[2] (3–4 fruit/vegetable servings daily)	27 (16.98)	35 (15.28)	62 (15.98)	
[3] (> 4 fruit/vegetable servings daily)	13 (8.18)	19 (8.30)	32 (8.25)	
Tobacco (T)				< 0.001
[0] (> 1 pack of tobacco per day)	10 (6.25)	7 (3.04)	17 (4.36)	
[1] (< 1 pack of tobacco per day)	19 (11.88)	3 (1.30)	22 (5.64)	
[3] (non-smoker)	131 (81.88)	220 (95.65)	351 (90.00)	

TABLE 2 | Descriptive statistics for fuster-bewat score (FBS), Maslach Burnout Inventory (MBI) emotional exhaustion (MBI-EE), depersonalization (MBI-DP), and personal accomplishment (MBI-PA) subscale scores.

Variable	Obs	Mean	SD	Min	Max
1. FBS	388	8.57	2.45	1	15
2. MBI-EE	389	23.53	15.18	0	54
3. MBI-PA	392	40.33	7.56	8	48
4. MBI-DP	396	6.39	6.72	0	30

Based on the AIC, the results suggested that Model 4 is the best fitting model ($AIC_4 = 1592.58$). It showed a negative association between cardiovascular health and emotional exhaustion ($p < 0.05$). The higher the emotional exhaustion the lower the cardiovascular health. Further, the model showed a positive association between personal accomplishment and cardiovascular health ($p < 0.05$). It should be noted that Model 4

TABLE 3 | Spearman's rank correlation coefficients for FBS, MBI dimensions and socio-demographic information (* $p < 0.05$).

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) FBS	1.0									
(2) MBI-EE	−0.18*	1.0								
(3) MBI-PA	0.12*	−0.34*	1.0							
(4) MBI-DP	−0.11*	0.59*	−0.23*	1.0						
(5) Gender	0.04	0.20*	−0.12*	0.10	1.0					
(6) Age	0.04	−0.27*	0.16*	−0.27*	−0.17*	1.0				
(7) Marital status	0.07	−0.09	0.17*	−0.14*	−0.06	0.41*	1.0			
(8) Education level	0.04	0.04	−0.10	0.05	−0.31*	0.02	−0.04	1.0		
(9) Specialty	−0.03	−0.02	0.07	−0.09	−0.08	0.08	0.07	−0.15*	1.0	
(10) Working hours	−0.06	0.22*	−0.01	0.05	−0.09	0.07	0.08	0.02	0.05	1.0

Fuster-BEWAT score (FBS), Maslach Burnout Inventory (MBI) emotional exhaustion (MBI-EE), depersonalization (MBI-DP), and personal accomplishment (MBI-PA) subscale scores.

does not include depersonalization as a predictor. While Model 3 and 5 showed a statistically significant negative association between cardiovascular health and depersonalization ($p < 0.01$), Model 6 and 7 did not support this. However, such discrepancy for depersonalization effect may be explained by its monotonic relationship with emotional exhaustion ($\rho = 0.59$, $p < 0.05$).

Emotional exhaustion was significantly positive correlated with REM and light sleep average (Spearman's rank correlation: 0.35 and 0.37, respectively, with $P < 0.05$) (Table 5).

DISCUSSION

As the study's main finding, healthcare practitioners with a low composite cardiovascular health score are more emotionally exhausted. This is, to the best of our knowledge, the first prospective study in the Middle East that examines the relationship between burnout and cardiovascular health. Although this study cannot conclusively establish a causal relationship between burnout and cardiovascular risk, the data indicate that healthcare practitioners with burnout have an associated cardiovascular risk. Furthermore, preliminary data from this study highlights the relationship between emotional exhaustion and sleep alterations detected through heart rate variability monitoring, implying that sleep and heart rate variability measures could be a promising starting point for explaining the mechanisms underlying burnout symptoms and cardiovascular disease. The findings of this study may be relevant in creating preventive strategies for burnout and cardiovascular risk reduction or prevention.

In this study, some comparison groups have different distributions of responses to gender, such as age (more women in the preponderant age group of 30–39), marital status (higher rate of single women than men, married men than women), specialty (more women than men nurses), working hours (more women than men in the category with 30–40 h per week, and more men than women in the category of more than 40 h per week) and education (more women than men in the preponderant

TABLE 4 | The regression models for Fuster-BEWAT score (FBS) with Maslach Burnout Inventory (MBI) emotional exhaustion (MBI-EE), depersonalization (MBI-DP), and personal accomplishment (MBI-PA) subscale scores ($N = 388$).**Model 1:** FBS ~ MBI-EE; adjusted for: gender, age, marital status, education level, specialty and working hours

Predictor	Coef.	(95% CI)	p-value
MBI-EE	-0.035	(-0.053, -0.017)	< 0.001**
AIC ₁ = 1596.24			

Model 2: FBS ~ MBI-PA; adjusted for: gender, age, marital status, education level, specialty and working hours

MBI-PA	0.061	(0.025, -0.097)	< 0.001**
AIC ₂ = 1604.32			

Model 3: FBS ~ MBI-DP; adjusted for: gender, age, marital status, education level, specialty and working hours

MBI-DP	-0.050	(-0.09, -0.01)	0.014*
AIC ₃ = 1609.23			

Model 4: FBS ~ MBI-EE and MBI-PA; adjusted for: gender, age, marital status, education level, specialty and working hours

MBI-EE	-0.029	(-0.048, -0.01)	0.002*
MBI-PA	0.045	(0.007, 0.082)	0.019*
Gender	0.61	(0.042, 1.17)	0.035*
AIC ₄ = 1592.58			

Model 5: FBS ~ MBI-PA and MBI-DP; adjusted for: gender, age, marital status, education level, specialty and working hours

MBI-PA	0.057	(0.020, 0.092)	0.002*
MBI-DP	-0.043	(-0.082, -0.003)	0.035*
AIC ₅ = 1601.73			

Model 6: FBS ~ MBI-EE and MBI-DP; adjusted for: gender, age, marital status, education level, specialty and working hours

MBI-EE	-0.032	(-0.054, -0.011)	0.004*
MBI-DP	-0.012	(-0.059, 0.036)	0.629
AIC ₆ = 1598.01			

Model 7: FBS ~ MBI-EE, MBI-PA and MBI-DP; adjusted for: gender, age, marital status, education level, specialty and working hours

MBI-EE	-0.026	(-0.048, -0.003)	0.025*
MBI-PA	0.045	(0.008, 0.082)	0.018*
MBI-DP	-0.014	(-0.061, 0.033)	0.567
Gender	0.601	(0.034, 1.169)	0.038*
AIC ₇ = 1594.25			

*Statistical significance, $p < 0.05$; ** high statistical significance, $p < 0.01$. Only statistically significant control variables (e.g., gender) was presented in the table. AIC: Akaike information criterion; CI: confidence interval.

group with bachelor degree). Professional specialty was found to be significantly related to high levels of emotional exhaustion and depersonalization among hospital healthcare workers during the COVID-19 pandemic (37, 38). The groups with a higher response rate in this study may indicate that they are more receptive to psychological support programs. These findings corroborate and complement a study that examined the impact of the COVID-19 outbreak on health professionals in Northern

TABLE 5 | Spearman's rank correlation coefficients between Maslach Burnout Inventory, Fuster-BEWAT score (FBS), and sleep scores (light sleep average, REM sleep average, and long interruptions) ($N = 47$, * $p < 0.05$).

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) FBS	1.000						
(2) MBI-EE	-0.287	1.000					
(3) MBI-PA	0.235	-0.427*	1.000				
(4) MBI-DP	-0.234	0.702*	-0.372*	1.000			
(5) LightsleepavgMin	-0.176	0.351*	-0.043	0.225	1.000		
(6) REMsleepavgMin	0.015	0.374*	-0.053	0.286	0.792*	1.000	
(7) Longinterruptin	-0.170	0.232	-0.115	0.250	0.223	0.245	1.000

Italy and identified female gender, nurse status, hospital work, and contact with COVID-19 patients as predictors of both emotional exhaustion and depersonalization (39). The disparities in response distribution in our study, on the other hand, could point to a general distribution per category that is independent of the pandemic. For example, the fact that more men reported high blood pressure and smoking while more women reported low physical activity may reflect the well-known high prevalence of hypertension and smoking in men while women are more sedentary (40, 41).

A high correlation between the dimensions of burnout-Emotional Exhaustion (EE), Depersonalization (DP) has been observed in this study. Fear of COVID-19 infection was linked to extreme emotional exhaustion and depersonalization (37). This study is consistent with a study of Bulgarian healthcare professionals, which found that emotional exhaustion and depersonalization are associated with low levels of sense of coherence (SOC) as a salutogenic construct in three dimensions: meaningfulness (Me), the desire of an individual to be motivated to cope; comprehensibility (C), the belief that the challenge is understood; and manageability (Ma), the belief that coping resources are available (42).

A negative association between cardiovascular health and emotional exhaustion has been observed in this study. The higher the emotional exhaustion the lower the cardiovascular health. Further, the model showed a positive association between personal accomplishment and cardiovascular health. Recent research indicates that a variety of psychosocial risk factors, such as work stress (43), vital exhaustion (44), or social isolation (45), raise the risk of recurrent cardiac events as well as cardiac and all-cause mortality. Screening for such psychosocial risk factors in populations with cardiovascular risk factors has the potential to improve understanding of their role in the occurrence and outcome of cardiovascular disease (46).

This study establishes a link between emotional exhaustion and REM sleep periods in healthcare professionals during the COVID-19 pandemic. Sleep, and particularly REMS, have recently been shown to play an important role in the emotional and mental recovery from difficult circumstances (47). A positive relationship between exhaustion and insomnia has been already observed in healthcare professionals already in March and April 2020 during the COVID-19 pandemic (48). Sleep quality can be influenced by high psychological distress, high emotional exhaustion, low depersonalization, and low

personal accomplishment (49). Furthermore, sleep disturbances have been linked to psychological distress in healthcare workers during the COVID-19 pandemic (50). Sleep disturbances are increasingly being linked to the development of cardiovascular diseases. The Sleep Heart Health Study, which monitored 3,810 participants for 11 years, revealed that inefficient sleep was related with an increased risk of incident cardiovascular disease events (51). Sleep disturbances have been linked to an increased risk of cardiovascular disease. Heart rate variability, a measure of autonomic nervous system dysfunction seen in sleep disorders, appears to be an essential marker of this risk (52–54). On the mechanisms that may be responsible for these sleep changes, the heart rate variability that is at the heart of the algorithm used to describe these sleep stages is also considered to be a reflection of the autonomic nervous system tone (55, 56). In this line of evidence, a recent study demonstrated that vagal dysfunction is both predictive and specific for burnout symptoms, suggesting that heart rate variability may be a promising starting point for explaining the mechanisms underlying burnout symptoms and cardiovascular diseases (57). Wearable sleep monitoring is gaining popularity, indicating the possibility of expanding burnout research through the use of wearable technology (58). On the other hand, the wide range of accuracy among commercial sleep technologies highlights the critical need for ongoing evaluations of newly developed sleep technologies (59, 60).

Study Limitations

The study's shortcomings must be acknowledged. The main weakness of this cross-sectional study was its inability to assess incidence and draw causal conclusions due to its design. There is no evidence of a temporal link between exposure and result. Although this study was originally intended to be a longitudinal one, it was converted to a cross-sectional one due to pandemic restrictions that made onsite visits difficult (28). As a result, the number of participants using wearable technology was significantly lower when compared to data gathered from online surveys. Another reason for avoiding the use of wearable technology was apprehension about being tracked by a GPS device. Another important factor that contributed to a decrease in interest for both recruiters and participants in participating in onsite visits was the longer-than-expected duration of social restrictions caused by pandemics.

CONCLUSION

In conclusion, this study provides evidence for a link between burnout and cardiovascular risk. Sleep disturbances caused by an altered autonomic nervous system may represent a mechanistic link between burnout and cardiovascular disease.

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These findings may lend support for policymakers and organizations campaigning for better occupational health. The development of occupational health surveillance and workplace health promotion initiatives by policymakers to prevent and treat burnout as well as other mental health disorders in the workplace during and after the COVID 19 pandemic is a potential future direction (61).

DATA AVAILABILITY STATEMENT

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

ETHICS STATEMENT

Ethical approval was obtained from the Abu Dhabi COVID19 Research IRB Committee of the Department of Health-Abu Dhabi (DOH/NCVDC/2020/1052) and Emirates IRB for COVID Research Committee (DOH/CVDC/2020/1246). The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

HA, OB, MA, MD, WA, and LC: study conception and design. FA, NA, SA, MB, NA, MA, and MD: investigation. MS, NU, EA, LC, HA, and OB: data curation and analysis. FA, NA, SA, MB, NA, MS, NU, MD, MA, LC, WA, EA, HA, and OB: interpretation of the data, writing of the manuscript, and critical revision of the manuscript regarding the important intellectual content. All authors contributed to the article and approved the submitted version.

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Gender Differences in Job Burnout, Career Choice Regret, and Depressive Symptoms Among Chinese Dental Postgraduates: A Cross-Sectional Study

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Background: Job burnout, career choice regret, and depressive symptoms among medical students have received widespread attention. However, little is known about the role of gender in these areas for dental postgraduates. This study aimed to explore gender differences in job burnout, career choice regret, and depressive symptoms among Chinese dental postgraduates.

Methods: The data were collected from an epidemiological survey conducted by our group from February 2021 to March 2021. We used a self-administered questionnaire covering demographic characteristics, the Maslach Burnout Inventory, the Primary Care Evaluation of Mental Disorders scale, and the Career Choice Regret scale. Univariate and multivariable analyses were performed to explore influencing factors.

Results: A total of 558 valid dental postgraduate questionnaires were included in this study. The prevalence of job burnout, career choice regret, and depressive symptoms exceeded 30% in males and females. The prevalence of job burnout was 4.7% higher in females than in males; career choice regret was 12.2% higher in females than in males ($P < 0.05$), and depressive symptoms were 4.9% higher in females than in males. The multivariable analysis showed that factors associated with job burnout for males were sleep time and career choice regret for females. The influencing factors on career choice regret for females were postgraduate entrance examination score, sleep time, and job burnout. Depressive symptoms were a common influencing factor for job burnout and career choice regret in male and female dental postgraduates. Also, job burnout and depressive symptoms had the highest odds ratio for influencing factors on each other.

Conclusion: Over 30% of dental postgraduates suffered from job burnout, career choice regret, and depressive symptoms, and incidences were higher in females. A discrepancy of influencing factors existed between male and female dental postgraduates. Targeted measures should be taken to change this situation.

Keywords: job burnout, career choice regret, depressive symptoms, dental postgraduates, gender differences

INTRODUCTION

Job burnout originates from the individual's long-term response to chronic emotional and interpersonal stress at work or their psychological response to work-related stress (1). There are three major features of job burnout: physical and emotional fatigue caused by work-related stressors, negative attitude toward career, and feeling disconnected from others (2). Studies have shown that job burnout is widespread in medical students (3). For example, the prevalence of job burnout among medical students in the United States was reported to be 52.8% (4), and it ranged from 38.1% to 53.8% for Chinese medical students (5).

Regret is a typical emotion related to decision-making, and career choice regret is experienced when the obtained career is not what the student expected or hoped for. Numerous studies have shown that career choice regret is strongly associated with job burnout in medical students (6–8). A survey from China reported that career choice regret was the strongest risk factor for job burnout in neurology postgraduates. A possible explanation is that regret induced a more intense dislike of the outcome of the career choice, which could increase the risk of burnout (9). Furthermore, career choice regret has been associated with depressive symptoms (10). Research shows that experiencing regret is related to an increase in depressive tendencies, the explanation being that regret plays a partial mediation role between other variables and depression (11). Evidence from neuroimaging also suggests that when regret occurs, brain regions associated with depression are activated, suggesting that regret may trigger depressive emotions (9).

In China, a qualified dental postgraduate needs at least 8 years of training. During this period, they face a huge academic burden, strict clinical requirements, and serious stress. Previous studies have demonstrated that medical students have more stress, more burnout, and a greater prevalence of mental health disorders than dental students (12–14). Therefore, research on dental postgraduates also applies to the whole medical student population. Dental postgraduates are engaged in clinical work, serve as part of the country's medical workforce, and participate in a wide range of complex tasks, such as treating patients and performing examinations (15). The use of sharp instruments may cause adverse complications or accidental injury to patients (7). In addition, dental postgraduates have to deal with anxious patients who are afraid of pain related to dental treatment (16). Their academic work involves an extensive educational curriculum and examinations. They are also under severe pressure to publish articles to meet the requirements for graduation. They have many sources of stress in their daily lives, including lack of sleep and leisure time, economic dependence, and the challenge of balancing family and work (2, 17–19). Chronic exposure to these stress factors may lead to job burnout, career choice regret, and depressive symptoms (15). Furthermore, job burnout and depression often intensify each other (20). Therefore, it is necessary to explore the relationship between these

stress factors and job burnout, career choice regret, and depressive symptoms.

Among the numerous demographic characteristics, gender plays a key role in job burnout, career choice, and depressive symptoms (21–23). For example, a survey from Pakistan found that female medical undergraduates were more likely to experience depression than males (24). Another study from a large sample size in China also found that career choice regret was more prevalent among female medical students (6). A survey from Saudi Arabia found that gender was a significant predictor of stress and anxiety among undergraduate dental students, with females having a significantly higher prevalence of stress and anxiety than males (25). These differences can be explained, to some extent, by the gender role theory. Traditionally, women tend to express their fatigue (higher overload) at work, while men usually do not express their feelings (26). Although previous studies have found that gender has an important effect on job burnout, career choice regret, and depressive symptoms, most of the studies included gender as an independent variable (6, 24, 25). Furthermore, some of these results were controversial (23, 27, 28). Finally, there is a lack of gender-specific comparison of Chinese dental postgraduates.

The current evidence prompts the following questions: ① Do Chinese dental postgraduates, in general, have job burnout, career choice regret, and depressive symptoms? If yes, how serious is the situation? ② Is there a gender difference in job burnout, career choice regret, and depressive symptoms among Chinese dental postgraduates? ③ What are the associated factors of job burnout, career choice regret, and depressive symptoms between Chinese male and female dental postgraduates, respectively? To address the above issues, our group conducted a cross-sectional survey. We hope that this study can provide a reference for related research and lead to the implementation of follow-up intervention measures.

MATERIALS AND METHODS

Data Collection

It is an accepted rule of thumb that when the events per variable (EPV) exceeded 10, the regression model is considered to be stable (2, 29), and the minimum sample size in this study was calculated to be 130 dental postgraduates. A convenience sampling method was used to recruit the participants. The research group conducted a survey from February 2021 to March 2021 to explore the status of job burnout, career choice regret, and depressive symptoms among Chinese dental postgraduates. First, the members of the research group contacted the directors of the College of Stomatology and dental postgraduates in dental departments in local hospitals *via* WeChat, telephone, or email, and invited them to participate in this survey. Second, when directors agreed to participate, postgraduates were invited by their directors to participate in this study. The inclusion criteria are as follows: ① Chinese dental students; ② from master's degree to doctorate level. To ensure the accuracy of the data, we evaluated the quality of all questionnaires,

according to the following exclusion criteria: ① the same answer was given for all the questionnaire items; ② If two or more consecutive questionnaires have identical answers for the same hospital or college, only one questionnaire is included.

Survey Questionnaire

The questionnaire was constructed on the questionnaire star platform (<https://www.wjx.cn/>), a free platform widely used for surveys in China, which creates an internet link to the questionnaire. The members of the research group sent the questionnaire to the directors who agreed to participate in this survey. The directors then invited the postgraduates in their study groups to participate in this survey. We adjusted the questionnaire settings as follows: ① To reduce the extent of missing data, only fully completed questionnaires could be submitted. Participants were prompted to complete unanswered questions; ② To ensure that each questionnaire was unique, only one questionnaire from an internet protocol address was accepted.

The questionnaire consisted of five parts. The first part was the front page of the questionnaire. It introduced the background and purpose of the survey, informed participants of their rights and potential risks, and informed them that the survey was voluntary and anonymous.

The second part was the demographic characteristics, including gender, age, academic year, type of degree, family income per month, postgraduate entrance examination score, work or study time per week, daily sleep time, marital status, whether have children, and who had ever undertaken part-time job during studies.

The third part included a self-administrated Chinese version of the Maslach Burnout Inventory, a self-reported 22-item questionnaire that measures the frequency and intensity of job burnout in the allied health professions (30). This instrument measured three domains, emotional exhaustion (9 items, score 0–54), depersonalization (5 items, score 0–30), and personal accomplishment (8 items, score 0–48). Each item was rated on a 7-point Likert-like scale (range 0–6). Scores between 19 and 26 for emotional exhaustion, six and nine for depersonalization, and 34 and 39 for personal accomplishment were considered to reflect an average level of job burnout (31). Emotional exhaustion (with a score of ≥ 27) or depersonalization (with a score of ≥ 10) indicate a high degree of job burnout (4, 31, 32). This scale has been successfully used with Chinese neurologists and postgraduates (6, 31).

The fourth part was the Primary Care Evaluation of Mental Disorders (PRIME-MD), consisting of two questions. If the responder answered “Yes” to at least one of the following two questions, they were considered to have depressive symptoms: “Have you often been bothered by feeling down, depressed, or hopeless during the past month?” and “Have you often been bothered by having little interest or pleasure in doing things during the past month?” PRIME-MD has been widely used to screen for depressive symptoms (4, 33), and the performance of this scale is

similar to that of longer instruments (34), with a sensitivity of 86 to 96% and a specificity of 57 to 75% for depressive symptoms (34, 35).

The last part included a question about career choice regret: “If you could go back, would you choose to be a doctor again?” “Yes,” “Not sure,” and “No” were the provided options, and “No” indicated career choice regret (36). This form has been used in many previous studies to assess the degree of career choice regret (6, 36, 37).

Statistical Analysis

We performed all analyses with SPSS version 25.0 (IBM Corp., Armonk, NY). Categorical variables were summarized as frequencies and percentages, while continuous variables were summarized as means with SD or medians with interquartile ranges depending on the data distribution. First, a chi-square test was adopted to explore whether the demographic information of male and female dental postgraduates is comparable. Second, a chi-square test was adopted to evaluate the overall job burnout, depressive symptoms, and career choice regret between the male and female dental postgraduates. Third, a chi-square test or Fisher exact test was adopted to explore the influencing factors of job burnout, depressive symptoms, and career choice regret. Finally, to further screen the influencing factors, binary logistic regression (forward elimination, backward elimination, and enter model) was adopted for the statistically significant influencing factors from the univariate analysis. The variables showed multicollinearity if the variance inflation factor (VIF) was larger than 10. Statistically, significance was defined as $P < 0.05$.

RESULTS

Participant Characteristics

A total of 580 questionnaires were collected, and 22 were excluded because the same answer was given for all the questionnaire items. This left 558 valid questionnaires (effective response rate: 96.2%) for subsequent analysis. The Cronbach's α coefficient of the Maslach Burnout Inventory-22 was 0.75, with emotional exhaustion being 0.90, personal accomplishment being 0.86, and depersonalization being 0.43. The Cronbach's α coefficient of the PRIME-MD was 0.867.

Of the respondents, 69.2% (386/558) were female, and 30.8% (172/558) were male. Most of the respondents were 22–25 years old, had clinical practice degrees, slept 6–8 h a day, had no children, and had not undertaken part-time work. The degree type was statistically different between males and females ($P < 0.05$). The ratio of clinical practice degrees among males is higher than among females. There was no statistical gender difference in other demographic factors, indicating that the demographic information between male and female dental postgraduates is comparable. **Table 1** shows the demographic variables of gender comparisons.

TABLE 1 | Demographic characteristics of participants.

Variables	Male	Female	χ^2	<i>P</i>
	N (%)	N (%)		
Age (years)			0.544	0.762
22–25	100 (58.1)	230 (59.6)		
26–30	63 (36.6)	141 (36.5)		
>30	9 (5.3)	15 (3.9)		
Academic year			2.702	0.440
First-year, master's degree	74 (43.1)	141 (36.5)		
Second-year, master's degree	44 (25.5)	102 (26.4)		
Third-year, master's degree	46 (26.7)	117 (30.3)		
Doctor's degree	8 (4.7)	26 (6.7)		
Degree type			4.265	0.039
Academic practice	40 (23.3)	123 (31.8)		
Clinical practice	132 (76.7)	263 (68.2)		
Family income (RMB per month)			0.909	0.635
<5,000	67 (38.9)	135 (34.9)		
5,000–10,000	63 (36.6)	155 (40.3)		
>10,000	42 (24.5)	96 (24.8)		
Postgraduate entrance examination score			0.002	0.999
<330	52 (30.2)	116 (30.1)		
330–360	68 (39.5)	153 (39.6)		
>360	52 (30.3)	117 (30.3)		
Work or study time per week (h)			1.173	0.556
<45	60 (34.8)	128 (33.3)		
45–55	47 (27.3)	123 (31.8)		
>55	65 (37.9)	135 (34.9)		
Daily sleep time (h)			0.628	0.731
<6	30 (17.4)	61 (15.8)		
6–8	132 (76.7)	307 (79.6)		
>8	10 (5.9)	18 (4.6)		
Marital status			1.031	0.597
Single	83 (48.2)	204 (52.8)		
Partner	75 (43.6)	152 (39.5)		
Married	14 (8.2)	30 (7.7)		
Whether have children			0.388	0.534
No	164 (95.4)	363 (94.0)		
Yes	8 (4.6)	23 (6.0)		
Who had ever undertaken part-time job			0.256	0.613
No	147 (85.5)	336 (87.0)		
Yes	25 (14.5)	50 (13.0)		

Prevalence Comparison of Job Burnout, Career Choice Regret, and Depressive Symptoms

The results show that 42.5% of female dental postgraduates reported job burnout, compared to 37.8% of males, but

TABLE 2 | Prevalence comparison of job burnout, career choice regret, and depressive symptoms.

Items	Male	Female	χ^2	<i>P</i>
	N (%)	N (%)		
Job burnout	65 (37.8)	164 (42.5)	1.085	0.298
Emotional exhaustion	33 (19.2)	111 (28.8)	5.692	0.017
Depersonalization	51 (29.7)	103 (26.7)	0.524	0.469
Personal accomplishment	70 (40.7)	176 (45.6)	1.158	0.282
Career choice regret	57 (33.1)	175 (45.3)	7.287	0.007
Depressive symptoms	70 (40.7)	176 (45.6)	1.158	0.282

this difference was not significant ($P = 0.298$). Female dental postgraduates had a higher prevalence of emotional exhaustion ($P = 0.017$), a lower prevalence of depersonalization ($P = 0.469$), and a higher prevalence of low personal accomplishment than their male counterparts ($P = 0.282$). For career choice regret, the prevalence was 33.1% and 45.3% for male and female dental postgraduates, respectively, and the difference was statistically significant ($P < 0.05$). For depressive symptoms, 45.6% of female dental postgraduates reported depressive symptoms compared to 40.7% of males, but there was no statistical significance ($P = 0.282$), as **Table 2** shows.

Univariate Analysis of Job Burnout, Career Choice Regret, and Depressive Symptoms

The univariate analysis showed that factors associated with job burnout for males were daily sleep time, career choice regret, and depressive symptoms; for females, the factors were career choice regret and depressive symptoms. Career choice regret for males was associated with job burnout and depressive symptoms; for females, it was associated with postgraduate entrance examination scores, daily sleep time, job burnout, and depressive symptoms. Depressive symptoms in males and females were both associated with job burnout and career choice regret (all $P < 0.05$), as **Table 3** shows.

Multivariable Analysis of Job Burnout, Career Choice Regret, and Depressive Symptoms

Career choice regret and daily sleep time were the job burnout risk factors for female and male dental postgraduates, respectively. A gradual increase in sleep time decreased the risk of job burnout for males. The risk factors for career choice regret in females were the postgraduate entrance examination scores, job burnout, and daily sleep time. Depressive symptoms were the common risk factors for males and females in job burnout and career choice regret. **Table 4** shows that job burnout and career choice regret were the common risk factors for depressive symptoms in males and females ($P < 0.05$). Multicollinearity analysis results indicated no severe collinearity between variables in job burnout, career choice regret, and depressive symptoms.

TABLE 3 | Univariate analysis of job burnout, career choice regret, and depressive symptoms.

	Job burnout				Career choice regret				Depressive symptoms			
	Male (%)	χ^2	Female (%)	χ^2	Male (%)	χ^2	Female (%)	χ^2	Male (%)	χ^2	Female (%)	χ^2
Age (years)	$P = 0.776$	0.546	$P = 0.581$	1.085	$P = 0.427$	1.924	$P = 0.894$	0.225	$P = 0.513$	1.394	$P = 0.903$	0.204
22–25	39 (39)		102 (44.3)		35 (35)		102 (44.3)		42 (42.4)		105 (45.7)	
26–30	22 (34.9)		57 (40.4)		21 (33.3)		66 (46.8)		25 (39.7)		65 (46.1)	
>30	4 (44.4)		5 (33.3)		1 (1.8)		7 (46.7)		2 (22.2)		6 (40)	
Academic year	$P = 0.757$	1.204	$P = 0.626$	1.748	$P = 0.367$	3.174	$P = 0.106$	6.115	$P = 0.669$	1.581	$P = 0.058$	7.493
First-year, master's degree	28 (37.8)		57 (40.4)		29 (39.1)		53 (37.5)		31 (41.9)		52 (36.9)	
Second-year, master's degree	19 (43.2)		42 (41.2)		14 (31.8)		50 (49)		16 (36.4)		54 (52.9)	
Third-year, master's degree	16 (34.8)		51 (43.6)		11 (23.9)		57 (48.7)		21 (45.7)		56 (47.9)	
Doctor's degree	2 (25)		14 (53.8)		3 (37.5)		15 (57.6)		2 (25.0)		14 (53.8)	
Degree type	$P = 0.057$	3.627	$P = 0.700$	0.148	$P = 0.103$	2.663	$P = 0.171$	1.872	$P = 0.402$	0.701	$P = 0.281$	1.163
Academic	10 (25)		110 (41.8)		9 (22.5)		62 (50.4)		14 (35.0)		61 (49.5)	
Clinical	55 (41.7)		54 (43.9)		48 (36.3)		113 (42.9)		56 (42.4)		115 (43.7)	
Family income (RMB per month)	$P = 0.098$	4.636	$P = 0.370$	1.987	$P = 0.486$	1.443	$P = 0.299$	2.416	$P = 0.923$	0.160	$P = 0.112$	4.383
<5,000	28 (41.8)		51 (37.8)		25 (37.3)		68 (50.3)		28 (41.8)		59 (43.7)	
5,000–10,000	27 (42.9)		71 (45.8)		21 (33.3)		64 (41.2)		26 (41.3)		80 (51.6)	
>10,000	10 (23.8)		42 (43.8)		11 (26.1)		43 (44.7)		16 (38.1)		37 (38.5)	
Postgraduate entrance examination score	$P = 0.091$	4.804	$P = 0.485$	1.446	$P = 0.870$	0.279	$P = 0.007$	9.994	$P = 0.583$	1.079	$P = 0.299$	2.414
<330	22 (42.3)		49 (42.2)		16 (30.7)		51 (43.9)		24 (46.2)		53 (45.6)	
330–360	19 (27.9)		70 (45.8)		24 (35.2)		83 (54.2)		25 (36.8)		76 (49.6)	
>360	24 (46.2)		45 (38.5)		17 (32.6)		41 (35)		21 (40.4)		47 (40.1)	
Work or study time per week (h)	$P = 0.125$	4.160	$P = 0.064$	5.491	$P = 0.236$	2.889	$P = 0.646$	0.875	$P = 0.243$	2.832	$P = 0.945$	0.113
<45	25 (41.7)		57 (44.5)		23 (38.3)		54 (42.1)		24 (40.0)		59 (46.0)	
45–55	12 (25.5)		42 (34.1)		11 (23.4)		59 (47.9)		15 (31.9)		57 (46.3)	
>55	28 (43.1)		65 (48.1)		23 (35.3)		62 (45.9)		31 (47.7)		60 (44.4)	
Daily sleep time (h)	$P < 0.001$	15.409	$P = 0.069$	5.360	$P = 0.168$	3.546	$P = 0.001$	13.483	$P = 0.101$	4.569	$P = 0.050$	5.990
<6	21 (70)		34 (55.7)		14 (46.6)		40 (65.5)		17 (56.7)		36 (59.0)	
6–8	41 (31.1)		122 (39.7)		39 (29.5)		125 (40.7)		48 (36.4)		134 (43.6)	
>8	3 (30)		8 (44.4)		4 (40.0)		10 (55.5)		5 (50)		6 (33.3)	
Marital status	$P = 0.974$	0.053	$P = 0.788$	0.477	$P = 0.258$	2.741	$P = 0.408$	1.795	$P = 0.248$	2.803	$P = 0.959$	0.084
Single	32 (38.6)		90 (44.1)		27 (32.5)		89 (43.6)		39 (47.0)		94 (46.0)	
Partner	28 (37.3)		62 (40.8)		28 (37.3)		69 (45.3)		27 (36.0)		69 (45.3)	
Married	5 (35.7)		12 (40)		2 (14.2)		17 (56.6)		4 (28.6)		13 (43.3)	
Whether have children	$P = 0.131$	2.283	$P = 0.228$	1.454	$P = 0.041$	4.159	$P = 0.497$	0.461	$P = 0.355$	0.857	$P = 0.521$	0.412
No	64 (39)		157 (43.3)		57 (34.7)		163 (44.9)		68 (41.5)		167 (46.0)	
Yes	1 (12.5)		7 (30.4)		0		12 (52.1)		2 (25.0)		9 (39.1)	
Who had ever undertaken part-time job	$P = 0.255$	1.297	$P = 0.590$	0.290	$P = 0.294$	1.103	$P = 0.187$	1.740	$P = 0.605$	0.267	$P = 0.503$	0.449
No	53 (36.1)		141 (42)		51 (34.6)		148 (44.0)		61 (41.5)		151 (44.9)	
Yes	12 (48)		23 (46)		6 (24)		27 (54.0)		9 (36.0)		25 (50.0)	
Job burnout	–		–		$P = 0.013$	6.210	$P < 0.001$	18.238	$P < 0.001$	18.804	$P < 0.001$	76.195
No	–		–		28 (26.1)		80 (36.0)		30 (28.0)		59 (26.5)	
Yes	–		–		29 (44.6)		95 (57.9)		40 (61.5)		117 (73.1)	
Career choice regret	$P = 0.013$	6.210	$P < 0.001$	18.238	–		–		$P = 0.001$	10.447	$P < 0.001$	20.783
No	79 (68.7)		69 (32.7)		–		–		37 (32.2)		74 (35.0)	
Yes	29 (50.8)		95 (54.2)		–		–		33 (57.9)		102 (58.2)	
Depressive symptoms	$P < 0.001$	18.804	$P < 0.001$	76.195	$P = 0.001$	10.447	$P < 0.001$	20.783	–		–	
No	26 (25.2)		47 (22.3)		25 (24.2)		73 (34.7)		–		–	
Yes	39 (56.5)		117 (66.4)		32 (46.3)		102 (57.9)		–		–	

P (probability, value according to Chi-square test).

TABLE 4 | Logistic regression of job burnout, career choice regret and depressive symptoms.

Variables	Job burnout			Career choice regret			Depressive symptoms		
	Male	Female		Male	Female		Male	Female	
	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)
Postgraduate entrance examination score	-	-	-	-	-	0.008	-	-	-
<330	-	-	-	-	-	1 (Reference)	-	-	-
330–360	-	-	-	-	-	1.58 (0.94–2.65)	-	-	-
>360	-	-	-	-	-	0.70 (0.4–1.22)	-	-	-
Daily sleep time (h)	-	0.003	-	-	-	0.003	-	-	-
<6	1 (Reference)	-	-	-	-	1 (Reference)	-	-	-
6–8	0.22 (0.09–0.54)	0.001	-	-	-	0.37 (0.20–0.68)	-	-	-
>8	0.17 (0.03–0.87)	0.033	-	-	-	0.74 (0.24–2.31)	-	-	-
Job Burnout	NA	-	NA	-	-	1.71 (1.07–2.74)	0.025	3.68 (1.89–7.19)	<0.001
Career choice regret	-	-	1.82 (1.15–2.87)	0.011	-	NA	-	2.46 (1.23–4.89)	0.011
Depressive symptoms	3.87 (1.95–7.65)	<0.001	6.21 (3.93–9.81)	<0.001	2.90 (1.51–5.58)	0.001	1.93 (1.21–3.08)	0.006	2.02 (1.28–3.18)

-, indicates these variables were excluded in regression models; OR, odds ratio; P (probability, value according to logistic regression analysis); NA, variable was not included in the logistic model.

The detailed results of logistic regression and VIF are shown in the **Supplementary Table**.

DISCUSSION

In this study, a self-administered questionnaire was adopted to investigate the gender differences in job burnout, career choice regret, and depressive symptoms among Chinese dental postgraduates. We explored the prevalence and influencing factors of job burnout, career choice regret, and depressive symptoms between male and female dental postgraduates. To our knowledge, this is the first study to examine this issue in this population.

The incidence of job burnout in our sample exceeded 40%, higher than the rate reported for dental students in Saudi Arabia (30.14%) and in Spain (26%) (38, 39), suggesting that it is more prevalent in this population. A contributing factor may be that the dental students in our survey are receiving postgraduate education. Under the Chinese medical education system, a qualified dental postgraduate needs at least 8 years of training. In addition, the emotional exhaustion of females was significantly higher than that of their male counterparts. This is consistent with previous studies (40, 41). A possible explanation is that females are more likely to express their emotional distress, are more sensitive to stress, and are more vulnerable to negative emotions than males (42–44). Multivariable analysis showed that daily sleep time was an influencing factor in job burnout among male dental postgraduates; the longer the daily sleep time, the lower the risk of job burnout. A possible explanation is that lack of sleep will lead to physical fatigue and the inability to cope with work effectively (45). Career choice regret was the influencing factor for female dental postgraduates. This factor was consistent with the results of previous surveys. A ranking of the things Americans regret most identified education and career as the most likely areas for regret (46). Research on regret behavior also shows that regret can lead to the desire to correct mistakes, undo events, and get a second chance. Regret can also lead to a greater aversion to the outcome of choices made (9). Career choice regret could induce an aversion to the chosen career, thereby increasing the risk of job burnout.

The incidence of career choice regret is significantly higher in females, consistent with another survey of Chinese healthcare students (47). A possible explanation is that females are expected to be more likely to prioritize their family and children. At the same time, the enormous stress of graduate education can easily lead to conflicts between family and study, which may increase their career choice regret (48). Multivariable analysis showed that postgraduate entrance examination score, daily h of sleep, and job burnout are associated with career choice regret for female dental postgraduates. Graduate entrance exam scores have a strong effect on being allocated a supervisor, especially for those with scores of 330–360 (not good and not bad). One possible explanation is that expectations are high for this group. However, their results tend to be worse than expected, potentially triggering a strong emotional response and increasing their career choice regret. Too much or too little

sleep may increase the risk of career choice regret. Long-term chronic sleep deprivation is an adverse circumstance that can severely reduce medical students' career identity, significantly impacting career choice (49). However, excessive sleep duration can also cause psychological problems (50–52), affecting the efficiency of postgraduates' work and study, thereby reducing their career identity. Our findings also indicate that consistent with a previous study (53), dental postgraduates with job burnout are more likely to experience career choice regret.

We found depressive symptoms to be a common risk factor for job burnout and career choice regret among male and female dental postgraduates. This finding was consistent with previous studies. For example, a study from China found that medical students who experienced depressive symptoms were more likely to drop out of medical school (54). Another survey found that the presence of depression was the variable predicting high emotional exhaustion, one of the main components of job burnout (55). A possible explanation is that the symptoms of job burnout overlapped with some psychiatric symptoms, particularly mood exhaustion and depressive symptoms (56). Depressive symptoms were also a risk factor for low medical career interest and high intention to leave (8, 57).

Our results show that the prevalence of depressive symptoms is higher in females, and it is not statistically significant. However, several studies have shown that gender is an influential factor in depressive symptoms (58–60). For example, a survey of Chinese high school students found that girls are more likely to suffer from depressive symptoms due to academic stress. The possible explanation is that girls generally respond to stressors with higher levels of depressive symptoms than boys (61). Our research found that the factors associated with depressive symptoms, namely job burnout and career choice regret, were similar between males and females. Previous studies found that job burnout was a significant risk factor for depression in medical students (62, 63). Research has also found that work-related risk factors for job burnout were predictors of depression (64). Furthermore, a study of Chinese neurology postgraduates demonstrated an overlap between job burnout and depressive symptoms (10). Job burnout, career choice regret, and depressive symptoms may overlap because depressive symptoms are the risk factor with the highest odds ratio for job burnout and career choice regret, and job burnout and career choice regret are also the risk factor with the highest odds ratio for depressive symptoms.

As females are becoming increasingly active in the healthcare industry, this disparity may have a significant impact. Appropriate measures are urgently needed to reduce the incidence of job burnout, career choice regret, and depressive symptoms in dental postgraduates. Education departments should pay more attention to adjustments in dental postgraduates' curriculum and clinical work so that students can combine work with rest. University administrators should reform the way students choose tutors and should conduct comprehensive assessments, not just postgraduate entrance examination scores. There is also a need to strengthen the training of stress management for graduate students to improve the prevention of students' negative psychological issues. Finally, early screening for psychological problems of dental students

should be strengthened, paying more attention to students who may have problems and helping them solve problems quickly.

CONCLUSIONS

Dental postgraduates have a relatively high prevalence of job burnout, career choice regret, and depressive symptoms. Female dental postgraduates showed a higher prevalence and more risk factors than their male peers. The daily h of sleep and depressive symptoms were associated with increased job burnout levels for male dental postgraduates, and career choice regret and depressive symptoms were associated with increased job burnout levels for female dental postgraduates. Depressive symptoms were associated with increased career choice regret levels for male dental postgraduates, and postgraduate entrance examination scores, daily h of sleep, and depressive symptoms were associated with increased career choice regret levels for female dental postgraduates. Job burnout and career choice regret were associated with increased depressive symptom levels in male and female dental postgraduates. Appropriate measures are urgently needed to address the current situation.

LIMITATIONS

This study has some limitations. First, this study used convenience sampling. Therefore, our data may be subject to selection bias. Second, some scales, such as PRIME-MD, involve recollections of events from a month ago, so there may be a recall bias. Third, this was a cross-sectional survey, so we could not determine whether the associations we found were causal. Fourth, due to space limitations, this study on the impact of gender differences is not sufficiently deep. Therefore, further studies using larger and more diversified sample sizes are needed to validate our results.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

AUTHOR CONTRIBUTIONS

LYan and XZ proposed the concept and design. LYan, HL, and PJ collected the data. LYan analyzed and interpreted the data, and wrote the manuscript. XZ, HL, and LYan edited the manuscript. XJ and LL gave guidance on the content of the article and supervised the study. PJ and XJ provided the funding. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

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Efficacy of a Workplace Intervention Program With Web-Based Online and Offline Modalities for Improving Workers' Mental Health

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Objective: This study aims to examine the efficacy of the Workplace Web-based blended psychoeducation mental health intervention program. Of particular interest is the short-term effect of the intervention on workplace burnout, stress, quality of life, and the mental health literacy of workers.

Methods and Materials: The study focused on employees ($n = 456$) in specific industries with high levels of work-related stress, adopting a phase III wait-listed cluster randomized controlled trial. Work-related burnout was assessed by the Maslach Burnout Inventory (MBI) and stress was measured using the stress subscale of the Depression, Anxiety, and Stress scale (DASS). Quality of Life was evaluated by the European Quality of Life-5 Dimensions (EQ-5D-5L) and Mental Health Literacy was assessed using the Australian National Mental Health Literacy and Stigma Survey. Data were analyzed as a trial with intention-to-treat analysis and adjustment for the clustering effect of work sites.

Results: Significant differences between intervention and control groups were found on all outcome measures except the self-rated quality of life. The intervention group displayed a significant reduction in the weighted mean score of about 1.0 units (s.e. = 0.4) on the stress scale ($p = 0.015$) and an increase in the weighted mean score of 1.9 units (s.e. = 0.9) in the professional accomplishment domain of the MBI ($p = 0.035$). Significant increases were found in the weighted mean scores in the intervention group for correct recognition of the mental problems, help-seeking, and stigmatization, in comparison to the control group who scored 0.2 (s.e. = 0.1), 0.9 (s.e. = 0.2), 1.8 (s.e. = 0.4), respectively.

Conclusions: The results obtained from a comparison of the outcome measures between the intervention and control groups were statistically significant, indicating that the intervention group performed better on most measures. The study demonstrates that, in the short term, the on-and-offline modalities of the Web-based blended psychoeducation intervention program is efficacious in reducing workplace burnout and stress and promoting mental health literacy at the workplace.

Keywords: work-related burnout, stress, mental health literacy, randomized controlled trial, psychoeducation, web-based intervention

INTRODUCTION

Work is an important part of daily life for many people. The Organization for Economic Co-operation and Development (OECD) has estimated that, on average, full-time workers in the OECD countries spent 37% of their time working on a normal day (1). Workplace mental health has long been one of the major health concerns globally. The workplace is also an important venue for preventing mental health problems and for promoting mental wellness (2). The World Health Organization (WHO) has also stated in its comprehensive mental health action plan 2013–2020 that the workplace should be the main focal environment for mental health promotion (3). The plan emphasized that community-based, including the workplace, prevention and early intervention of mental health problems is of paramount importance and the improvement of the mental wellness of the working population should be considered a priority (3). Programs specifically designed for employees in the workplace could provide great benefits in terms of early identification and intervention of mental health problems.

As burnout and stress in the workplace are common precursors of mental health problems, the majority of intervention programs developed in the past were mainly designed to address these issues (4–7). Burnout is classified as an occupational phenomenon, not as a medical condition, in the 11th version of the International Classification of Diseases (ICD-11). It is defined as: “a syndrome conceptualized as resulting from chronic workplace stress that has not been successfully managed.” (8) In terms of the focus of intervention, there would be multiple points of attack and thus different approaches. Awa et al. reviewed different intervention programs for the effectiveness of reducing burnout and concluded that there were mainly two types of intervention programs, either person-directed or organization-directed (4). The effectiveness of person-directed intervention programs seemed to last for a short term of 6 months or less, programs that were directed at the organization level demonstrated an effect that could last for 12 months or longer. The researchers proposed that dual foci programs directed at the organization and the individual should be developed for future workplace intervention (4).

Psychoeducation is defined as “an intervention with systematic, structured, and didactic knowledge transfer for an illness and its treatment, integrating emotional and motivational aspects to enable patients to cope with the illness and to improve its treatment adherence and efficacy” by Ekhtiari et al. (9). It has been identified as an effective intervention strategy for mental health and has long been adopted in different populations (10, 11). For example, a randomized controlled study conducted by Shin and Lukens demonstrated the efficacy of a culturally sensitive psychoeducation intervention program for chronic mental illness (12). In addition to individual supportive therapy, psychoeducation was significantly more effective in terms of mental health outcomes than individual supportive therapy alone (12). With the advancement of information technologies, online or digital psychoeducation intervention offers the convenience of reaching the target audience more easily with greater acceptance. Psychoeducation, if supported by other

measures such as supervision, may offer a better outcome (13). Online psychoeducation would also provide the benefit of continual treatment and support to individuals experiencing mental health problems even in difficult times, such as the current COVID-19 pandemic when personal contacts are greatly disrupted (14). In terms of the efficacy of online psychoeducation intervention programs targeting the workplace, particularly with multiple foci on workers and the workplace environment, little has been reported in the literature.

Many advantages of using an online or digital means for the delivery of training or education programs have been advocated. These include flexibility of learning material delivery, more independent learning, self-pacing, and self-responsible (15). Some disadvantages of using online teaching and training as the sole means of education delivery have also been identified, particularly from the students’ or learners’ perspective. Dumford and Miller, utilizing data from a national survey of university students, found that students who had participated in online learning were less likely to learn collaboratively, with fewer interactions with their teachers, and less inclined to discuss with others when compared with those taking face-to-face classes (16). These disadvantages may have a considerable impact on the effectiveness of a psychoeducation program used as an intervention strategy for mental health problems because interaction with and support from others are important elements of the therapeutic regime. Hence, blended learning, combining the online delivery of the learning materials and face-to-face live instructions and interaction between learners and instructor, has been suggested as a better approach (17).

Taking into consideration the suggestion by Awa et al. (4), a workplace intervention program was designed by the study team aiming as a preventive strategy for mental health problems and for promoting better mental health in the workplace (The WPMHL program). More specifically the intervention program targets the individual and organizational factors, particularly in enhancing the protective factors, that might affect the mental health status of workers. Details of the intervention program have been provided in the published protocol for a phase III wait-listed cluster randomized controlled trial for enhancing mental wellbeing in the workplace (18). In brief, the program comprises two main components, an individual-directed psychoeducation course, and an organization-directed consultation. The individual-directed psychoeducation course is based on the evidence-based Workplace Mental Health First Aid (MHFA) training program with additional elements on stress reduction and burnout prevention (19). This psychoeducation course is a blended program, using the e-Learning approach, consisting of six self-paced Web-based online e-Learning modules with a face-to-face group session at the end of the course. These modules cover the common mental health problems encountered by adults in daily life and at the workplace. These include depression, anxiety, obsessive-compulsive disorders, post-traumatic disorder, and others. It also includes some specific materials on burnout prevention and stress reduction. In each module, basic information, such as signs, symptoms, and possible causes, on these problems are presented with case studies and related activities for enhancing the learning

of participants. The online modules are delivered through a purpose-built Web-based platform specifically designed for this project. The group session provides an opportunity for interactions among participants and the trainer for clarification of queries and for participants to gain hands-on experience through practice. The main focus of the psychoeducation modules is to enhance the mental health literacy of workers. Mental health literacy (MHL) was defined as “knowledge and beliefs about mental disorders which aid their recognition, management or prevention” by Jorm (20). There are different components embedded in this construct. These include the ability to recognize specific disorders, knowledge, and attitudes toward help-seeking, stigmatization, and social distancing from sufferers of mental health problems. For the organization-directed component, a consultation session is provided to the manager of the department or unit by a senior social worker with expertise in workplace issues. The consultation is based on the assessment of a Workplace Environment scan, using a standard protocol and the Moos Work Environment Scale (WES) (21). This uniquely designed dual-foci program aims to address the needs of the individual and issues in the work environment at the organization level.

This study aims to examine the efficacy of the intervention program through a phase III wait-listed cluster randomized controlled trial. It attempts to seek the answer to the research question of whether the program would reduce work-related burnout and stress; increase the general health-related quality of life and mental health literacy of participants. It is hypothesized that workers undergoing the intervention program would have a reduced level of work-related burnout and stress and an increase in health-related quality of life and mental health literacy in comparison to the controls. Of interest to the current report is the short-term effect (i.e., post-intervention), while data on the follow-up phase are still forthcoming.

MATERIALS AND METHODS

The full trial protocol of phase III wait-listed cluster randomized controlled trial (CRCT) was published previously in 2019 (18). In summary, the study focused on specific industries that were considered to have a high level of work-related stress, such as the servicing and hospitality industries. Six large-scale corporates agreed to participate in the project and employees were recruited from these corporates through their corresponding Human Resources departments. Participants joined the study voluntarily without any intervention from the management of these companies. Since the scope of business of these corporates covered a wide range of different work natures, ranging from manual labor to senior executives, the recruited sample also represented a multitude of different work types. Institution ethics approval for the study was granted by the Human Research Ethics Committee of the Tung Wah College (Ethics Approval number: REC2018020). The trial was also registered with the Australian New Zealand Clinical Trials Registry (ANZCTR, Registration number: ACTRN12619000464167). The intervention phase of the trial commenced in March 2021 and was completed in

December 2021 with the follow-up phases still ongoing at the time of manuscript submission.

As a cluster randomized trial, the office sites were the primary unit of randomization. Upon recruitment, participants were screened for their eligibility with the exclusion of those who had been exposed to similar psychoeducation training. For random allocation of sites, a list of participating office sites with some basic staffing information was obtained from the Human Resources Departments of these corporates. The randomization was conducted by a qualified statistician who was blinded to the process of recruitment and the ongoing outcome assessments. The central registry was responsible for generating the randomization tables and provided the information to the field staff right after the briefing session and baseline data collection *via* instant messaging. Once registered, participants completed the baseline data collection *via* an Internet-based online platform specifically designed for the study. Participants nested in different site offices were then allocated to the intervention or the wait-listed control groups randomly according to a randomization schedule generated by the central registry. Post-intervention data collection took place immediately after the completion of the online psychoeducation training course and at the end of the face-to-face session, also *via* the online platform. Participants were then followed for 3 months with another data collection using the same method.

The intervention program was briefly described in the introduction and full detail in the previous publication by the authors (18). The full program, including both the organizational and psychoeducation components, lasted for 3 months for each site. Interested readers can refer to the publication for more information. The outcome measures of the study included work-related burnout, stress, general health-related quality of life, and mental health literacy.

The Maslach Burnout Inventory (MBI) was used to assess the work-related burnout of participants (22, 23). There are three domains, reflected in the three subscales, of the MBI capturing three different aspects of the burnout phenomena. One of the subscales is Emotional Exhaustion which measures the feeling that one is exhausted emotionally by work. Depersonalization captures the state that the worker is impersonally responding to clients or recipients of one's service or care. The last subscale is Personal Accomplishment which assesses the extent of the worker's competence and achievement in service provision. The MBI has been fully validated, translated into many languages, and employed widely in many countries (24, 25). The psychometric properties of the MBI were also studied by Wickramasinghe et al. resulting in a three-factor model which fitted the data significantly better than other alternative models. The internal consistency for the subscales was high with Cronbach's alpha values of 0.84, 0.87, and 0.88, respectively (24). In this study, the subscale scores were used for analyses.

Stress was assessed by the stress subscale of the Depression, Anxiety, and Stress scale (DASS) (26). A fully validated and commonly used instrument, the DASS was designed for assessing stress, depressive symptoms, and anxiety in the general population. The psychometric properties of the scale were well-studied showing strong reliability and validity for both the

English and the Chinese versions (27, 28). The stress subscale consists of 7 items with a 4-point Likert response scale ranging from 0 (never) to 3 (almost always) resulting in a total summative score from 0 to 21. A recent study demonstrated a moderately high internal consistency for the stress subscale with a Cronbach's alpha value of 0.79 (29). In this study, the total summative score of the stress subscale was used for analyses.

Health-Related Quality of Life (HRQoL) was evaluated using the five-level version of European Quality of Life-5 Dimensions (EQ-5D-5L) (30). The instrument has been widely used in many countries and the validity has been well-demonstrated and published. The instrument was also translated into the Chinese language and the Chinese version of the EQ-5D-5L was validated with a moderately high Cronbach's alpha value of 0.78 and a good test-retest reliability of an Intraclass Correlation of 0.777 (31). For analysis purposes, the total raw scores of the EQ-5D-5L were used.

Mental Health Literacy was assessed using the Australian National Mental Health Literacy and Stigma Survey (32). The instrument has been validated and widely used in many studies in different countries (33). Since the full survey is lengthy and comprises many domains with different independent constructs, the full survey instrument was not used. In consideration of the specific local context, some components of the instrument were selected and utilized in the study. These included correct identification of mental health problems, help-seeking for a mental health problem, stigmatization, and social distancing.

Information on potential confounding factors was also collected in case an adjustment for the effect of confounding was necessary. These variables included demographics, employment duration, resignation intentions, health conditions, and behaviors, such as drinking, smoking, physical activity, and sick leaves.

The statistical software program Stata V17.0 was used for conducting data analyses (34). The statistical analytical approaches employed were based on the following considerations: (1) participants were nested in different corporates, thus adjustment for the clustering effect of the dataset is necessary; (2) outcome measures were continuous variables and measured repeatedly at baseline and post-intervention; (3) data collected at the baseline on both groups mimicked a cross-sectional survey, thus an appropriate corresponding approach need to be applied. A two-stage procedure was employed for the analyses. First, for examining participants' characteristics and the randomness of the sample baseline data were described and comparisons between groups were conducted. Adopting the approach for analyzing cross-sectional cluster data, baseline data were pre-set with the Stata `svy` command and weighted with the inverse of the sample size in each site as the weighting factor. Descriptive analyses were conducted using frequencies and percentages or means and standard errors. Comparisons of proportions and means between groups were carried out using Chi-squared tests and simple linear regression modeling, respectively, with adjustment for the clustering effect. Any variables with significant differences between groups would suggest a potential confounder and include them in further subsequent analyses. For the inclusion

of potential confounders, a $p < 0.20$ was used as the inclusion criteria. Second, for investigating the efficacy of the intervention program, comparisons of the mean scores of the outcome measures between the intervention and control groups after the intervention program adjusting for the clustering effect, and the baseline assessment of the outcome measures were conducted. The Generalized Linear Latent And Mixed Model (GLLAMM) approach was employed to test for any group differences. To handle any loss to follow-up, the main analyses were conducted according to the principle of Intention-to-Treat (ITT) and missing data in any variables were imputed using the multiple imputation approach with an assumption of Missing at Random (MAR) for all missing values. An initial data cleaning procedure had revealed that only a few variables had missing values $<2\%$ of the sample size. A type I error rate of 5% was adopted for the testing of hypotheses.

RESULTS

In total, 456 participants were recruited to the trial from five corporates with 229 (50.2%) randomly allocated to receive the intervention program first. All participants in the intervention group completed the Web-based online modules and the face-to-face session within the designated time from the commencement of the intervention. Baseline data and the post-intervention

TABLE 1 | Frequency (%) or mean (s.e.) of participants' demographic, health and work-related variables, and baseline assessment of outcome variables by groups and the results on comparisons ($N = 456$).

Participants' characteristics	Control ($n = 227$)	Intervention ($n = 229$)	Results on comparison ^a
Demographics			
Age (years)	40.5 (1.1)	40.9 (1.4)	$p = 0.575$
Male sex	97 (42.7%)	118 (51.5%)	$p = 0.104$
Education level (University or above)	173 (76.2%)	190 (83.0%)	$p = 0.109$
Marital status (married)	135 (59.5%)	136 (59.4%)	$p = 0.988$
Full-time employment (yes)	227 (100.0%)	227 (99.1%)	$p = 0.407$
Flexible hours (yes)	82 (36.1%)	82 (35.8%)	$p = 0.926$
Health and work-related variables			
Regular exercise (yes)	178 (79.5%)	166 (73.8%)	$p = 0.198$
Smoker (yes)	8 (3.6%)	9 (4.0%)	$p = 0.864$
Drinker (moderate/heavy)	4 (1.8%)	4 (1.8%)	$p = 0.981$
Intended to resign (yes)	99 (43.6%)	107 (46.7%)	$p = 0.203$
Outcome variables			
Burnout — emotional exhaustion	20.1 (0.8)	20.9 (0.8)	$p = 0.611$
Burnout — depersonalization	6.5 (0.4)	6.6 (0.4)	$p = 0.897$
Burnout — professional accomplishment	28.0 (1.0)	28.0 (0.8)	$p = 0.999$
Stress	7.1 (0.3)	7.4 (0.3)	$p = 0.541$
Quality of life (self-rating)	80.7 (1.4)	70.3 (1.0)	$p = 0.568$
MHL — correct recognition	3.3 (0.05)	3.3 (0.03)	$p = 0.567$
MHL — help-seeking	12.1 (0.2)	12.2 (0.3)	$p = 0.611$
MHL — stigmatization	24.5 (0.5)	24.9 (0.5)	$p = 0.213$
MHL — distancing	12.1 (0.3)	12.2 (0.4)	$p = 0.709$

^aAdjusted for the clustering effect.

TABLE 2 | Mean (s.e.) of the outcome measures assessed at the completion of the intervention program by groups and results on comparisons.

Outcome measures	Control (<i>n</i> = 227)	Intervention (<i>n</i> = 229)	Results on comparison ^a
Burnout — emotional exhaustion	20.5 (1.0)	20.9 (0.6)	<i>p</i> = 0.872
Burnout — depersonalization	6.9 (0.6)	7.4 (0.3)	<i>p</i> = 0.689
Burnout — professional accomplishment	27.7 (1.2)	28.2 (0.8)	<i>p</i> = 0.035
Stress	7.5 (0.5)	6.7 (0.4)	<i>p</i> = 0.015
Quality of life (self-rating)	80.5 (1.6)	81.5 (0.8)	<i>p</i> = 0.375
MHL — correct recognition	3.2 (0.1)	3.4 (0.1)	<i>p</i> = 0.003
MHL — help-seeking	11.9 (0.2)	12.9 (0.3)	<i>p</i> < 0.001
MHL — stigmatization	24.5 (0.6)	26.3 (0.5)	<i>p</i> < 0.001
MHL — distancing	12.3 (0.6)	11.9 (0.5)	<i>p</i> = 0.160

^aAdjusted for the clustering effect, age, education level, and baseline assessment of the outcome measure. Bold values represent significant results.

outcome assessments were conducted for both the intervention and control groups within a week of completion of the intervention. **Table 1** summarized the descriptive statistics on the demographic, health and work-related variables, and the baseline assessments on the outcome measures, work-related burnout, stress, quality of life, and MHL. Results on the comparisons of these variables between the intervention and control groups were also presented. As shown, none of these comparisons was statistically significant suggesting that the randomization process was performed satisfactorily. It is also noted that the comparisons of two demographic variables, namely sex and education level, resulted in a significance level $p < 0.20$. By the selection criteria, these two variables were included in further analyses.

Results of the comparisons of the post-intervention outcome measures between the intervention and control groups with the Intention-to-Treat analysis are summarized in **Table 2**. Significant differences were found in all outcome measures except the self-rating of quality of life measure (**Table 2**). There was a significant reduction in the average stress score in the intervention group in comparison to that of the controls with mean scores of 6.7 (s.e. = 0.4) and 7.5 (s.e. = 0.5) for the intervention and control groups, respectively ($p = 0.015$). This represented a weighted mean reduction of about 1.0 units (s.e. = 0.4) on the stress scale. For burnout, of the three domains of the MBI, no statistically significant differences between groups were found in two, namely emotional exhaustion and depersonalization. But a significant difference was observed in the professional accomplishment domain ($p = 0.035$). Participants in the intervention groups scored higher in professional accomplishment than the controls with mean scores of 28.2 (s.e. = 0.8) and 27.7 (s.e. = 1.2), respectively. This represented an increase in the weighted mean score of 1.9 units (s.e. = 0.9) on the scale for the intervention group. In terms of Mental Health Literacy, significant differences between groups were observed in all domains except social distancing (**Table 2**). Significant increases in the weighted mean scores were observed in the intervention group for correct recognition of a mental problem, help-seeking, and stigmatization, in comparison to the

controls with 0.2 (s.e. = 0.1), 0.9 (s.e. = 0.2), 1.8 (s.e. = 0.4), respectively. Since the response set of the stigmatization scale was presented in a reversed order with a higher score representing a lower stigmatization attitude, an increased score on the scale reflected a reduction of the stigmatization attitude.

DISCUSSION

This trial aimed to investigate the efficacy of the purposefully designed intervention program for enhancing the mental wellbeing and mental health literacy of workers in the workplace. The results obtained from comparisons of the outcome measures between the intervention and control groups were statistically significant in favor of the intervention group on most measures, except for the quality-of-life measure. These results provide some evidence to support the efficacy of the intervention program under investigation. In general, these results are consistent with those observed in the literature. In terms of workplace mental health intervention, this trial specifically examined the effects on mental health literacy apart from burnout and stress which are common mental health outcomes of workplace programs (35, 36). Randomized Control Trials that focus on multiple aspects, including mental health wellbeing, cognitive understanding, and attitudes toward mental health, are not widely found in the literature. This study could be considered exceptional in the field. For the null result of the quality-of-life measure, there would be many reasons. One possible reason is related to the nature of the instrument. As noted by the developers of the instrument that: “EQ-5D is a standardized measure of health status developed by the EuroQol Group in order to provide a simple, generic measure of health for clinical and economic appraisal (37).” It is mainly designed for assessing patients with reasonably good utility. Although it could also be used in the general population, the utility of the instrument may not be as good as in the patient population, particularly when applied to a group of healthy participants. Another possible reason may be related to the timing of the study when the community was greatly affected by the pandemic and the general quality of life of the entire population was on the downside. The intervention program, as a workplace preventive strategy, has been designed with a specific focus on addressing workplace issues. Hence, participants may respond more positively to the work-related outcome measures.

To echo the appeal of the WHO in the mental health action plan 2013–2020 that the workplace is an important venue for mental health education and promotion, this study has provided substantiating evidence in demonstrating such value. The study has also rendered support to the argument that a well-designed workplace mental health intervention program is efficacious in alleviating stress and burnout, both are precursors to more severe mental health illnesses. Further, such a program can also enhance the mental health literacy of workers, which is a protective factor against mental health problems. There would be many practical implications drawn from the results of this study; two are outstanding. The first is related to the contents of the intervention program and the other is the use

of digital technologies for health advancement, particularly in mental health. As suggested by Awa et al., a well-designed workplace mental health intervention program should consist of both individual-directed and organization-directed components to address issues arising from both parties. Work is a significant part of daily life and workers spend a large amount of time in the workplace. The resultant effect is a reciprocal relationship between workers and the work environment. The experience and mental state of workers will affect the work environment, and in turn, the physical and non-physical work environment will affect workers. Hence, any workplace mental health intervention program should address both variables. This would result in a better chance of success in assisting employees and employers toward an improvement of the overall wellbeing. In terms of the use of digital technologies for health advancement, particularly for mental health, there are ample examples in the last few years. The COVID-19 pandemic has also stimulated and motivated a more rapid development and adoption of digital health (DHealth) (38). In the post-pandemic era, it is foreseeable that healthcare provision and health advancement, including education and promotion, will be largely driven by and gain benefits from DHealth.

As in all trials, there are strengths and limitations in the current study that have been identified. First, the representativeness of the sample would be ascertained. Although participants were not recruited randomly from the working population, they were recruited by the Human Resources departments of five very large-size multinational corporates. These corporates are involved in a multitude of different businesses involving many different industries thus the work nature of their employees covers a wide range from manual labor to high-level executives. As a result, the sample reflects many sectors of the local working population and suggests the generalizability of the results. Second, the use of standardized and validated assessment instruments for all main variables of interest minimizes measurement and interpretation biases. Third, as shown by the results on comparisons of many baseline variables between the intervention and control groups, the randomization process is satisfactory further reducing the systematic basis of the trial. For the study design, this is a wait-listed cluster randomized controlled trial (CRCT) with the waiting control group not subjected to any placebo treatment. In terms of the design, a wait-list trial may not be as strong as a parallel-arm RCT with placebo treatment for the controls. Moreover, there would be a chance for treatment effect dilution for the controls to be exposed to the intervention program while they are still waiting, particularly for those participants who are working in the same environment. However, based on experience gained in previous trials utilizing a similar individualized Spaced-education approach for training, the chances for such dilution of treatment effect are slim and neglectable (39). Moreover, all participants involved in the study have been assigned a unique password for accessing the Web-based modules thus minimizing the risk of early exposure to the intervention materials of the controls. Another limitation identified is the missing values in some of the demographic variables. To reduce any bias in

the effect estimation, Intention-To-Treat analysis was applied with the imputation of the missing values. As indicated, these missing values had exhibited a missing at random pattern upon examination. Hence, should there be any biases introduced by these missing values they are likely to be non-differential and exert a minimal effect on the strength of the effect estimates. Finally, this study has demonstrated the short-term effect of the intervention program. A follow-up study will present the results of the investigation of the long-term effect.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because permission by the funder is required to release the dataset. Should there be a request, permission could be sought through the institute's Research Office. Requests to access the datasets should be directed to LL, lawrence.lam@uts.edu.au.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by institution ethics approval for the study was granted by the Human Research Ethics Committee of the Tung Wah College (Ethics Approval number: REC2018020). The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

LL, ML, PW, and PR designed the study. LL obtained the funding, designed the statistical analysis plan, and will direct the data analyses. The Workplace Environment scan component of the intervention program was designed by LL and PW was responsible for the online and the face-to-face modules of the psychoeducation training. The data collection questionnaire was developed by LL, PW, and ML with the MHL scale translated and validated by LL with the permission of the original author. LL and PW authored the first draft of the study protocol to which ML and PR then contributed. All authors read and approved the final manuscript.

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Job Demands, Resources and Burnout Among Polish Nurses During the Late Wave of COVID-19 Pandemic: The Mediating Role of Emotional Labor

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Objective: Burnout has been recognized as a serious health problem. Nurses as a professional group are at a high risk of burnout occurrence, especially when facing burden associated with the COVID-19 pandemic. Despite evidence that higher job demands lead to burnout, there is less known about the indirect effect of job demands and resources on burnout via surface acting. Using the JD-R framework, this study examined how job demands and resources affected burnout among Polish nurses and whether these relationships are mediated by surface acting and moderated by coping with the workload.

Materials and Methods: A sample of 270 nurses from the biggest hospital in Southern Poland filled out an online questionnaire at the time between the fourth and the fifth wave of the COVID-19 pandemic in Poland. The Polish adaptations of Oldenburg Burnout Inventory (OLBI), Organizational Constraints Scale (OCS), Interpersonal Conflict at Work Scale (ICAWS), Areas of Worklife Survey (AWS), and Emotional Labor Scale (ELS) were used. Mediation and moderation analyses were carried out in the SPSS macro-PROCESS.

Results: Surface acting partially mediated the positive association between organizational constraints and interpersonal conflict at work and burnout, as well as the negative association between the perceived organizational support and burnout. Coping with workload moderated the direct effect of organizational constraints on burnout via surface acting.

Conclusion: The findings enrich the knowledge of the mediating and moderating mechanisms to explain the association between job demands, resources and burnout among nurses. There have been proposed interventions concerning increasing organizational support, effective emotional regulation of management education and psychological training regarding adequate coping strategies which could help reduce or prevent the occurrence of burnout in this professional group.

Keywords: JD-R model, nurses, emotional labor, burnout, Poland, COVID-19

INTRODUCTION

The World Health Organization (WHO) recognizes occupational burnout as a result of chronic stress experienced in the workplace consisting of three dimensions: the feeling of loss, negative feelings concerning work and the mental distance toward it, as well as reduced professional effectiveness (1). Nurses as a professional group are highly subject to burnout due to, first of all, direct contact with patients who require emotional involvement, while also dealing with various possible situations, including the patients' suffering, fear or aggression (2, 3) and secondly, the relatively low position in the working organization such as a hospital and tasks they are generally assigned to Lasalvia et al. (4). Thus, nurses are known to be at higher risk for the development of burnout compared to other medical occupations (3). A study that examined the prevalence of burnout among 1,329 medical professionals from five different professional fields found that nurses experience its highest level (5). Similarly, the results of a systematic review of Khamisa et al. (6) showed that high levels of work-related stress, burnout, and poor health are common among nurses. Woo et al. (7), in turn, based on 113 studies included for systematic review and 61 studies considered in the meta-analysis showed that 11.23% of nurses worldwide experienced burnout symptoms.

The situation of Polish nurses in terms of burnout seems to be even worse as the study of Uchmanowicz et al. (8) reported increasing levels of burnout and worsening job satisfaction among members of this professional group. Additionally, Poland has one of the lowest indicators of practicing nurses per 1,000 residents among the OECD countries. In 2015, it was by comparison only 5.2; whereas this indicator for Germany was 13.3, Denmark–16.7 and Switzerland–18 (9). The high average age of nurses in Poland was estimated to be around 52 years of age, which, when combined with the high percentage of nurses dissatisfied with their working conditions leads them to the feeling of work overload and high levels of occupational stress and burnout (10, 11).

The already high prevalence of burnout among nurses in ordinary times became an even more serious concern during the current COVID-19 pandemic due to the emergence of new stressors at their workplace, such as the high death rate of COVID-19 patients, the increased number of overtime shifts, the fear of not getting the appropriate medical equipment (including personal protective equipment) or the possibility of COVID-19 transmission and the infection of family members (12, 13). According to a systematic review by Galanis et al. (14), nurses have experienced high levels of burnout during the COVID-19 pandemic, as the overall prevalence of emotional exhaustion in this professional group led to 34.1%, while depersonalization amounted to 12.6% and the lack of personal accomplishment totaled 15.2%.

According to the Job Demands-Resources theory (JD-R), occupational burnout is a long-term effect of stress caused by prolonged excessive job demands and insufficient resources to deal with these job demands effectively (15–18). Burnout in this perspective consists of two components, named exhaustion and disengagement from work (19). The exhaustion dimension refers to feelings of physical fatigue and overload with relation to work

(20), while the dimension of disengagement refers to the distance from work and negative attitudes toward their own work (19). In addition, it is assumed that job resources buffer the potentially negative effects of excessive job demands on employee health and well-being (21, 22).

Different studies conducted among nurses which applied JD-R theory confirmed that such stressors, as excessive workload (23, 24) third-party aggression (23, 25), emotional and organizational demands (26, 27) are related to burnout among this professional group. However, the amount of research which used JD-R model to examine direct relationships as well as indirect via emotional labor between such fundamental stressors for nursing staff as organizational constraints and interpersonal conflict at work and burnout is scarce (28, 29). Thus, our study is an attempt to fill this gap in the scientific literature.

Organizational constraints are related to situations or things that prevent employees from translating ability and effort into a high level of job performance. These include faulty equipment, incomplete or poor information flow, as well as interruptions by others (30). Garcia-Arroyo et al. (31) demonstrated that organizational constraints considered from the JD-R perspective should be regarded as demands that can limit autonomy, job control, and decision-making capacity, generating stress, and burnout. Similarly, using JD-R framework, Baka (32) showed that organizational constraints were associated with job burnout and depression among Polish teachers. In turn, interpersonal conflicts at work are defined as a negative interpersonal encounter disturbing team cohesion and characterized by a contentious exchange, hostility or aggression (30). This demand has been acknowledged as a persistent problem and one that is on the rise among nursing personnel (33). In the study of Lanz and Bruk-Lee (34) conducted among US nurses, interpersonal conflict at workplace predicted both burnout and turnover intention. Similarly, interpersonal conflicts were found to be positively related to emotional exhaustion, depersonalization and negatively in terms of personal accomplishment among Emergency Room-nurses in Spain (35).

In the current study interpersonal conflicts are considered in the context of theory of social relations which seems to be relevant within the context of hospital as a work organization (36). Interpersonal conflict with coworkers is likely to affect adversely nurse's psychological health because relationships among coworkers are based on a communal sharing model of interpersonal relations. In turn, interpersonal conflict with nurse's supervisor leads to negative feelings and cognitions regarding one's job because an employee's relationship with supervisor is based on an authority ranking model in the Fiske's theory (36). In the current study, we do not distinguish conflicts regarding coworkers or conflict between worker and supervisor and treat them together. Both organizational constraints and interpersonal conflicts at work are viewed as hindrance stressors because they serve as barriers for nurses to goal accomplishment (37). Based on mentioned studies, we formulate hypothesis 1:

H1: *Job demands will have direct effects on burnout with organizational constraints and interpersonal conflict at work having a positive association with burnout.*

With regard to job resources, social support has been acknowledged as an important resource which influences of an individual's perception of threatening situation at work (38). Organizational support has been recently recognized as a crucial job resource in nursing staff (39). The high level of organizational support has been acknowledged as a factor which reduced burnout among nurses in China (40). Moreover, Escriba-Aguir and Pe'rez-Hoyos (41) reported that low supervisory social support was related to higher emotional exhaustion in nurses, whereas in their longitudinal study, Van der Ploeg and Kleber (42) found the lack of supervisory social support at the baseline to be related to higher emotional exhaustion and depersonalization, while also to lower personal accomplishment in the follow up. Accordingly, we present hypothesis 2:

H2: *Organizational support as a job resource will be directly negatively associated with burnout.*

Baka and Prusik (24) indicated that currently researchers who apply JD-R model are looking for potential mediational variables that would deepen the understanding of mechanisms regulating the relationship between job demands and burnout. One of them is emotional labor which recently has been attracting attention as a factor that relates to burnout and turnover intention among nurses (43). Emotional labor refers to the effort involved in managing feelings when the work role specifies that particular emotions should be displayed and others should be hidden (44). Healthcare staff, especially nurses, are required to deliver compassionate care to the patients in frequently challenging working conditions. However, demands of emotional labor occur when a nurse has to change her actual emotions in order to present emotions that conform to the rules and expectation of the job (44). In the case of demanding and stressful situations such as organizational difficulties or interpersonal conflict at work, nurses adopt surface acting in order to display the emotions required for their role, albeit their true feelings remain unchanged (emotional dissonance) or their negative feelings are simply suppressed (emotional suppression) (45, 46). Since engaging in surface acting requires higher levels of self-control, this kind of emotional labor has been found to be significantly associated with burnout and depressive symptoms among nurses (47). For example, the study conducted by Gilardi et al. (25) which applied JD-R framework, revealed that surface acting mediated the relationship between patients and/or their relatives' aggression and burnout among nurses in Italy. In line with that research, we decided to focus especially on surface acting as a detrimental process leading to burnout among nurses. We would like to distinguish factors which are positively and negatively related to surface acting in order to broaden knowledge concerning this kind of emotional labor and, in effect, gain an opportunity to counteract it. We assume that organizational constraints and interpersonal conflict at work as hindrance stressors provoke emotional dissonance/emotional suppression considered as surface acting because the negative emotions that are triggered, may be appraised as inconsistent with the interiorized role of nurse as an empathetic healthcare worker (48). Thus, in the next hypothesis we expect that:

H3: *Job demands will indirectly affect burnout via surface acting, indicating the mediating effect of surface acting on the relation between organizational constraints, interpersonal conflict at work and burnout.*

With respect to the relationship between perceived organizational support and emotional labor, previous studies demonstrated that the high level of organizational support leads to high levels of effort in deep acting, whereas in the case of feeling a low level of organizational support, nurses simply choose a less effortful way, i.e., surface acting, to perform emotional labor (49, 50). Therefore, we expect that higher perceived organizational support will be associated with lower surface acting and, in turn, with lower burnout level among nurses. Accordingly, we present hypothesis 4:

H4: *Surface acting will mediate the relationship between organizational support and burnout.*

Apart from job resources, the JD-R model recognizes personal resources, for instance coping strategies, which are expected to buffer the undesirable impact of job demands on strain (21). Coping behavior is defined as constantly changing cognitive and behavioral efforts to manage specific external or internal demands that are appraised as exceeding the resources of the person (51). In the current study, coping with workload has been considered as a kind of proactive coping method defined as self-determined goal setting behavior that motivates people to overcome difficulties in order to achieve desirable personal outcomes and growth. In essence, proactive coping consists of the accumulation of various resources and the attainment of skills such as organization, planning, goal-setting, and mental simulation (52). Negative association between proactive coping and burnout has been reported in previous studies (53, 54). Moreover, the buffering effect of proactive coping on relationship between work stress and burnout has been confirmed in the study of Greenglass (55). Thus, in our last hypothesis we expect that:

H5: *Coping with workload will moderate the direct path in the mediation process of organizational constraints on burnout through surface acting. These relations will be weaker for nurses with higher capabilities of coping with workload.*

The Late Wave of COVID-19 Pandemic in Poland and Nursing

There are no studies exploring the burnout level among Polish nurses specifically during COVID-19 pandemic so far. However, according to the research by Szwamel et al. (56) which encompassed all healthcare workers in Poland, 71.63% (356) of the respondents presented high and moderate levels of emotional exhaustion, 71.43% (355) reported low and moderate job satisfaction levels, whereas 40.85% (203) displayed high and moderate levels of depersonalization. The current research has been conducted during the late wave of COVID-19 pandemic, which means that the organization of work of nurses and the level of job demands were different from traditional ones (57).

The late wave of COVID-19 pandemic in Poland has taken place in the end of 2021 and at the beginning of 2022. Despite of full access to vaccination, the situation paradoxically seemed to be quite dramatic, especially because of very high rate of death due to COVID-19. For example, on 29 December has been reported the highest rate of death during the whole pandemic period – 795 persons passed away this day (58). Moreover, since January until February 2022 the number of confirmed cases with COVID-19 has increased four times, i.e., from 11,775 on 5th January to 45,800 cases reported on 5th February. However, the number of hospitalizations due to COVID-19 during this period decreased (59). There is insufficient amount of research conducted during the late wave of pandemic concerning mental health of nurses therefore our study could be regarded as a contribution to the current knowledge.

MATERIALS AND METHODS

Sample and Data Collection

This cross-sectional study was conducted in the University Hospital of Cracow, the largest hospital in Southern Poland. The survey was conducted from 3 January to 6 February 2022. An online survey was created using the Qualtrics platform and link for the study, which was sent to all hospital nurses. The inclusion criteria applied related to a nurse and female gender of the respondent. Participation in the research was completely voluntary and anonymous.

At the beginning of the survey, the participants were informed about the general purpose of the study, while also the fact that the study is non-invasive and the results would be analyzed anonymously. It was also explained that they could withdraw from the study by closing the web browser without their responses being recorded. The participants provided their written consent prior to participating in this study. The contact details of the person responsible for the project was provided in case they wished to obtain additional information or had any questions concerning the study.

The final research group consisted of 311 nurses. Due to incomplete responses, or the failure to meet the inclusion criteria, 41 people were removed from the analysis. The complete data obtained from 270 participants was then included in the statistical analysis. The average completion time of the survey was 20 mins. To calculate the sample size for the study we used the formula: $n \geq Z^2 \cdot p(1 - p) / d^2$, where n is size sample, Z is the z score for $\alpha = 0.05$ ($=1.96$), p is prevalence of disease in population and d is the margin of error. We included a correction for a finite population in the calculations. For this, we used formula: $n_{adj} = Nn / (N + n - 1)$ (60). Based on general sample size (total number of nurses) of 1,789, prevalence of burnout during the COVID-19 pandemic among nurses of 0.2 (61), 5% margin of error, and 95% confidence level, the optimal sample size for this study was calculated at 216 nurses.

Measures

Burnout

The Polish adaptation (62) of the Oldenburg Burnout Inventory – OLBI (19) was applied. This 16-item scale was divided into two subscales – exhaustion (e.g., “There are days when I feel tired before I arrive at work”) and disengagement from work (e.g., “It happens more and more often that I talk about my work in a negative way”). Each subscale contains eight items, which are worded in a positive way (four items) and a negative way (four items). Exhaustion encompasses both cognitive and physical fatigue, while disengagement describes to what extent an individual experiences distance from their work, work goal and work content. Responses were given on a four-point Likert scale, 1 = “totally agree” to 4 = “totally disagree.” Occupational burnout (OB) was calculated by taking the average of all item responses. The higher score indicates higher burnout. In this study, the Cronbach’s alpha for OLBI was 0.84.

Organizational Constraints

The Polish adaptation (63) of the 11-item Organizational Constraints Scale (OCS) was applied, which measures the extent to which participant’s experienced organizational constraints at work (30). Items include situations that interfere with job performance such as inadequate training, poor equipment or supplies, and inadequate help from others. Respondents are asked to indicate how often it is difficult or impossible to do their job because of each item. The range of response options is from 1 (less than once per month, or never) to 5 (several times per day). All items are summed up into a total score. In this study, the Cronbach’s alpha of the scale was 0.88.

Interpersonal Conflict at Work

The Polish adaptation (63) of 4-item Interpersonal Conflict at Work Scale (ICAWS) was used (30). The scale measures the participants’ perceived level of interpersonal conflict at work. The items ask how well the employee gets along with others at work, especially in terms of conflicts with others and how often others act negatively to the respondent. Responses were given on a five-point scale, from 1 (less than once per month or never) to 5 (several times per day). The total score is the sum of all items. The Cronbach’s alpha for the ICAWS in this study was 0.81.

Perceived Organizational Support

Perceived organizational support (POS) has been estimated by using the Polish adaptation (64) of two subscales, i.e., *Rewards* (four items) and *Fairness* (six items) from Areas of Worklife Survey (AWS) developed by Leiter and Maslach (65). POS is considered as the general perception of being valued by their employer. The reward area addresses the extent to which rewards – monetary, social, and intrinsic – are consistent with the expectations of managers. Fairness is the extent to which decisions at work are perceived as being fair and people are treated with respect (65). Perceived organizational support was calculated by taking the sum of all item responses from both scales. This dimension was successfully applied previously in the study of Sikora (66). Responses were given on a five-point scale,

1 = “totally disagree” to 5 = “totally agree.” The Cronbach’s alpha for POS in the current study was 0.78.

Coping With Workload

The Polish adaptation of the 6-item subscale *Workload* from Areas of Worklife Survey (AWS) by Leiter and Maslach (65) was employed. In the Polish version of the tool, the scale has been applied to measure coping with workload, which describes the subjective feeling of an employee with regard to what extent he/she is able to cope with job responsibilities which are perceived by an individual to be consistent (e.g., “I do not take problems from work to my private life”). Responses were given on a five-point scale, 1 = “totally disagree” to 5 = “totally agree.” A higher score indicates a greater ability to cope with a workload. This variable was applied successfully in the previous study of Sikora (66). The Cronbach’s alpha for this dimension in the current study was satisfactory (0.73).

Surface Acting

In order to measure surface acting, we utilized two subscales of the Polish adaptation (67) of the revised Emotional Labor Scale (ELS) developed by Lee and Brotheridge (68). The ELS measures deep acting and two aspects of surface acting (hiding feelings and faking emotions). Surface acting refers to the efforts invested in managing the visible aspects of emotions that appear on the “surface,” whereas deep acting refers to the efforts spent in regulating deeply felt emotions. The Polish adaptation of the tool (67) demonstrated that two subscales of surface acting are mutually interrelated, therefore we decided to treat them as one dimension, namely, those which have been confirmed in the Polish version of the tool, which, in turn significantly differ from deep acting. Responses were given on a five-point scale, where 1 = “never” and 5 = “always.” The total score is the sum of six responses derived from both subscales of ELS. A higher score indicates greater surface acting. The Cronbach’s alpha for surface acting in the current study was 0.84.

Statistical Analyses

The analyses of the study data were conducted using the IBM SPSS version 27.0 for Windows. The general characteristics of participants and job demands, such as organizational constraints (OC), interpersonal conflict at work (ICAW); job resources – perceived organizational support (POS), coping with workload (CWW), as well as surface acting (SA) and occupational burnout (OB) were analyzed using descriptive statistics. Correlations were verified by Pearson’s correlation coefficients. To verify the mediating effects of SA in the association between JD-R and burnout, Hayes’ PROCESS macro 4.0 programme was used. Analysis of mediating effects was performed by inputting Model 4, 95% confidence interval (CI), and 5,000 as the bootstrap sample size. The moderated direct effect of CWW on the relationship between OC and OB through SA was tested by using PROCESS macro (Model 5). Finally, all analyses were controlled for the socio-demographics of nurses, including the work experience, workplace, education level, marital status and number of children. A statistically significant mediating effect was confirmed if the CI of the indirect path did not include 0.

The Shapiro-Wilk normality test was applied to consistency of the residual (error) distribution with the normal distribution for each linear model. In the model diagnostics, we also checked the occurrence of multicollinearity between independent variables, based on tolerance (≥ 0.1 and variance inflation factor (VIF) < 10). Moreover, the Durbin-Watson value was used to assess autocorrelation of errors (result close to 2.00, indicate no problem with the autocorrelation of errors). To avoid multicollinearity problems in model with moderation (**Figure 1**) we applied mean centering for OCS and CWW. *P*-values less than 0.05 were considered statistically significant.

RESULTS

Sample Characteristics

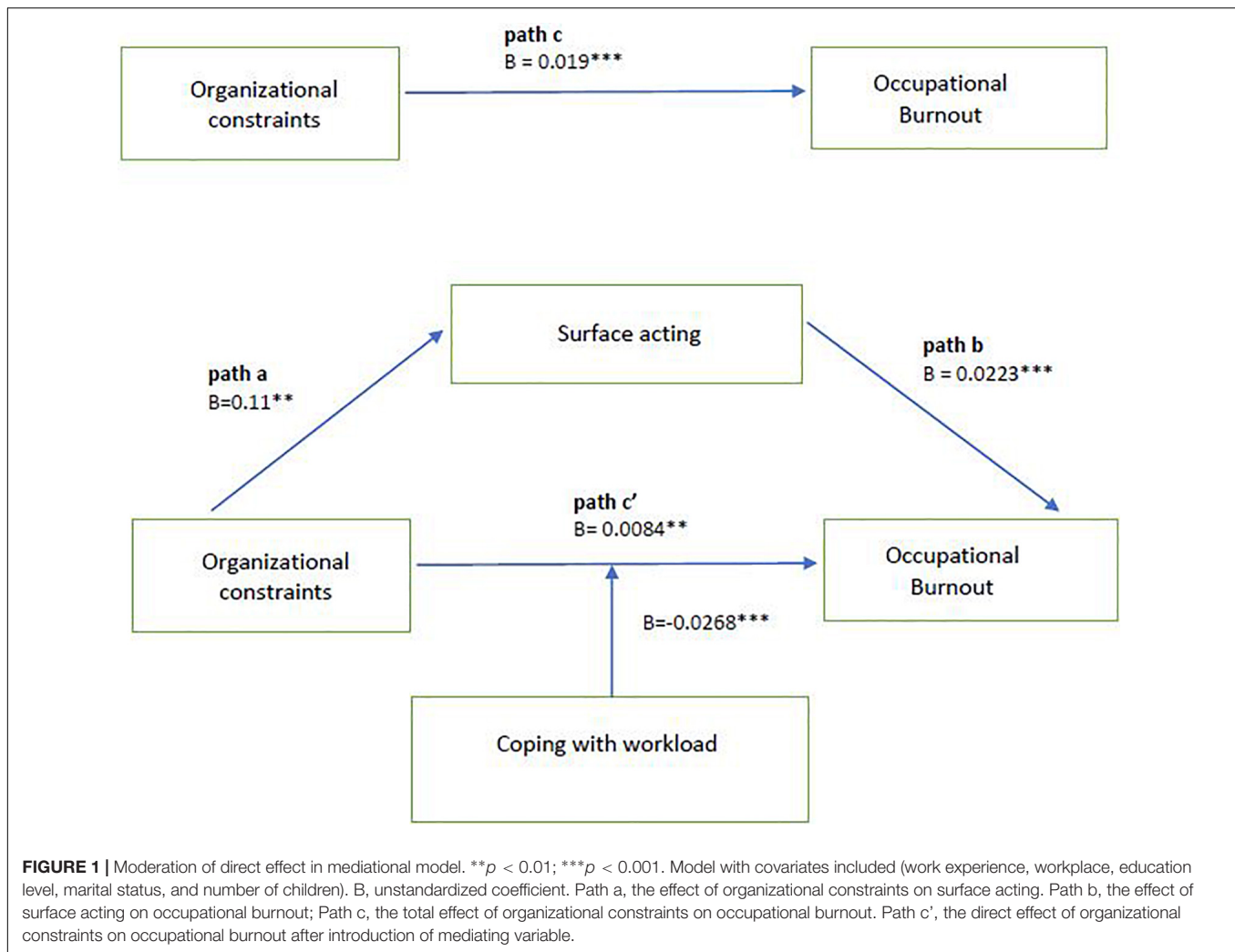
A group of 270 participants took part in the study. As shown in **Table 1**, all respondents were women and their mean age was 37 years ($SD = 12.2$). Most of the participants were in a relationship (71.5%) – both in terms of marital or informal ties. It is worth mentioning that this group is divided into half in terms of the participants’ number of children – 51.1% did not have any child, while 37% had 1 or 2 children. Another important characteristic of the research group is their educational level – the vast majority of respondents obtained a higher degree diploma (88%). In terms of work experience, less than half of the sample (41.1%) had worked in the nursing profession for at least 16 years, while a quarter of the research group had worked as a nurse for no more than 2 years.

In **Table 2** was presented burnout level according to general sociodemographic characteristics of participants. The higher level of burnout was reported among nurses without higher education degree, working between 3 and 15 years, not having children and employed in Operating Block/Emergency Room unit.

The next stage of the analysis was to measure the descriptive statistics in the case of all the variables. The results are presented in **Table 3**. We found that our research group was characterized by moderate levels of burnout ($M = 2.47$; $SD = 0.38$) and surface acting ($M = 14.34$; $SD = 4.34$). Furthermore, the sample reported the average level of job demands, while perceived organizational support (job resource) was relatively high ($M = 30.64$; $SD = 5.62$). Pearson correlations analyses showed that both organizational constraints and interpersonal conflict at work were positively associated with burnout ($r = 0.40$, $p < 0.01$) and surface acting, i.e., OC ($r = 0.23$, $p < 0.01$), ICAW ($r = 0.30$, $p < 0.01$). By contrast, perceived organizational support and coping with workload had a negative correlation with burnout, i.e., POS ($r = -0.47$, $p < 0.01$), CWW ($r = -0.43$, $p < 0.01$), as well as with surface acting, i.e., POS ($r = -0.21$, $p < 0.01$), and CWW ($r = -0.28$, $p < 0.01$).

Testing for Mediating Effects

Table 4 presents the fact that organizational constraints had a significant positive effect on burnout (95% CI = [0.014, 0.025], $t = 6.572$, $p < 0.001$). When the mediating variable surface acting was put into the model with covariates,



the direct effect of OC on OB was still significant (95% CI = [0.011, 0.022], $t = 5.694$, $p < 0.001$), indicating that SA partially mediated the association between OC and OB. The bootstrapped standardized indirect effect on the path from OC to OB through SA was significantly different from 0 (95% CI = [0.001, 0.006]).

Table 5 shows that the positive effect of interpersonal conflict at work on burnout was significant (95% CI = [0.039, 0.072], $t = 6.538$, $p < 0.001$). The direct path between ICAW and OB remained significant (95% CI = [0.027, 0.060], $t = 5.2140$, $p < 0.001$) when SA and the covariates were included in the model, indicating the partial mediation of SA in the association between ICAW and OB. Bootstrapping results showed an indirect effect of 0.0116 (95% CI = [0.004, 0.021]) through surface acting.

Table 6 displays that perceived organizational support had a significant negative effect on burnout (95% CI = [−0.040, −0.024], $t = -7.855$, $p < 0.001$). When surface acting with covariates were added, the direct effect of POS on OB was still significant (95% CI = [−0.035, −0.020], $t = -7.075$, $p < 0.001$), indicating partial mediation. The indirect effect of POS on OB

through SA was significantly different from 0 (95% CI = [−0.008, −0.001]). These findings support hypotheses 1, 2, 3, and 4.

Testing for Moderation of Direct Effect in Mediational Model

In our research model (**Figure 2**) we hypothesized that coping with workload would moderate a direct path in the mediation process of organizational constraints on burnout through surface acting. **Figure 1** shows the results of this analysis using Model 5 of PROCESS macro by Hayes (69). After coping with workload with covariates were put into the model, organizational constraints had a significant positive effect on burnout (95% CI = [0.0023, 0.0145], $t = 2.7188$, $p < 0.001$), and the product of organizational constraints and coping with workload had negative significant effect on burnout (95% CI = [−0.0025, −0.0002], $t = -2.2331$, $p = 0.02$), indicating that CWW moderated the direct effect of OC on OB.

Further simple slope analysis results are shown in **Figure 3**. For participants with high coping with workload level ($M + 1SD$), organizational constraints had no significant effect on burnout

TABLE 1 | Demographic information of nurses ($N = 270$).

Characteristics n (%)	
Gender	
Female	270 (100)
Relationship status	
Single	77 (28.5)
In relationship	193 (71.5)
Number of children	
0	138 (51.1)
1–2	100 (37.0)
3 and more	32 (11.9)
Education	
Higher (MA or PhD)	127 (47.0)
Higher (BA)	111 (41.1)
Secondary	32 (11.9)
Work experience (years)	
0–2	69 (25.6)
3–15	90 (33.3)
16 and more	111 (41.1)
Work place	
OP/ER	36 (13.3)
ICU	53 (19.6)
Other	181 (67.0)

OP, operating block; ER, emergency room; ICU, Intensive Care Unit.

($b_{simple} = 0.003$, $t = 0.670$, $p = 0.504$). As the coping with workload decreased to the middle (M) and low level (M-1SD), role of organizational constraints had a positive effect on burnout and the effect was increasing gradually (middle level: $b_{simple} = 0.009$, $t = 2.901$, $p = 0.004$; low level: $b_{simple} = 0.016$, $t = 4.416$, $p < 0.001$), indicating that with the improvement of coping with workload level, the positive effect of organizational constraints on burnout was decreasing gradually. These findings confirm hypothesis 5.

Comparison of the Mediating Effects of Surface Acting

The mediating effect of surface acting in the relation between OC and OB was 16% (0.0032/0.0194), while the mediating effect of SA in the relation between ICAW and OB was 21% (0.0116/0.0551). In turn, the mediating effect of SA in the relation between POS and OB was 13% (−0.0042/−0.0317). This implied that interpersonal conflict at work had more of an influence on the burnout of nurses through surface acting compared with the other two analyzed associations.

DISCUSSION

This study explored how job demands and resources affected burnout among nurses and whether these relationships are mediated by surface acting and moderated by coping with workload. Our findings turned out to be consistent with the JD-R theory, thus confirming hypotheses 1 and 2.

The health-impairment process was indicated by the significant positive association between organizational

constraints, interpersonal conflict at work and burnout among nurses. These findings are consistent with previous studies supporting the positive relationship between job demands and burnout in terms of both organizational constraints (26, 70) and conflicts at work (35, 71). As our results pointed out, interpersonal conflicts are stronger significantly associated with burnout. It could be explained by notion that conflicts at work, which are situations that prevent employees from translating ability and effort into high levels of job performance, are associated with strong negative emotions, such as anxiety, hostility or frustration, leading to low job satisfaction and organizational deviance and, consequently burnout (72). In addition, this finding seems to confirm the assumptions of the theory of social relations (36) in which interpersonal conflicts with coworkers and supervisor are related to poor personal psychological outcomes of an employee. Moreover organizational constraints turned out to be also significantly associated with higher level of burnout among nurses. As previous studies stated, a lack of adequate resources including the lack of supplies, lack of equipment, broken equipment and unavailable resources have been shown to be among the top workplace stressors in several countries (73), leading to occupational burnout among the nursing personnel (74).

With respect to the relationship between organizational support considered to be a job resource and burnout, we found its significant negative association. This finding is in line with a previous study according to which the perception of a pleasant working environment and the sense of receiving organizational care could reduce burnout among medical staff (50). Although the relationship between JD-R and burnout is well established in subject-related literature (22), most studies were conducted in the Western countries, whereas our results show that this association is consistent outside the Western context as well.

The Mediating Role of Surface Acting

Regarding hypotheses 3 and 4, our study demonstrated that surface acting has a partial mediating effect on the positive relationship between both analyzed job demands and organizational support and burnout. In other words, higher organizational constraints and conflicts at work are associated with an increase in surface acting, which is in turn associated with an increase in burnout. This finding is consistent with a previous study of Gilardi et al. (25) in which, using the JD-R model, they confirmed the mediating role of surface acting between job demands and burnout among Italian nurses. It could be explained by notion that the nurses' efforts to manage their emotions that are specifically triggered by the lack of equipment, as well as interpersonal conflicts at the workplace activate a resource depleting process, which leads to emotional exhaustion and the adoption of a strategy of disengagement. We assume that both these stressful situations provoke emotional dissonance because the negative emotions which emerge are appraised as inappropriate for the interiorized role of a health care worker. This dissonance generates a state of tension because nurses experience a person–role conflict (48). If this state of tension persists, it leads to the depletion of the

TABLE 2 | Burnout according to general characteristics of participants.

Education	N (%)	Burnout				
		Mean (SD)	Median (IQR)	Min–Max	t or F (df)	p
Higher (MA + PHD)	127 (47.0)	2.47 (0.40)	2.44 (0.56)	1.56–3.69	0.749 (2)	0.474
Higher (BA)	111 (41.1)	2.46 (0.38)	2.44 (0.50)	1.50–3.75		
Secondary	32 (11.9)	2.55 (0.41)	2.50 (0.55)	2.00–3.50		
Work experience (years)						
0–2 years	69 (25.6)	2.45 (0.39)	2.44 (0.63)	1.50–3.75	0.392 (2)	0.676
3–15 years	90 (33.3)	2.50 (0.40)	2.50 (0.63)	1.63–3.69		
16 years and more	111 (41.1)	2.46 (0.39)	2.44 (0.44)	1.50–3.50		
Children (number)						
0	138 (51.1)	2.51 (0.38)	2.50 (0.50)	1.50–3.75	1.796 (2)	0.168
1–2	100 (37.0)	2.42 (0.39)	2.44 (0.44)	1.56–3.50		
3 and more	32 (11.9)	2.46 (0.41)	2.44 (0.50)	1.63–3.38		
Marital status						
In relationship	193 (71.5)	2.47 (0.39)	2.44 (0.13)	1.50–3.50	−0.532 (268)	0.595
Single	77 (28.5)	2.49 (0.39)	2.50 (0.56)	1.50–3.75		
Workplace						
OP/ER	36 (13.3)	2.61 (0.45)	2.53 (0.55)	1.88–3.75	2.850 (2)	0.060
ICU	53 (19.6)	2.44 (0.43)	2.50 (0.66)	1.50–3.25		
Other	181 (67.0)	2.46 (0.36)	2.44 (0.50)	1.56–3.50		

OP, operating block; ER, emergency room; ICU, Intensive Care Unit.

TABLE 3 | Means, standard deviations, and Pearson's coefficient correlations between observed variables (N = 270).

Variable	Mean	SD	1	2	3	4	5	6
(1) Organizational constraints (OC)	21.63	7.77	–	0.50**	−0.46**	−0.45**	0.40**	0.23**
(2) Interpersonal conflict at work (ICAW)	7.76	2.70	–	–	−0.48**	−0.33**	0.40**	0.30**
(3) Perceived organizational support (POS)	30.64	5.62	–	–	–	0.32**	−0.47**	−0.21**
(4) Coping with workload (CWW)	16.67	4.13	–	–	–	–	−0.43**	−0.28**
(5) Occupational burnout (OB)	2.47	0.38	–	–	–	–	–	0.39**
(6) Surface acting (SA)	14.34	4.34	–	–	–	–	–	–

** $p < 0.01$.

TABLE 4 | Mediating effect of surface acting (SA) in association between organizational constraints (OC) and burnout (OB).

	Unstandardized coefficient (B)	Standard error (SE)	t	p	LLCI	ULCI
OC → OB (total effect) ^a	0.019	0.003	6.572	<0.001	0.014	0.025
OC → SA	0.113	0.035	3.259	0.001	0.045	0.181
SA → OB	0.028	0.005	5.644	<0.001	0.018	0.038
OC → OB (direct effect) ^b	0.016	0.003	5.694	<0.001	0.011	0.022
OC → SA → OB	0.003	0.001			0.001	0.006

Model with covariates included (work experience, workplace, education level, marital status, and number of children).

LLCI, the lowest value of the confidence interval; ULCI, the highest value of the confidence interval; OC, organizational constraints; OB, occupational burnout; SA, surface acting.

^aTotal effect of organizational constraints on occupational burnout.

^bThe direct effect of organizational constraints on occupational burnout after introduction of surface acting.

resource of self-control, and, consequently, mental and physical exhaustion (75).

By contrast, as demonstrated, a higher level of perceived organizational support is related to a decrease in surface acting, which in turn is associated with a decrease in burnout among Polish nurses. Several explanations for such an effect could be

proposed. As Chou et al. (49) showed, when supervisor support is available, nurses are more capable of availing of deep acting which, in turn, is associated with a decrease in occupational burnout among a professional group of nurses (76). Goussinsky and Livne (77) suggested that support from the supervisor - a key component of organizational support - encourages the

TABLE 5 | Mediating effect of surface acting (SA) in association between interpersonal conflict at work (ICAW) and burnout (OB).

	Unstandardized coefficient (B)	Standard error (SE)	t	p	LLCI	ULCI
ICAW → OB (total effect) ^a	0.055	0.008	6.538	<0.001	0.039	0.072
ICAW → SA	0.434	0.097	4.477	<0.001	0.243	0.625
SA → OB	0.027	0.005	5.202	<0.001	0.017	0.037
ICAW → OB (direct effect) ^b	0.044	0.008	5.214	<0.001	0.027	0.060
ICAW → SA → OB	0.012	0.004			0.004	0.021

Model with covariates included (work experience, workplace, education level, marital status, and number of children).

LLCI, the lowest value of the confidence interval; ULCI, the highest value of the confidence interval; ICAW, interpersonal conflict at work; OB, occupational burnout; SA, surface acting.

^aThe total effect of interpersonal conflict at work on occupational burnout.

^bThe direct effect of interpersonal conflict at work on occupational burnout after introduction of surface acting.

TABLE 6 | Mediating effect of surface acting (SA) in association between perceived organizational support (POS) and burnout (OB).

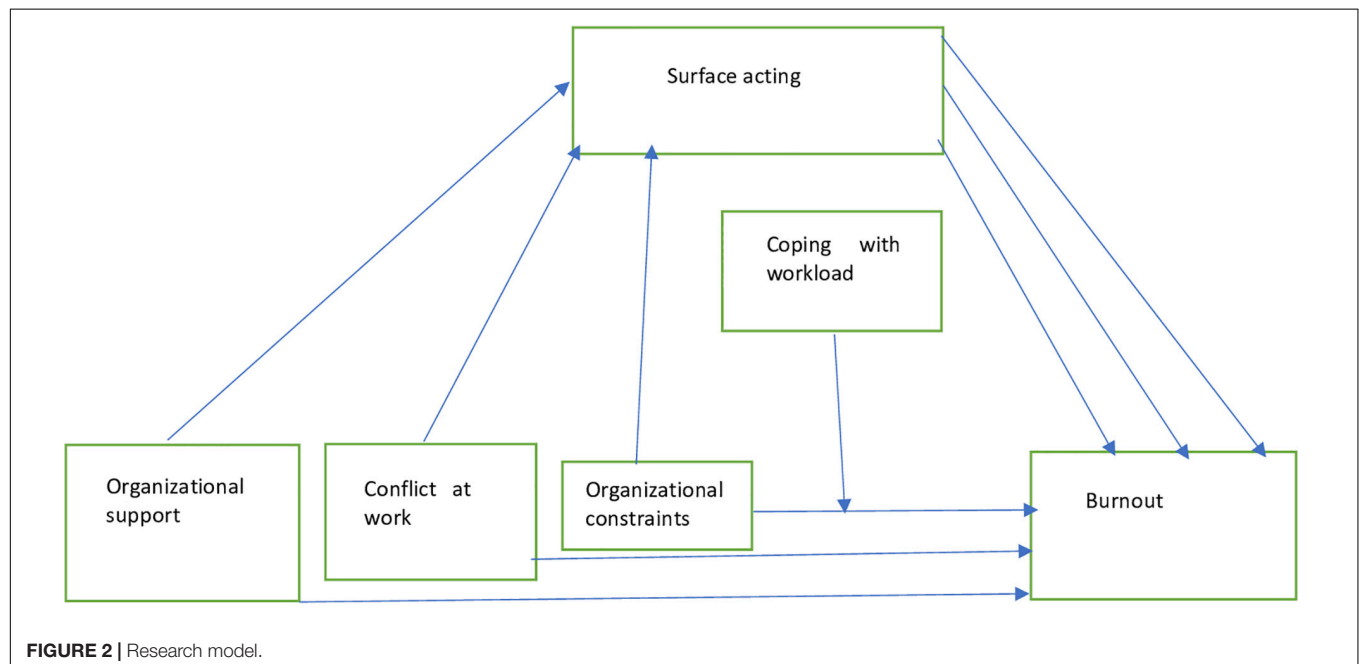
	Unstandardized coefficient (B)	Standard error (SE)	t	p	LLCI	ULCI
POS → OB (total effect) ^a	-0.032	0.004	-7.855	<0.001	-0.040	-0.024
POS → SA	-0.153	0.049	-3.140	0.001	-0.249	-0.057
SA → OB	0.027	0.050	5.634	<0.001	0.018	0.037
POS → OB (direct effect) ^b	-0.028	0.040	-7.075	<0.001	-0.035	-0.020
POS → SA → OB	-0.004	0.002			-0.008	-0.001

Model with covariates included (work experience, workplace, education level, marital status and number of children).

LLCI, the lowest value of the confidence interval; ULCI, the highest value of the confidence interval; POS, perceived organization support; OB, occupational burnout; SA, surface acting.

^aThe total effect of perceived organization support on occupational burnout.

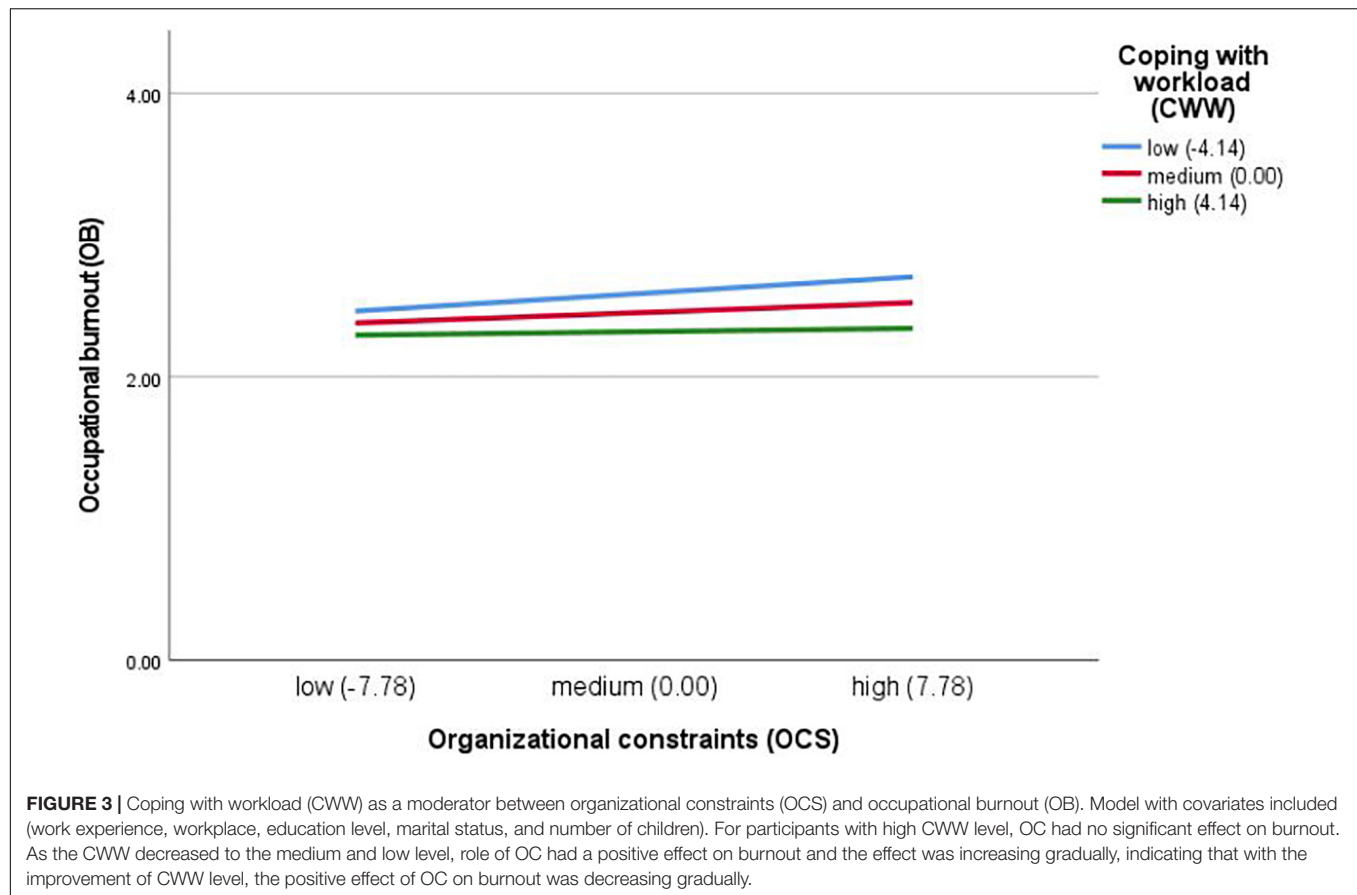
^bThe direct effect of perceived organizational support on occupational burnout after introduction of surface acting.



internalization of work roles and leads workers to engage more in deep acting. On the other hand, nurses who reported low levels of support are more likely to regulate their emotions using surface acting which was found to be a significant predictor of burnout (49).

The Moderating Role of Coping With Workload

With respect to hypothesis 5, our study indicates that coping with workload moderated the direct path in the mediation process of organizational constraints on burnout through surface acting



among Polish nurses. This is consistent with the buffering impact of job and personal resources on the relationship between job demands and burnout postulated by the JD-R model (21). In the case of high organizational constraints, nurses characterized by greater abilities to cope with workload reported lower burnout compared with nurses with a decreased level of CWW. This finding is in accordance with the study of Chang and Chan (78) conducted among Taiwanese nurses that examined the buffering effect of proactive coping with relation to burnout. In line with this study (78), we assume that individuals with a greater capacity to cope with workload, considered by us to be a kind of proactive coping, are future-oriented and know how to utilize the acquired resources to face distress before they begin to feel emotionally exhausted. In the case of workload which is a big stressor, proactive nurses often make efforts to plan in advance which enables them to deal more easily with multiple work responsibilities. Similarly, it could be assumed that in the case of organizational constraints, they are more likely to build up resources that serve as buffers against stress deriving from, e.g., inadequate training or lack of supplies, and consequently, against the occurrence of burnout.

It is worth mentioning a few contributions of our study. First, to the best of our knowledge, so far no studies have investigated the mediating role of surface acting between organizational constraints and interpersonal conflict at work (job demands) which are regarded as very important stressors among nursing

staff (28, 29). Thus, our study filled this gap in subject-related literature by using the JD-R framework. Second, we pointed out, that not only stressors related to interpersonal relations are associated with surface acting, and consequently, with higher burnout among nurses (25), but also organizational constraints have similar detrimental effect. Third, we included coping with workload considered as a personal resource which turned out to be significant moderator in relationship organizational constraints – burnout. To the best of our knowledge, this is the first study exploring the issue of coping with workload as a moderating variable in the association between job demands and burnout. This finding has practical implications by emphasizing the importance of psychological training which should enhance the capability of coping with workload in this professional group. Fourth, our study supported validity of the Job Demands-Resources theory also in Eastern Europe, while most studies using this theoretical framework have been conducted in Western countries. Fifth, since there is insufficient amount of research carried out during the late wave of COVID-19 pandemic, our study could be regarded as a contribution to the current knowledge regarding mental health of nurses.

Limitations and Future Directions

Although the results of the study deepen our understanding concerning the mediating and moderating effects in associations

between job demands and burnout among nurses from Central-Eastern Europe, there are several limitations which should be listed. Firstly, our sample consisted of nurses from only one hospital and only females, therefore future studies may take into account a more representative sample of nurses to draw better conclusions about JD-R, burnout and surface acting. We recommend conducting studies on bigger samples and analyse nurses, including both females and males, recruited from many Polish hospitals, located both in big cities, as well as small cities. Secondly, since we analyzed cross-sectional data, our results should be interpreted with caution, as we reported associations between job demands, resources and burnout, yet we cannot confirm causal relations. This limitation may be addressed by the collection and analysis of longitudinal data, e.g., data obtained during pandemic and in post-pandemic period. Thirdly, in our research model we did not include any personal traits, such as, for instance self-efficacy or ego-resiliency, which, according to research, affect JD-R and burnout among nurses (23, 25). Thus, in the future it may be worth exploring personal traits and their role with relation to burnout in order to get a more comprehensive overview of the well-being of Polish nurses. Since these variables were not included in our model, they may have unknown effects in terms of the estimates from our analysis. Fourthly, all study variables were measured using self-report questionnaires, which may lead to potential bias and could affect the accuracy of the assessment, thus future studies may combine self-report questionnaires with more objective measurements.

CONCLUSION

This is the first study relating to the burnout level of Polish nurses during the COVID-19 pandemic. The findings enrich our knowledge on the mediating and moderating mechanisms in order to explain the association between job demands, resources and burnout among nurses during the latest wave of the COVID-19 pandemic. We confirmed that job demands, such as interpersonal conflict at work and organizational constraints significantly increase burnout, both directly and indirectly by means of surface acting, whereas, job resources, such as organizational support, decrease it. Moreover, perceived organizational support has a direct negative impact on burnout, as well as an indirect effect via a decrease in surface acting.

Our results suggest that when nurses experience high job demands, strengthening organizational support and coping with workload could help alleviate burnout. It is important especially in the context of COVID-19 pandemic, during which many nurses perceived their workplace as potentially harmful and dangerous. As previous studies reported, organizational support

during COVID-19 pandemic was associated with lower level of anxiety (79), lower burnout occurrence (50) and increased work engagement among nurses (80). Moreover, as we showed, organizational support could reduce burnout in nurses via a decrease in surface acting. Thus, interventions that provide effective emotional regulation management education, as well as psychological training concerning adequate coping strategies could help reduce or prevent the occurrence of burnout among nurses as well as decrease the negative effect of insufficient perceived organizational support. In the context of the COVID-19 burden and its mental consequences, it is worth mentioning that hospital organizations that nurses work in should provide organizational support, for instance, work allocation and flexible work hours, in order to alleviate burnout among this professional group (81).

DATA AVAILABILITY STATEMENT

The original contributions presented in this study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

This study was reviewed and approved by the Jagiellonian University Bioethics Committee (protocol code: 1072.6120.298.2021, approval date: 15.12.2021).

AUTHOR CONTRIBUTIONS

GW: research idea, research design, conceptualization, literature review, data collection, data interpretation, draught manuscript, and revision of work. AW: conceptualization, project administration, work supervision, revision of work, and funding. IB: data interpretation, visualization, and revision of work. All authors contributed to the article and approved the submitted version.

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Relationship Between Person-Organization Fit and Teacher Burnout in Kindergarten: The Mediating Role of Job Satisfaction

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As an important organizational factor, person-organization fit in kindergartens may lead to teacher burnout when it is unfitted. In order to explore the influence mechanism of person-organization fit on teacher burnout in kindergartens, this study introduced the variable of job satisfaction to study the mediating effect of job satisfaction on the relationship between person-organization fit and teacher burnout in kindergartens. A total of 637 teachers from Henan, China, were surveyed by Person-Organization Fit Scale, Job Satisfaction Scale and Maslach Burnout Inventory. Results showed that person-organization fit, job satisfaction and teacher burnout were negatively correlated. Person-organization fit is positively correlated with job satisfaction. Job satisfaction partially mediated the relationship between person-organization fit and teacher burnout in kindergartens. In the end, the results of the relationship between person-organization fit, job satisfaction, and teacher burnout in Chinese kindergartens were discussed in this study.

Keywords: teacher burnout, person-organization fit, job satisfaction, kindergarten teacher, mediation analysis

INTRODUCTION

At present, teacher burnout arouses widespread concern gradually (1, 2). Kindergarten teachers who work with children aged 3–6 have dual responsibility of childcare and education, which leads to heavy workload, great work pressure and prone to burnout (3, 4). Teacher burnout affects the quality of education and also leads to teachers' dismission (5, 6), which is not conducive to the stability of the teaching staff and the development of education. In China, kindergarten teachers are generally facing the contradiction between high work pressure and low salary. As a result, burnout is more likely to be happened onto kindergarten teachers and the dismission rate of kindergarten teachers is higher than that of other teachers (7, 8). Teacher burnout is a phenomenon with social and cultural context and has different causes and manifestations in different societies (2, 9). To explore the potential predictors of kindergarten teacher burnout under the context of Chinese society can not only reveal the influencing factors and mechanism of teacher burnout to reduce the occurrence of burnout, but also enrich the localization research on teacher burnout and provide the possibility of cross-cultural comparison for researches in different countries and regions.

Teacher burnout as a psychological syndrome in response to chronic excessive pressure on the job includes three dimensions, an overwhelming exhaustion, feelings of cynicism and detachment from the job, and a sense of ineffectiveness and lack of accomplishment (10). Previous studies on teacher burnout have focused on individual factors, including age (11), personality traits (12),

etc. Little attention is paid to the impact of organizational factors. A growing body of research suggests that burnout is more of social phenomenon than an individual one (10, 13). Therefore, the influence of organizational factors, human factors and the interaction between them should be considered in relation to burnout (14), especially from the perspective of person-organization fit (POF). Current studies focus on the relationship between POF and work attitude, innovation behavior, and turnover intention (15–17), while there are few studies on person-organization fit and job burnout. At the same time, studies have shown that when individuals' perception is compatible with their organization, their job satisfaction will be improved (18, 19), and the improvement of job satisfaction can reduce burnout and turnover tendency (20). From what has been discussed above, it can be assumed POF, job satisfaction and teacher burnout are closely related. However, there are no studies on whether and how POF and job satisfaction affect teacher burnout in kindergartens. Therefore, this study focuses on the relationship between POF and teacher burnout in kindergartens and identified potential mechanisms (i.e., job satisfaction).

Person-Organization Fit and Teacher Burnout in Kindergartens

Person-organization fit is defined as the compatibility between people and organizations, which is embodied in three aspects: value fit, demand-supply fit and demand-ability fit (21). According to the Job Demand-Resource model, individuals with sufficient resources will show more positive work attitudes and behaviors, while people may feel tired and disconnected in an environment with high work requirements and insufficient resources (22). Person-organization fit is an important support resource for teachers. From this perspective, when the degree of POF is high, it is easy to stimulate the positive power of teachers, while teachers with low degree of POF are more likely to feel job burnout (23). The positive correlation between POF and teacher burnout in primary and secondary school teachers has been proven (24), but this relationship has not been studied among kindergarten teachers. Meanwhile, research has found that compared with social factors and personal factors, organizational factors have the most influence on kindergarten teacher burnout (3). In kindergarten environment, organizational climate has a significant impact on teacher burnout, which is reflected in the correlation between a higher degree of supportive atmosphere and a lower degree of teacher stress and burnout (4). Thus, this study takes kindergarten teachers as samples to verify the relationship between POF and teacher burnout, so as to enrich research on teacher burnout in kindergartens.

Job Satisfaction as a Mediator

Job satisfaction refers to the degree of positive emotional orientation generated by teachers when they consider various aspects related to job after they engaged in teaching (25). Job satisfaction is significantly affected by POF (26). Research show that teachers with higher POF are more satisfied with their campus and career respectively, that is, the higher the level of POF, the higher the degree of satisfaction (27). This proves that there is a strong correlation between POF and job satisfaction.

TABLE 1 | Demographic information of the sample ($n = 637$).

Characteristics	<i>n</i> (%)
Area	
Urban	497 (78.0)
Rural	140 (22.0)
Gender	
Male	13 (2.0)
Female	624 (98.0)
Teaching experience	
≤5 years	290 (45.5)
6–10 years	204 (32)
11–15 years	78 (12.2)
≥15 years	65 (10.2)

Meanwhile, job satisfaction also has direct impact on teacher burnout, which has been confirmed by the previous study, namely, there is a significant correlation between job satisfaction and all dimensions of teacher burnout (19). Teachers with low happiness and satisfaction in school will have a higher risk of job burnout (28). Therefore, job satisfaction is not only affected by POF, but also affects teacher burnout. However, few studies have explored the mediating role of job satisfaction in the relationship between the two. Thus, this study aims to focus on kindergarten teachers and explore the relationship between POF and teacher burnout, and investigate the mediating role of job satisfaction in the relationship between POF and teacher burnout. Specifically, the research hypotheses are as follows:

H1: Person-organization fit, job satisfaction and teacher burnout in kindergartens are significantly correlated.

H2: Job satisfaction plays a mediating role in the relationship between person-organization fit and teacher burnout in kindergartens.

MATERIALS AND METHODS

Participants and Procedures

All participants were kindergarten professional teachers from different cities in Henan Province, China. Prior to this survey, permission was granted from kindergartens and the informed consent is provided to all the participants. The questionnaires were distributed to teachers in 2021 and were collected within 1 week. A total of 700 questionnaires were sent out in this study, and 672 were retrieved, with a recovery rate of 96%. 637 questionnaires were obtained by eliminating invalid questionnaires from the 672 questionnaires collected, and the criteria for elimination included: (a) a regular pattern of responses; (b) missing data; (c) contradictory responses to relevant items (e.g., inconsistent responses to homogeneous items or consistent responses to opposing items). These 637 questionnaires formed the final sample. The demographic characteristics of the sample are shown in **Table 1**.

Person-Organization Fit Scale

Person-organization fit scale compiled by Wang Ling was used to measure the matching degree of teachers and kindergartens (29). The scale includes three dimensions: values fit (e.g., my personal values are very similar to those of the kindergarten), demand-supply fit (e.g., the resources my job provides me are a good fit for the job I'm looking for), requirement-ability fit (e.g., job requirements are a good fit for my skills). This scale is adapted from the Person-Organization Fit Scale compiled by Cable and Derue (30), and is better adapted to Chinese kindergarten teachers with good reliability and validity. There are nine items in the scale and all items were scored on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). There is no reverse scoring question in 9 items. The higher the score of the three dimensions, the higher the fit degree of teachers and kindergartens. In the study, Cronbach's α is 0.94. Internal consistency is 0.91 for value fit, 0.88 for demand-supply fit, 0.90 for requirement-ability fit.

Maslach Burnout Inventory

The Maslach Burnout Inventory (MBI), developed by Maslach and Jackson, contains three different versions: MBI-Human Service Survey (MBI-SS), MBI-Educators Survey (MBI-ES) and MBI-General Survey (MBI-GS) (10). The MBI-ES with good reliability and validity was used to investigate teacher burnout in this study, which is divided into three dimensions, namely emotional exhaustion (e.g., a day's work makes me tired), depersonalization (e.g., after this career, I became more cold to people than before) and low accomplishment (e.g., I have many meaningful achievements in my work). The scale showed good reliability and validity in Chinese samples (31–33). The MBI-ES consist of 22 items on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Items 4, 7, 8, 9, 12, 14, 17, 18 and 19 will be scored in reverse. Composite measure of burnout was used in the study, that is, the lower the total score in the three dimensions, the lower the burnout degree. In our sample, Cronbach's α is 0.93. For internal consistency, emotional exhaustion was 0.89, depersonalization was 0.78, and low accomplishment was 0.87.

Job Satisfaction Scale

Job satisfaction scale was used to evaluate the degree of satisfaction that teachers feel during their work. This study adopts the Kindergarten Teacher Job Satisfaction Questionnaire compiled by Wang Yongxian (34). The questionnaire has five dimensions, including job itself (e.g., I am satisfied with the current work schedule), working environment (e.g., I am satisfied with the interpersonal relationship between colleagues), advanced study and promotion (e.g., I think there are many opportunities for advanced study), work remuneration (e.g., I am satisfied with the current welfare system), principal (e.g., I think principal values teacher advice), a total of 30 questions. All items were obtained on 6-point Likert scale with 1 point for strongly disagree and 6 points for strongly agree. The higher the scores, the higher the teacher's job satisfaction. In the scale, Cronbach's α is 0.96. The internal consistency of five dimensions is 0.92, 0.84, 0.72, 0.91, 0.96 respectively, corresponding to job

itself, working environment, advanced study and promotion, work remuneration and principal.

Control Variables

This study controlled the potential impact of demographic variables (area, gender, and teaching experience) on dependent variables and mediating variables, as all of them may affect teacher burnout.

Data Analysis

SPSS26.0 was used for descriptive statistics and correlation analysis of person-organization fit, teacher burnout and job satisfaction. The mediating effect of job satisfaction on person-organization fit and teacher burnout was examined by Bootstrap. The nonparametric percentile Bootstrap method of deviation correction is a method of repeated sampling from a sample, which means repeated sampling with a return from a given sample can produce multiple samples (35). The sampling size was set at 1,000 in the current study. Repeated sampling by many times, it can be obtained an estimate of the product of 1,000 coefficients and rank them from small to large by numerical value. The 2.5th and 97.5 percentile site constitute a confidence interval (CI) of 95%. If the CI does not include 0, the coefficient product is significant, in other word, the mediation effect is significant.

RESULTS

The Relationship Between Person-Organization Fit, Job Satisfaction and Teacher Burnout

In this study, the means, standard deviations and correlations among three variables are presented in **Table 2**. The results showed that person-organization fit was negatively correlated with teacher burnout ($r = -0.510$, $P < 0.001$), among which, three dimensions of person-organization fit showed significant negative correlation with teacher burnout (value fit, $r = -0.411$, $P < 0.001$; demand-supply matching, $r = -0.554$, $P < 0.001$; requirement-ability fit, $r = -0.404$, $P < 0.001$), and the negative correlation between demand-supply fit and teacher burnout is more significant than the other two dimensions. Person-organization fit was positively correlated with job satisfaction ($r = 0.667$, $P < 0.001$), and job satisfaction was negatively correlated with teacher burnout ($r = -0.618$, $P < 0.001$). Thus, H1 was supported.

Mediating Effect of Job Satisfaction

Table 3 shows the regression analysis results of the relationship between person-organization fit and teacher burnout, in which area, gender and teaching experience are the control variables. Results showed that person-organization fit positively predicted job satisfaction ($\beta = 0.753$, $p < 0.001$) and negatively predicted teacher burnout ($\beta = -0.798$, $p < 0.001$). When job satisfaction was included in the regression equation, the direct effect value of person-organization fit on teacher burnout is significantly reduced ($\beta = -0.257$, $p < 0.001$). These results indicate that job

TABLE 2 | Means, standard deviations and correlations among variables.

Variable	Mean	SD	1	2	3	4	5	6
POF	4.23	0.58	1					
TB	1.01	0.94	−0.51***	1				
JS	4.90	0.66	0.67***	−0.62***	1			
VF	4.26	0.63	0.89***	−0.41***	0.55***	1		
DSF	4.18	0.70	0.93***	−0.55***	0.68***	0.77***	1	
RAF	4.26	0.61	0.88***	−0.40***	0.56***	0.65***	0.74***	1

POF, person-organization fit; TB, teacher burnout; JS, job satisfaction; VF, value fit; DSF, demand-supply fit; RAF, requirement-ability fit.

*** $p < 0.001$.

TABLE 3 | Regression analysis of the relationship among variables.

	Model 1	Model 2	Model 3	Model 4	Model 5
Constant term	4.243***	1.003**	2.539***	5.971***	6.691***
Control variables					
Gender	0.168	0.276*	−0.513*	−0.627**	−0.429*
Teaching experience	0.043	−0.004	−0.167***	−0.117***	−0.120***
Areas	0.143**	0.122**	−0.037	−0.014	0.073
Independent variables					
POF		0.753***		−0.798***	−0.257***
Mediate variables					
JS					−0.717***
R ²	0.016	0.455	0.046	0.290	0.429
F	3.334***	132.005***	10.256***	64.593***	94.744***

All variables in these models have been standardized. Model1 took satisfaction as dependent variable and only introduced controls variables. Model2 took satisfaction as the dependent variable, and introduced POF and control variables to conduct regression analysis. Model3 took teacher burnout as dependent variable and only introduced control variables. Model4 took teacher burnout as dependent variable, and introduced POF and control variables to conduct regression analysis. Model5 took teacher burnout as dependent variable and introduced POF, JS and control variables to make regression analysis. POF, person-organization fit; JS, job satisfaction.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

satisfaction has a significant mediating effect on the relationship between person-organization fit and teacher burnout.

Bootstrap was used to further test the mediating effect. Results are showed in **Table 4** and **Figure 1**. After controlling for demographic variables (area, gender and teaching experience), the total effect of person-organization fit on teacher burnout is -0.80 ($SE=0.05$, $t = -14.73$, $P < 0.001$, 95% CI $[-0.90, -0.69]$). The mediating effect of job satisfaction on person-organization fit and teacher burnout is -0.54 ($SE = 0.06$, 95% CI $[-0.66, -0.43]$), excluding 0. This proved that the mediating effect is significant, and job satisfaction plays a partial mediating role in the effect of person-organization fit on teacher burnout. Therefore, H2 was supported.

DISCUSSION

This study investigated the relationships among person-organization fit, teacher burnout and job satisfaction in kindergartens. Results showed that there was a significant negative correlation among three dimensions of person-organization fit and teacher burnout, confirming a previous study, which found that when individuals can form a good sustainable fit with the organizational environment, they will

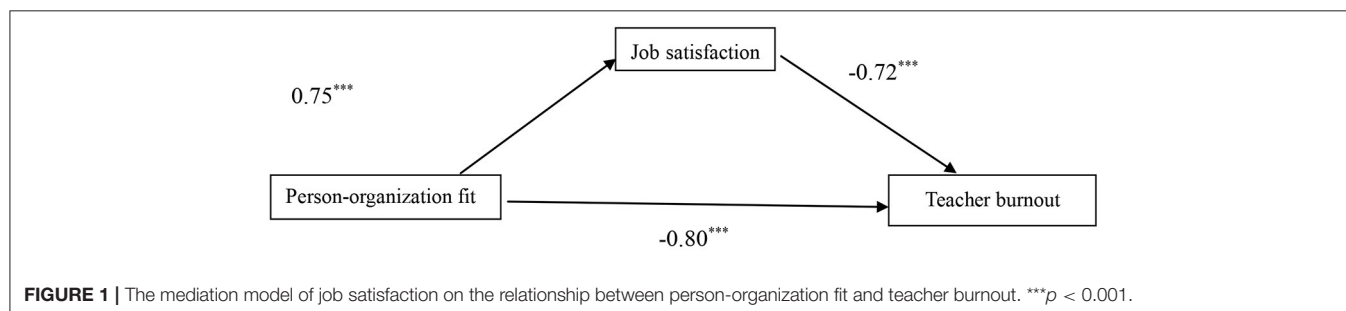
be actively engaged in work; On the contrary, individuals may experience burnout (36). In addition, the negative correlation between demand-supply fit and teacher burnout is stronger than the other two (value fit and requirement-ability fit). The result is consistent with the Job Demand-Resource Model. According to this model, compared with job resources, job demand is more significantly correlated with burnout, that is, individuals are more likely to suffer burnout when job fails to meet their needs (22). This indicates that compared with the fit of value and requirement-ability, teachers care more about whether their needs can be met in kindergartens. When teacher needs and organizational supply are unbalanced, individuals will suffer from burnout. As can be seen from **Table 2**, the score of demand-supply fit is the lowest compared with the other two dimensions, which may be largely related to the low salary and low social status of kindergarten teachers in China (8). The results of this study suggest that kindergarten managers should consider various needs of teachers, pay attention to the living state and quality of teachers, and provide targeted support for them to reduce burnout.

The current study found that person-organization fit in kindergartens is positively correlated with job satisfaction of teachers. This finding is consistent with previous studies.

TABLE 4 | Mediating effect of job satisfaction.

	Effect	SE	t	p	LLCI	ULCI
POF→ TB(c)	−0.80	0.05	−14.73	0.0000	−0.90	−0.69
POF→ JS(a)	0.75	0.03	22.58	0.0000	0.69	0.82
JS→ TB(b)	−0.72	0.06	−12.38	0.0000	−0.83	−0.60
POF→ TB(c')	−0.26	0.07	−3.94	0.0001	−0.39	−0.13
POF→ JS→ TB	−0.54	0.06			−0.66	−0.43

C, the total effect of person-organization fit on teacher burnout; a, the effect of person-organization fit on job satisfaction; b, the effect of job satisfaction on teacher burnout; c', the direct effect of person-organization fit on teacher burnout when job satisfaction was included; LLCI, the lowest value of the confidence interval; ULCI, the highest value of the confidence interval; POF, person-organization fit; TB, teacher burnout; JS, job satisfaction.



Teachers with a high degree of person-organization fit are more satisfied with their organizations and careers (27). A study on the relationship between person-organization fit and job satisfaction of young teachers in colleges and universities confirmed that all three dimensions of person-organization fit had a significant positive impact on teachers' job satisfaction (18). A study on person-organization fit and job-related happiness of kindergarten teachers also found that there was a significant positive correlation between person-organization fit and job-related happiness (37). These indicate that when individuals are well matched with their work requirements provided by the organization, they are more willing to make more contributions to the organization, and more satisfaction can be felt (26, 38, 39). Job satisfaction mainly comes from satisfying the needs to individuals (40, 41), and teachers' needs are usually obtained from the environment of kindergarten. Therefore, if there is a good interaction between teachers and kindergartens, the higher the fit between individuals and the organization, the higher the satisfaction will be.

This study also showed that there is a significant negative correlation between job satisfaction and teacher burnout. The finding is in consistence with a systematic review of longitudinal studies on determinants of teacher burnout, which found that job satisfaction was the most predictive factor (42). As a positive attitude related to job, job satisfaction can significantly negatively predict teacher burnout (43). Other studies also showed that the more satisfied teachers are with their work and salary, the more harmonious their interpersonal relationships are, and the less job burnout are experienced (44–46). A study of 564 in-service teachers in Turkey found a significant positive correlation between job satisfaction and teacher burnout. It also pointed out that “happiness” and “love” were significantly positively

correlated with job satisfaction, and “sadness” and “fear” had significant predictive effects on teacher burnout (47). It can be concluded that teachers' higher job satisfaction can effectively reduce job burnout (48, 49). Therefore, to improve teachers' job satisfaction will help to reduce teacher burnout.

Finally, results confirm that job satisfaction plays a partially mediating role in the relationship between person-organization fit and teacher burnout. This fits nicely into social exchange theory. According to this theory, when individuals receive sufficient material and spiritual support from an organization, their job satisfaction will be improved, and in return, they will increase work involvement and reduce job burnout (50). Other studies have proven that when teachers perceive a high degree of fit with the organization, they will express a positive attitude toward work, and their perception of job burnout will be correspondingly weakened (51). Meanwhile, if teachers' job satisfaction is improved, their perceived burnout will be reduced and their enthusiasm to work will be improved (46, 52). Therefore, improving the degree of person-organization fit will improve job satisfaction and reduce mobility intention for teachers (53). The Conservation of Resources Theory proposes that individuals with more resources will not only do their best to maintain existing resources, but will also be better able to acquire new resources. Thus, individuals are also willing to invest resources in an organization, resulting in more positive experience evaluation and job satisfaction (54). In general, the more support and help that teachers received from an organization, the more satisfaction they will have with the organization, thus the work involvement will be increased and the burnout will be reduced (19, 55). These suggest that adjusting the job demands and job resources at the organization level will safeguard against daily stress and chronic burnout (56).

Therefore, person-organization fit of kindergarten teachers not only directly affects job burnout, but also indirectly affects teacher burnout through job satisfaction. These results suggest that kindergarten managers can take positive measures in person-organization fit and job satisfaction to reduce teacher burnout.

Practical Implications

Based on the social and cultural background of China, this study introduced person-organization fit for the first time and examined the effects of job satisfaction and person-organization fit on teacher burnout in kindergarten teachers, and found that improving person-organization fit and job satisfaction in kindergartens can significantly reduce teacher burnout. This result can provide practical implications for kindergarten managers and policy makers. On the one hand, teachers' needs should be considered from the perspective of person-organization fit, and the fit degree should be improved to enhance teachers' job satisfaction and reduce burnout. On the other hand, it is necessary to create a more friendly kindergarten environment, such as offering a transparent and fair system for promotion and continuous study, and a system of compensation to matching their efforts, so that teachers can focus more on teaching itself and reduce burnout.

LIMITATIONS

There are limitations to this study that need to be stated. Firstly, this study only selected 637 kindergarten teachers from Henan Province for investigation. The sample size is not sufficient and the selected subjects are not broad enough, which may reduce the universality of the results. The sample size can be expanded to cover more provinces and regions in China in the future. Secondly, this study adopts a cross-sectional design, which is not conducive to explaining the causal relationship between variables. In the future, longitudinal research design or experimental research can be adopted to verify the impact of human-organization fit and job satisfaction on teacher burnout. Thirdly, the current study only examined the impact of person-organization fit on teacher burnout, but there are other organizational factors that affect teacher burnout, which can be further explored. Finally, the mediating model shows that the job satisfaction is partially mediated between person-organization fit and teacher burnout, suggesting that there are other mediating factors existed. Future studies can introduce other mediating variables, such as psychological capital and work-family balance, to better understand the impact of person-organization fit on teacher burnout, which can help alleviate teacher burnout.

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CONCLUSION

This study is the first to explore the relationships between person-organization fit, job satisfaction and teacher burnout. The results not only find the direct impact of person-organization fit on teacher burnout, but also confirm the mediating role of job satisfaction between the two. It enriches the existing research literature in understanding the relationship between person-organization fit, teacher burnout and job satisfaction of kindergarten teachers in the context of Chinese culture. In addition, other possible mediating factors between person-organization fit and teacher burnout and antecedent variables of teacher burnout deserve further exploration.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Faculty of Education, Henan University. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

LZ and YC: research idea and research design. YC: data collection and analysis. LZ: manuscript writing. All authors contributed to the article and approved the submitted version.

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Investigating the links between diagnostic uncertainty, emotional exhaustion, and turnover intention in General Practitioners working in the United Kingdom

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Background: General Practitioners (GPs) report high levels of burnout, job dissatisfaction, and turnover intention. The complexity of presenting problems to general practice makes diagnostic uncertainty a common occurrence that has been linked to burnout. The interrelationship between diagnostic uncertainty with other factors such as burnout, job satisfaction and turnover intention have not been previously examined.

Objectives: To examine associations between diagnostic uncertainty, emotional exhaustion (EE), depersonalization (DP), job satisfaction, and turnover intention in GPs.

Methods: Seventy general practices in England were randomly selected through the Oxford-Royal College of General Practitioners Research and Surveillance Centre (RCGP-RSC). A total of 348 GPs within 67 these practices completed a 10-item online questionnaire which included questions on

GP characteristics, work-life balance, job satisfaction, sickness presenteeism, diagnostic uncertainty, turnover intention as well as EE and DP. Associations between diagnostic uncertainty and each of EE, DP, job satisfaction, and turnover intention were evaluated in multivariate mixed-effect ordinal logistic regressions whilst adjusting for covariates, to account for the correlation in the three outcomes of interest.

Results: Almost one-third of GPs ($n = 101$; 29%) reported experiencing >10% of diagnostic uncertainty in their day-to-day practice over the past year. GPs reporting greater diagnostic uncertainty had higher levels of EE [OR = 3.90; 95% CI = (2.54, 5.99)], job dissatisfaction [OR = 2.01; 95% CI = (1.30, 3.13)] and turnover intention [OR = 4.51; 95% CI = (2.86, 7.11)]. GPs with no sickness presenteeism had lower levels of EE [OR = 0.53; 95% CI = (0.35, 0.82)], job dissatisfaction [OR = 0.56; 95% CI = (0.35, 0.88)], and turnover intention [OR = 0.61; 95% CI = (0.41, 0.91)].

Conclusion: Diagnostic uncertainty may not only negatively impact on the wellbeing of GPs, but could also have adverse implications on workforce retention in primary care.

KEYWORDS

burnout, diagnostic uncertainty, presenteeism, work-life balance, general practice, General Practitioners

Introduction

Burnout in General Practitioners (GPs) is a widely recognized problem in primary care (1) and it is estimated that more than 50% of GPs working in the UK have reported moderate or high levels of burnout (2). GPs have been reporting high workload pressures and demands in their day to day practice and have been found to be at high risk of burnout compared to other specialties (2). Burnout in GPs has been linked with low job dissatisfaction, sickness presenteeism and diagnostic uncertainty in primary care and therefore can have major adverse implications on the primary care delivery (3–7). Furthermore, GPs who have been found to be at high risk of burnout are more likely to report intention to quit (1, 2, 8), which in turn may have wider implications on workforce retention in an already stretched primary care workforce.

Diagnostic uncertainty has been defined as a “*subjective perception of an inability to provide an accurate explanation of the patient’s health problem.*” (9) and is a major challenge in primary care where GPs are often faced with making a diagnosis based on early symptoms, of a wide range of diagnostic possibilities at the point of patient presentation and with reduced and/or delayed access to diagnostic tests (10) and GPs have been found to experience one of the highest levels of uncertainty compared to other medical specialties (10, 11).

Diagnostic uncertainty can contribute to medical errors and are more likely to occur when doctors are unfamiliar with the patient and when presentations are non-specific (12). Diagnostic errors have been found to be the most common

cause of avoidable significant harm (13) and medical errors due to diagnostic uncertainty can have serious implications for patients, medical practitioners and healthcare systems (12), leading to poorer patient outcomes, medical litigation, defensive medicine and delivery of care, as well as increases in healthcare costs (14). Although GPs encounter uncertainty in their day-to-day practice, very few studies have explored the association between diagnostic uncertainty, burnout, job satisfaction, sickness presenteeism and turnover intention (3, 4).

The overall sustainability of the primary care system does depend on the function and wellbeing of its workforce and therefore investigating the associations between diagnostic uncertainty, job satisfaction, turnover intentions, burnout subcomponents such as Emotional Exhaustion (EE) and Depersonalization (DP), and may provide insight into ways to mitigate burnout in a workforce that is already under immense pressure. This in turn could lead to a greater understanding of factors that have not been previously explored in conjunction with each other, with the aim that this could improve the quality of both physician wellbeing and patient care.

Methods

Study design

This was a cross-sectional study using a self-reported online questionnaire involving 70 randomly selected general practices

in England. Participants were recruited through the Oxford-Royal College of General Practitioners (RCGP) Research Survey Centre (RSC) between December 2019 to March 2020, in a period prior to the COVID-19 pandemic (15).

All GPs who were working in the 70 selected practices were considered eligible to participate in the study.

Study measures

An online 10-item questionnaire link was sent to participating GP practices through the RCGP RSC using the survey monkey platform (16). This included three items on key GP and practice characteristics (full-time equivalent [FTE] status of the responder, sum of FTE of all GPs in the practice, and age). There were five validated items on % of diagnostic uncertainty, overall job satisfaction, sickness presenteeism over the past 12 months, turnover intention within the next 5 years and work-life balance (see [Supplementary Material](#)) (17–20). A validated abbreviated scale of the Maslach Burnout inventory consisting of 2 items (EE and DP) was used (21).

The RSC provided anonymized data on GP gender, practice list size, practice-level National Health Service (NHS) region, practice location, as well as the 2019 Index of Multiple Deprivation (IMD) quintiles which is a composite area deprivation score which includes seven domains [income, employment, education, health, living environment, barriers to housing, and services and crime (22)].

Sample selection

The GP survey was intended to reach 350–400 GPs across 70 different practices from the total nationally representative pool of general practices in RSC consistent with our funding availability. Each participating GP received a £20 payment to their GP practice. The practices were selected randomly and the distribution of the survey was done using random sampling by the RSC and avoided selection bias by practice. The random sample was representative of the distribution of GP practices in England.

Data analysis

Over 99% of data were provided for all wellness factors and variables and the remaining missing values were imputed using the R package ‘MICE: Multivariate Imputation by Chained Equations’ (23).

Descriptive statistics were then used to assess the baseline characteristics of the GPs involved. Differences between wellbeing factors were assessed with the Kruskal-Wallis H

test (24) and polychoric correlations was estimated between wellbeing factors (25).

We used a multivariate mixed-effect ordinal logistic model, fitted using *mvord* package in R software (26), to account for the correlation in the four outcomes (EE, DP, job dissatisfaction, and turnover intention). The following covariates were included in the model: GP demographics (age, FTE, and gender), GP practice characteristics (NHS region, IMD quintile, and list size) and wellbeing factors (work-life balance, diagnostic uncertainty, and sickness presenteeism). A mixed-effect model was used to assess for GP clusters within practices.

Clinical expertise of the co-authors (MP and MH) and data availability drove the decision as to which variables were to be included in the models. Variance inflation factors were used to examine for multicollinearity and scores below 4 were considered as uncorrelated (27). The statistical analyses were produced through R software to undertake the multivariable mixed-effect ordinal logistic regression (28).

Results

Demographics and descriptive results

The survey reached 67 practices and a total of 348 completed surveys were received. Baseline characteristics are presented in [Table 1](#). Twenty-two percent of GPs reported high levels of EE and 16% reported high levels of DP. Over 40% of GPs reported poor work-life balance and nearly 75% of GPs reported sickness presenteeism at work. Only 60% of GPs reported job satisfaction in their current job roles and about one third of GPs reported no intention to quit over the next 5 years. All wellbeing factors when statistically compared were significantly different, with the exception being diagnostic uncertainty and DP [$\chi^2(4) = 7.39$, $p = 0.117$] and diagnostic uncertainty and turnover intention [$\chi^2(4) = 7.85$, $p = 0.097$].

The estimated correlations for the wellbeing factors ranged from small to moderate (0.109–0.591). The strongest correlation was shown between EE and turnover intention ($\rho = 0.591$) and the weakest correlation was between work-life balance and job satisfaction ($\rho = 0.109$; [Table 2](#)).

Multivariate mixed-effect ordinal regression results

[Table 3](#) summarizes the multivariate mixed-effect ordinal logistic regression results. High levels of diagnostic uncertainty (>10%) was found to be associated with increased odds for EE [OR 3.9 (95% CI, 2.54, 5.99)], increased odds for job dissatisfaction [OR 2.01 (95% CI 1.3, 3.13)] and increased odds for turnover intention [OR 4.51 (95% CI 4.51 (2.86, 7.11))]. In contrast, GPs who were ≥ 50 years were much less likely to report

TABLE 1 Baseline characteristics of the recruited 348 General Practitioners.

Variable	N (%) [*]
Number of general practices	67
Practice-level index of multiple deprivation (IMD)	
• Quintile 1 (least deprived)	46 (13.2)
• Q2	45 (12.9)
• Q3	56 (16.1)
• Q4	68 (19.5)
• Q5 (most deprived)	62 (17.8)
Not available	71 (20.4)
NHS region	
• London	5 (1.4)
• Midlands And East	31 (8.9)
• North	110 (31.6)
• South	131 (37.6)
Not available	71 (20.4)
Age, mean (\pm SD)	45 (\pm 8.5)
Age	
• <40 years	100 (28.7)
• 40–49 years	139 (39.9)
• \geq 50 years	109 (31.3)
Gender	
• Male	152 (43.7)
• Female	196 (56.3)
Years worked in practice	
• <1 year	26 (7.5)
• 1–5 year	101 (29.0)
• 6–10 year	63 (18.0)
• 11–20 year	91 (26.2)
• >20 years	67 (19.3)
FTE category	
• 0–0.500	81 (23.3)
• 0.501–0.750	120 (34.5)
• 0.751–1.000	146 (42.0)
• Not available	1 (0.3)
FTE, mean (\pm SD)	0.737 (\pm 0.22)
Wellbeing factors	
Diagnostic uncertainty	
• 0–5%	124 (35.6)
• 6–10%	123 (35.3)
• \geq 11%	101 (29.0)
Frequency of Emotional exhaustion (EE)	
• Never	34 (9.8)
• A few times a year or less	108 (31.0)
• Once a month or less	58 (16.7)
• A few times a month	70 (20.1)
• Once a week	31 (8.9)
• A few times a week	38 (10.9)
• Daily	9 (2.6)

(Continued)

TABLE 1 Continued

Variable	N (%) [*]
Frequency of Depersonalization (DP)	
• Never	68 (19.5)
• A few times a year or less	111 (31.9)
• Once a month or less	60 (17.2)
• A few times a month	54 (15.4)
• Once a week	13 (3.7)
• A few times a week	34 (9.8)
• Daily	8 (2.3)
Turnover intention within the next 5 years	
• None	115 (33.1)
• Slight	119 (34.0)
• Moderate	48 (13.8)
• Considerable	34 (9.8)
• High	32 (9.2)
Work-life balance	
• Strongly agree/ Agree	133 (38.2)
• Neutral	73 (22.0)
• Disagree/Strongly Disagree	142 (40.8)
Sickness presenteeism over the past 12 months	
• Never	94 (27.0)
• Once	111 (31.9)
• \geq 2 times	143 (41.1)
Job Satisfaction	
• Strongly agree	48 (13.8)
• Agree	162 (46.6)
• Neutral	73 (21.0)
• Disagree	51 (14.7)
• Strongly Disagree	14 (4.0)

^{*} Unless otherwise stated.

turnover intention [OR 0.54 (95% CI 0.33, 0.90)] compared to GPs < 40 years of age.

Over and above diagnostic uncertainty, GPs who did not report any episodes of sickness presenteeism (or reported only one episode) over the past 12 month had decreased odds for EE [OR 0.53 (95% CI 0.35, 0.82)], decreased odds for job dissatisfaction [OR 0.56 (95% CI 0.35, 0.88)] and increased odds of turnover intention [OR 0.61 (95% CI 0.41, 0.91)] compared to GPs who reported >1 episode. GPs reporting a good work-life balance had decreased odds for experiencing EE [OR 0.67 (95% CI 0.45, 0.99)]. GPs working longer hours (higher FTE) had over increased odds for higher DP [OR 2.36 (95% CI 1.30, 4.28)] and increased odds of being dissatisfied with their job [OR 2.43 (95% CI 1.37, 4.33)]. Gender, age, list size, NHS region and practice-level IMD were not found to be associated with EE, DP, or turnover intention. However, female GPs were marginally less likely to report job dissatisfaction. There was no evidence of multicollinearity in the set of covariates that was included in the model.

TABLE 2 Polychoric correlations of all GP wellness factors.

EE

0.456	DP						
0.347	0.150	Sickness presenteeism					
0.238	0.144	0.096	Work-life balance				
0.497	0.164	0.283	0.110	Diagnostic uncertainty			
0.467	0.246	0.274	0.109	0.405	Job satisfaction		
0.591	0.295	0.346	0.210	0.503	0.429	Turnover intention	

TABLE 3 Multivariate mixed-effect ordinal regression model of the relationship between GP demographic, practice and wellbeing factors with burnout (emotional exhaustion, depersonalization), job dissatisfaction, and turnover intention.

Variable	Emotional exhaustion*		Depersonalization*		Job dissatisfaction*		Turnover intention*	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age [‡]	Reference = Up to 39 yrs.							
• 40–49 yrs.	1.22	0.81, 1.85	1.08	0.71, 1.62	1.39	0.96, 2.04	0.98	0.65, 1.49
• 50 yrs. and over	0.81	0.52, 1.26	0.83	0.52, 1.32	1.25	0.78, 2.00	0.54	0.33, 0.90
Gender:	Reference = Male							
- Female	0.81	0.58, 1.13	0.99	0.70, 1.39	0.70	0.50, 0.99	0.90	0.59, 1.36
Work-life balance:	Reference = Disagree/Strongly disagree work schedule leaves me with good work-life balance							
- Neutral	0.81	0.54, 1.20	0.89	0.60, 1.33	0.87	0.58, 1.32	0.96	0.61, 1.52
- Strongly agree/Agree	0.67	0.45, 0.99	0.81	0.53, 1.24	0.78	0.52, 1.15	0.82	0.54, 1.25
Diagnostic uncertainty:	Reference = 0 to 5% patients were difficult to diagnose							
- 6–10%	2.04	1.24, 3.36	1.32	0.80, 2.16	1.47	0.87, 2.47	3.44	1.99, 5.92
- Over 10%	3.90	2.54, 5.99	1.53	0.97, 2.40	2.01	1.30, 3.13	4.51	2.86, 7.11
Presenteeism:	Reference = Presented at work more than once with a sickness							
- Never	0.53	0.35, 0.82	0.78	0.49, 1.22	0.56	0.35, 0.88	0.66	0.42, 1.04
- Once	0.73	0.49, 1.10	0.88	0.58, 1.33	0.81	0.56, 1.18	0.61	0.41, 0.91
IMD Quintile:	Reference = IMD code 1 (least deprived)							
- 2	1.07	0.58, 1.97	1.11	0.60, 2.07	1.29	0.75, 2.23	1.55	0.86, 2.79
- 3	1.31	0.72, 2.39	0.91	0.52, 1.58	1.17	0.67, 2.05	1.59	0.87, 2.89
- 4	1.00	0.55, 1.84	0.71	0.42, 1.22	1.04	0.59, 1.82	1.20	0.68, 2.11
- 5 (most deprived)	0.79	0.45, 1.38	0.83	0.49, 1.41	0.77	0.45, 1.33	1.04	0.59, 1.81
FTE [‡]	1.58	0.82, 3.05	2.36	1.30, 4.28	2.43	1.37, 4.33	1.18	0.52, 2.71
List size [‡]	1.00	0.99, 1.00	1.00	0.99, 1.00	1.00	0.99, 1.00	0.99	0.99, 1.00
NHS Region:	Reference = North							
- London	0.65	0.13, 3.18	1.24	0.37, 4.11	0.44	0.09, 2.05	1.86	0.37, 9.39
- Midland and East	1.01	0.58, 1.78	1.08	0.53, 2.18	0.91	0.50, 1.67	0.86	0.47, 1.59
- South	0.80	0.55, 1.17	0.89	0.61, 1.29	0.98	0.66, 1.45	1.00	0.68, 1.47

*Treated as ordinal responses (higher scores were unfavorable) and fitted using mvord package in R.

[‡]Continuous variables.

FTE, full-time equivalent. The bold values indicate the statistically significant values.

Discussion

Statement of principal findings

This study, using a national cohort involving 67 practices and 348 GPs, found that GPs reporting higher levels of diagnostic uncertainty had two to five times higher risk

of EE, job dissatisfaction and turnover intention. Beyond diagnostic uncertainty, GPs reporting multiple episodes of sickness presenteeism were also found to have two times higher risk of EE, job dissatisfaction and turnover intention. GPs reporting poor work-life balance had 1.5 times higher risk of EE, whereas those working longer hours had 2 times higher risk of DP and job dissatisfaction. Characteristics such as age,

gender, IMD quintile, NHS region, list size were not found to be associated with EE or DP.

Meaning of the study: Possible mechanisms and clinical implications

Our study found a clear relationship between GPs experiencing high levels of diagnostic uncertainty (>10%) and EE, job dissatisfaction and turnover intention compared to GPs who experienced low levels of diagnostic uncertainty. Previous studies in primary care have focused on GP trainees which identified that an intolerance of uncertainty was associated with burnout (4) and this association was also found in emergency medicine trainees too (29). In our study, participants were fully qualified GPs who have a level of expertise in this specialty (64% with >6 years of working experience). The level of work experience has been suggested to modify perceptions of diagnostic uncertainty (10, 30), however, our study has demonstrated that diagnostic uncertainty continues to occur even in experienced GPs and can put GPs at higher risk of EE which could subsequently lead to burnout. One component of diagnostic uncertainty that was previously found to be predict burnout in emergency medicine physicians was related to concerns about bad outcomes (31) and diagnostic uncertainty has been previously linked to diagnostic errors in primary care (32).

Our study only assessed for the level of diagnostic uncertainty the GP had experienced, while future research could consider the reasons behind diagnostic uncertainty to help develop interventions to help GPs to embrace uncertainty in their day-to-day practice. Although studies have explored factors driving turnover intention in GPs such as workload, low job satisfaction and burnout (1, 33), diagnostic uncertainty and turnover intention in primary care have not been previously explored. This further highlights the need to understand the wider implications of diagnostic uncertainty on service delivery and workforce retention.

Our study identified that GPs reporting multiple episodes of sickness presenteeism was associated with higher levels of EE, job dissatisfaction, and turnover intentions and similar results have also been reflected previously in the literature (7, 34). Sickness presenteeism is common amongst senior doctors which could be related to having a higher threshold of recognizing illness in themselves, showing commitment to their workplace and reserving their sick leave for when their dependents are unwell (35). Furthermore, lower sickness presenteeism levels have also been found when perceived social support is available (36). This suggests there is a need to modify perceptions and attitudes around doctors' sickness behaviors in order to mitigate EE and potentially burnout and improve workforce retention in primary care as well the need to invest in organizational changes that will enable adequate resources in primary care and to make workloads to be more manageable (37).

GPs within our study who reported poor work-life balance were found to be at a higher risk of EE which is consistent with previous research on GPs (38). GPs have been found to have one of the higher rates of burnout and poor work-life balance compared to other medical specialties (39) and high work demands have led to GPs choosing to reduce working hours or retire early due to work pressures (40, 41). These findings suggest perceived poor work-life balance can not only lead to EE but also put additional pressures on a healthcare system that is already over-stretched. Although multiple factors that can negatively impact on primary care are known such as increasing workloads, service delivery demands, complaints and litigation (1, 41), our study shows that work-life balance remains a concern in GPs and effective interventions are required to improve the working lives of GPs.

Previous literature has suggested that older GPs aged >50 years reported high levels of intention to leave (42) which is in contrast to our results. Factors that have been linked to turnover intention in older GPs include perverse tax situation, early retirement being a viable option, alternative employment options, work-related factors such as workload and burnout (43, 44). It may have been possible that our GP cohort did not have early retirement or alternative employment as viable options or alternatively, may have been satisfied with their current role. Another possibility could be that GPs who did not report turnover intention may already be close to retirement age and did not wish to leave their current role. However, due to the nature of our study, we were not able to explore why turnover intention was lower in older GP participants, however, this could be an interesting area to understand in order to help explore strategies to support workforce retention, especially in light of the COVID-19 pandemic.

Our study did not find an association between practice level IMD and EE or DP which seems to contrast with previous research that has highlighted the complexity and demands of caring for patients in the context of high socioeconomic deprivation (45). Factors that could be driving GPs' workload and burnout include increased multimorbidity, increased emotional demands in managing perceived overwhelming patient demand, high prevalence of psychosocial problems and complex social challenges (45). Most studies on GPs working in socially deprived locations have been qualitative in nature (45, 46), and our study only had a small number of GPs ($n = 62$) working in the most deprived quintile, suggesting there is a need to quantify the relationship between social deprivation and GP burnout.

Within our study, DP was not found to be associated with diagnostic uncertainty or any demographic or practice factors except for FTE, with GPs working full-time were at higher risk of DP compared to those working fewer hours. Previous research has found that male doctors and career length has been associated with DP in primary care (47), however the study did not explore whether FTE or part-time showed any differences in DP. Increasing workloads and patient demands

have been identified as one of the main job stressors in GPs (48) and therefore GPs working full-time may experience higher workloads and demands, and full-time GPs have reported to work an average of around 55 h per week (48). A previous study has found that for every additional 5 h of work worked beyond the 40 h week, the risk of burnout increases (49), however, this finding was only found in female doctors. Further research may be required to assess the relationship between FTE and burnout and to explore the relationships between FTE, working hours, burnout, and gender.

Strengths and limitations of the study

Diagnostic uncertainty is not uncommon in primary care however, the strength of this study is that it has not only explored diagnostic uncertainty but specifically explored the link between diagnostic uncertainty, turnover intention, job dissatisfaction, and burnout in GPs across practices in England. Furthermore, our findings also highlight potential areas for future research that could not only have implications to GP wellbeing but also wider implications to GP workforce retention and primary care service delivery. However, this study has several limitations. First, this was a cross-sectional study and therefore causation cannot be determined. Secondly, although the survey was intended to reach over 700 GPs, however, we only received 348 complete responses which gives an overall response rate of <50%. The response rate in this study is similar to previous studies involving GPs (50–52), however, our results may only reflect the perspectives of participating GPs rather than all GPs working in practices across the UK. Furthermore, although we used validated items within our survey, however, our results are based on self-reported data on abbreviated measures and there could be a risk of recall bias especially if GPs are asked to recall information over the preceding 12 months. In our study, we assessed EE and DP as separate dependent variables, however, another potential consideration for future research could be to consider EE and DP together as a dependent variable. Within our study, diagnostic uncertainty was found to be an important factor associated with emotional exhaustion, turnover intention and job satisfaction. The measure included in our study was developed using a comprehensive literature review, analyzes of medical legal claims and pilot tested through cognitive interviews (19) and therefore this was considered a suitable measure for diagnostic uncertainty in our survey which was designed to minimize survey fatigue. However, it is acknowledged that this measure may have limitations in its validity and more research is needed in this area to create a method to comprehensively assess diagnostic uncertainty as there is currently no gold standard to assess diagnostic uncertainty (9). Furthermore, the study was also conducted pre-COVID so the results may be less relevant given considerable changes in primary care following COVID-19 restrictions.

Conclusion

Diagnostic uncertainty was found to be associated with EE, turnover intention and job dissatisfaction suggesting the need to understand not just how diagnostic uncertainty impacts individual GPs but also the wider negative implications of diagnostic uncertainty in the workforce planning and service delivery of primary care. Alongside diagnostic uncertainty, sickness presenteeism also needs to be considered and addressed while designing GP wellness and workforce retention remedies in primary care such as addressing workload, adequate resources and a supportive environment.

Data availability statement

The datasets presented in this article are not readily available because the data is stored in a repository which is managed by the Royal College of General Practitioners Research and Surveillance Centre (RSC). Any requests to access the datasets should be directed to maria.panagioti@manchester.ac.uk.

Ethics statement

The project was reviewed by the University of Manchester's research ethics committee IRAS ID: 330 268533. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

Author contributions

MP, PL, RP, CC-G, AE, and DA contributed to the conception of the study. SZ, AH, CC-G, MP, SL, PL, RP, CC-G, AE, and DA contributed to funding acquisition, design study, and data collection. SZ, AH, MH, EK, and MP contributed to the data analysis. AYZ, SZ, AH, MH, and MP contributed to data interpretation and visualization. AYZ drafted the original manuscript draft. SZ, AH, MH, CC-G, SC-S, SS, and AKZ contributed to specific sections in the manuscript. All authors contributed to the manuscript revision, read, and have approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsy.2022.936067/full#supplementary-material>

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Cognitive functioning in non-clinical burnout: Using cognitive tasks to disentangle the relationship in a three-wave longitudinal study

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Burnout is often characterized by cognitive deficits and it has been associated with depression and anxiety. However, it is not clear whether cognitive impairment is a burnout consequence or employees with poor cognitive skills are more prone in developing burnout. Moreover, the exact nature of the association between burnout and depression, and burnout and anxiety is still unknown. Depression and anxiety are also related to cognitive impairments but their prospective associations are not fully understood. The aim of the present three-wave longitudinal study was to investigate the causality between cognitive functioning, burnout, depression, and anxiety among non-clinical burnout employees. The cause-effect associations of burnout with depression and anxiety were also explored. Perceived family support as a protective factor against cognitive decline, burnout, depression and anxiety was examined as well. A wide range of cognitive tasks tapping different cognitive domains were administered to employees of the general working population. Burnout, depression, anxiety, and perceived family support were assessed with self-reported questionnaires. Present results suggest that visuospatial functioning deficits are a burnout consequence and they indicate the role of automatic processing skills and executive functions in burnout onset. Additionally, current findings support that burnout is differentiated from depression and anxiety but it is reciprocally associated with the two psychological phenomena. Lastly, current results support the inclusion of perceived family support as an intervention to help individuals who suffer from mental health and cognitive difficulties.

KEYWORDS

burnout, cognitive functioning, cognitive impairment, depression, anxiety, perceived family support, longitudinal study

Introduction

Occupational chronic stress is a growing health risk factor among working populations (1) and burnout is one of its consequences. The concept of burnout is not unitary and its definition depends upon the tool used for its measurement (2). The present paper adopts the approach to burnout as provided by Maslach et al. (3). That is, burnout consists of three dimensions; exhaustion, cynicism, and reduced personal efficacy (3). Exhaustion refers to the depletion of emotional resources; cynicism concerns employees' distancing from their work, clients etc.; reduced personal efficacy is the negative appraisal of an individual's work resulting in low work self-esteem (4). Hereafter, the term "burnout" reflects the abovementioned three dimensions. Cognitive performance has become an important aspect in the burnout research during the past decades. Desart et al. (5) proposed a new burnout definition by including two new core symptoms; cognitive and emotional loss of control; a notion that has been supported by other scholars as well (6). Nevertheless, whether cognitive impairment is a burnout consequence or employees with lower cognitive skills are more prone to such stress effects and thus, more vulnerable to burnout is still unclear. An additional limitation concerns the lack of studies investigating non-clinical burnout, as most researchers focus on clinical populations. By taking into consideration the importance of detecting and addressing early the burnout effects, the present study focuses on the examination of non-clinical burnout employees; i.e., employees who have not received a clinical diagnosis (in contrast to the clinical burnout individuals) but report high burnout levels as measured by self-reported questionnaires and they continue working.

Burnout has also been associated with depression and anxiety as burned-out employees often suffer from these two mental health problems (7). Burnout's comorbidity with depression and anxiety is so common that its empirical distinction from these two mental disorders has been a matter of debate among researchers (8, 9). Additionally, both depression and anxiety have been linked with cognitive impairment (10, 11). Hence, when examining the association between burnout and cognitive functioning researchers also need to consider for possible comorbidity with depression and anxiety as this association might be biased by the presence of these two mental health problems. Another research question that has not received much attention concerns whether individuals with weaker cognitive skills are more susceptible in experiencing psychological distress as a result of the everyday difficulties these individuals might experience.

Burnout and cognitive functioning

Several studies (12, 13) and reviews (14, 15) have indicated the negative associations between burnout and cognitive

functioning, with executive functioning deficits being the most prominent ones (14). Executive functions are high order cognitive functions and they include cognitive skills such as inhibition, switching (or cognitive flexibility), planning (16), reasoning, and problem solving (17). Employees with poorer executive function skills might be less able to stay focused on tasks, make decisions, and struggle with time management. All these difficulties can potentially lead to burnout onset. At the same time, as burnout levels rise they can further affect executive functions (18); a process that leads to a vicious circle. Although executive deficits are common amongst burned-out employees, they are also the most studied ones (14); overlooking potential associations between burnout and other cognitive functions.

The basic burnout conceptualization regards burnout as a three-dimensional concept. Nevertheless, the consistent associations of burnout with cognitive deficits have led several scholars (5, 6) to enhance our approach to the burnout model by arguing that cognitive deficits should also be included in the burnout definition. Schaufeli et al. (6) identified cognitive deficits as a core burnout component while the authors argued that cognitive impairment is a burnout consequence that emerges due to the lack of energy which is prominent in burnout. However, the causality between burnout and cognitive functioning should first be elucidated before cognitive impairment is included as a core burnout dimension.

Although individuals with poorer executive functioning abilities are more vulnerable to the stress effects (19), the investigation of whether cognitive impairment is a burnout consequence or employees with lower cognitive abilities are more prone in developing burnout is an under-explored research area. Most relevant studies are of a cross-sectional design while longitudinal studies mainly focus to the long-lasting effects of burnout (20, 21). To the authors' knowledge, so far, only two studies have examined for reversed effects and they provide mixed results. Specifically, in their study, Feuerhahn et al. (22) found that executive functioning deficits were a consequence of the exhaustion burnout dimension while Lemonaki et al. (23) showed that lower cognitive flexibility abilities—but not working memory and inhibition—predicted higher burnout levels. Nevertheless, both studies focused only on the examination of executive functions while they measured this relationship only at two different time points. Hence, it still remains impossible for the form of change of these two variables over time to be determined and the results could possibly reflect measurement error and not a true change over time (24).

Although the cognitive deficits in clinical burnout have been widely recognized (21, 25), the results among non-clinical burnout populations remain inconclusive. Physiological studies suggest the negative effects of burnout as it leads to a decrease of the brain-derived neurotrophic factor (BDNF) (26); a protein which plays an important role on neuroplasticity (27). Decrease BDNF levels have been observed to mediate the negative effects of non-clinical burnout on cognitive functioning

(28); a result which indicates that even at its early stages, burnout can disrupt normal brain and cognitive functioning. Studies have observed working memory deficits among non-clinical burnout employees (29) while others have failed to find cognitive impairments (30). Interestingly, some studies observed greater verbal working memory skills (31). A more recent study provides mixed results as the researchers showed that cynicism was negatively related to visuospatial skills but positively related to automatic processing skills (32); possibly indicating the employees' activation of strategies in order to amplify their efforts during the initial burnout stages.

The sparse evidence regarding the cognitive patterns that characterize non-clinical burnout do not allow for drawing safe conclusions. Two theories that could explain the positive associations between non-clinical burnout and cognitive functioning, and in which the current study draws on, are the cognitive reserve (CR) and the self-regulation theories. The CR theory (33) suggests that when individuals carry out challenging tasks they employ the cognitive reserve process which permits them to use those cognitive strategies and brain networks that are more efficient and thus, enable them to cope with failure. Self-regulation theory (34) concerns one's ability to inhibit a prepotent response and guide their cognitive, affective and behavioral sources for attaining a goal. That is, an individual's self-regulation processes enable them to direct their cognitive resources on completing a task (35). Hence, non-clinical burnout employees might be still able to self-regulate and initiate the cognitive reserve in order to achieve optimal performance; a process which could possibly explain the observed greater cognitive performance in certain non-clinical burnout employees. In line with the above theoretical arguments, we hypothesize that:

Hypothesis 1: Non-clinical burnout will be positively related to cognitive functioning.

Depression and anxiety

Depression and anxiety are two mental health problems that often coincide with burnout. This concurrence is so frequent which—along with their conceptual and behavioral similarities—have led to a debate among researchers on whether burnout is distinct—or another form—from these two psychological phenomena (36, 37). So far, the research evidence is inconclusive as some argue that burnout is a specific form of depression (36) while others suggest that burnout is a distinct concept (38); indicating also the importance of developing targeted clinical examinations of the working populations. Recent studies show that although burnout is accompanied by depressed mood and distressed feelings (6, 39), these feelings do

not constitute robust and stable burnout characteristics, instead they might result as a reaction to burnout's onset (39).

Regarding the relationship between burnout and depression, four theoretical models have been proposed: (1) the stability model which proposes that, although burnout and depression are associated with each other, they are independent from one another (40); (2) the burnout-as-antecedent model which suggests that burnout leads to depression and not the opposite (41); (3) the burnout-as-consequence model which assumes that depression leads to burnout and not vice versa (42); (4) the reciprocal effects model which posits that the second and third models are both true (43). Considering the relatively stable significant associations between burnout and depression when examining their predictive relationship, the most comprehensive model to consider is the reciprocal effects model. Although these models concern the burnout-depression relationship, in view of the lack of a similar theoretical framework in this study the same argumentation was assumed for the burnout-anxiety relationship.

Drawing on the above, we suggest that burnout is bidirectionally associated with depression and anxiety but it is a distinct concept. On this basis, the following hypothesis was formulated:

Hypothesis 2: Burnout will be moderately and positively related to depression and anxiety.

Depression and anxiety have been linked with cognitive deficits pertaining to memory (44) and executive functions (45, 46). However, most relevant studies focus on clinical populations. Ganguli et al. (47) showed that depressive symptoms among non-clinical populations were cross-sectionally, but not prospectively, associated with cognitive impairment. To the authors' knowledge, the examination of everyday anxiety in non-clinical populations so far has received no attention as most studies focus on the effects of specific anxiety disorders on cognitive functions, such as obsessive compulsive (48) and post-traumatic disorder (49). An additional limitation concerns the insufficient evidence examining the role of cognitive functions in the onset of depression and anxiety. Studies have shown that individuals with lower cognitive abilities are more susceptible in developing depression (50) and anxiety (51). This study sought to elucidate the nature of the causality between cognitive functioning and depression, and anxiety.

Based on the above empirical argumentation we propose that:

Hypothesis 3: Non-clinical depression and non-clinical anxiety will be related to lower cognitive performance.

Hypothesis 4: Individuals with poorer cognitive abilities will exhibit higher depression and anxiety levels.

Perceived family support

An important area in the burnout research is the investigation of non-work-related factors that can contribute to—or protect against—its onset. Most studies focus on the effects of perceived social support (friend, co-worker support) on mental health (52, 53). Considering the COVID-19 pandemic challenges and the fact that many employees had to work from home, the examination of the effects of family on employees' mental health is of importance. Although limited, greater levels of perceived family support have been found to protect against burnout onset whereas poor perceived family support appears to enhance it (54, 55). The traditional conceptualization of depression and anxiety mainly focuses on the interpersonal factors affecting the two mental health issues. Nevertheless, although greater levels of family support can reduce mental health problems the reverse could also hold true; i.e., depression and anxiety may lead to a reduction in the quality of one's family relationships (56). According to Coyne's interactional theory of depression, depressed individuals provoke negative interaction patterns with others leading to a rejection from them which further increases their depressive feelings, creating a vicious circle (57). Thus, family support could act both as a consequence and contributing factor of burnout, depression and anxiety suggesting mutual reinforcing relationships (58). Although family support has been observed to facilitate cognitive performance (59), the relevant research evidence is sparse.

In line with the above empirical evidence, we hypothesize:

Hypothesis 5: Perceived family support will be negatively related to burnout, depression and anxiety, and positively associated with cognitive performance.

Hypothesis 6: Higher burnout, depression and anxiety levels will predict lower feelings of perceived family support.

Aims of the present study

As most studies mainly focus on clinical populations, in the present study we sought to examine non-clinical populations *via* a longitudinal design. Moreover, considering that executive functions are the most studied cognitive functions, we measured a broad range of cognitive functions.

The present study adds to the current literature in four ways. Firstly, by elucidating the association between non-clinical burnout and cognitive functioning and whether cognitive impairment is a burnout consequence, or employees with poorer cognitive abilities are more susceptible in developing burnout. Next, we aim to explore the causality of non-clinical depression and anxiety with cognitive functioning. Third, we endeavor to clarify the nature of the burnout-depression and burnout and anxiety relationships. Lastly, we examine the role of perceived family support in cognitive functioning, burnout, depression, and anxiety.

Materials and methods

Ethics

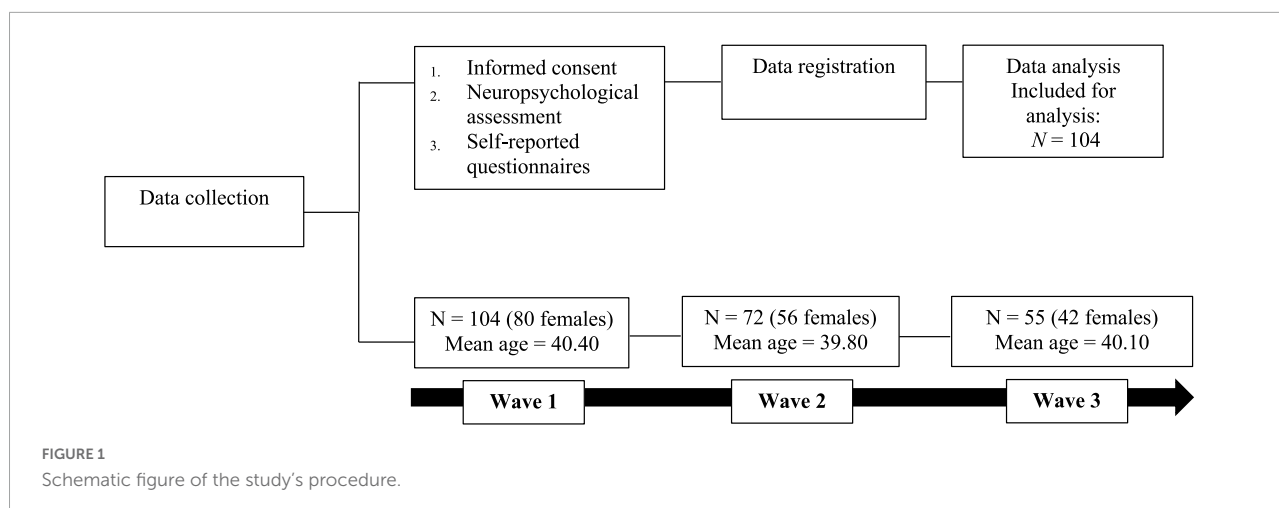
The ethical procedures according to the declaration of Helsinki when conducting research with human participants were followed. All participants agreed and signed an informed consent form for voluntary participation prior to their participation in the research at all three times of assessment.

Procedure

Following the methodological procedures of previous longitudinal studies that examined both cross-sectionally (12, 60, 61) and longitudinally (20, 21, 62) the burnout—cognitive functioning relationship, we conducted a baseline study in order to gain an appreciation of the participants' baseline characteristics (32) and how they developed over time. The present study concerns the longitudinal results after the completion of all three-time measurements.

Details regarding the procedures that were followed have been previously described (32). As both brief and extended time lags can decrease the chances of detecting the effects of the independent to the depended variable (63), participants were examined within an 8 and 17-month period interval after the baseline. That is, after the completion of each wave assessment, the participants who had initially attended the cognitive evaluation were first conducted to participate in the follow-up assessment. The baseline assessment was conducted between September 2018 and January 2019.

The majority of research in the area of burnout suffers from the problem of common method variance among the related survey instruments. The present research avoids this problem by involving participants in an exhaustive in-person cognitive functioning paper-and-pencil test. The structured interview lasted 60 min on average. This assessment procedure is the most reliable and valid way to assess cognitive functioning among individuals, but the interview is time-consuming and



demanding for non-clinical burnout participants; and thus, it is more reliable for detecting any cognitive impairments (see Figure 1 for a schematic presentation of the procedure).

Participants

The participants were Greek employees of the general working population. Of the 104 participants who were assessed at baseline (T1), 72 of them agreed to participate at the first follow-up (T2) and 55 at the second follow-up (T3). *Post hoc* G*Power analysis with a medium effect size ($f^2 = 0.15$) revealed a sufficient sample size to identify at least medium effects with a statistical power > 0.80 ($\beta = 0.88$) (64). The initial sample was contacted either by phone or in person; and by phone during the two follow-ups. Exclusion criteria included neurological disorders that could affect cognitive functioning (i.e., traumatic brain injury, epilepsy, multiple sclerosis).

Questionnaires

Burnout was assessed by administering the Maslach Burnout Inventory—General Survey (MBI-GS) (65); a 16-item Likert-type scale designed to measure the three burnout subscales. All three subscales exhibited good reliabilities at all three time points with Cronbach's alphas: $\alpha_{t1} = 0.90$, $\alpha_{t2} = 0.92$ and $\alpha_{t3} = 0.94$ for exhaustion; $\alpha_{t1} = 0.71$, $\alpha_{t2} = 0.79$ and $\alpha_{t3} = 0.83$ for cynicism; and $\alpha_{t1} = 0.84$, $\alpha_{t2} = 0.85$ and $\alpha_{t3} = 0.78$ for personal efficacy. The McDonald's omegas were $\omega_{t1} = 0.90$, $\omega_{t2} = 0.92$, $\omega_{t3} = 0.94$ for exhaustion; $\omega_{t1} = 0.73$, $\omega_{t2} = 0.80$, $\omega_{t3} = 0.85$ for cynicism; and $\omega_{t1} = 0.84$, $\omega_{t2} = 0.82$, $\omega_{t3} = 0.80$ for personal efficacy.

The Hospital Anxiety and Depression Scale (HADS) is comprised of two 7-item subscales for measuring self-reported anxiety and depression (66) and it can be used in both patient and healthy populations (67). Scores ≥ 8 indicate potential case

TABLE 1 Demographic characteristics of the participants at T1 ($N = 104$), T2 ($N = 72$), and T3 ($N = 55$).

Characteristic	T1	T2	T3
Age (mean, SD)	40.40 (10.06)	39.80 (9.80)	40.10 (9.89)
Years of education (mean, SD)	16.82 (1.39)	16.88 (1.37)	16.90 (1.26)
Years of working experience (mean, SD)	15.20 (8.67)	15.97 (10.64)	16.18 (11.44)
	N (%)	N (%)	N (%)
Children yes/no	40/64 (38.5/61.5)	28/44 (38.9/61.1)	22/33 (40/60)
Sector			
Public	62 (59.6)	44 (61.1)	33 (60)
Private	42 (40.4)	28 (38.9)	22 (40)
2nd occupation	22 (21.1)	17 (23.6)	9 (20)
Males/females	24/80 (23.1/76.9)	16/56 (22.2/77.8)	13/42 (23.6/76.4)
Family status			
Cohabiting	8 (7.7)	8 (11.1)	7 (12.7)
Married	47 (45.2)	31 (43.1)	24 (43.6)
In a relationship	1 (1)	—	—
Separated	4 (3.8)	4 (5.6)	3 (5.5)
Divorced	3 (2.9)	—	—
Single	41 (39.4)	29 (40.3)	21 (38.2)
Questionnaires	Mean (SD)	Mean (SD)	Mean (SD)
Exhaustion	2.89 (1.54)	2.88 (1.56)	2.97 (1.70)
Cynicism	2.08 (1.30)	2.54 (1.45)	2.58 (1.51)
Personal efficacy	5.05 (0.96)	5.04 (0.85)	5.00 (0.88)
HADS-depression	5.02 (3.24)	5.08 (3.38)	5.69 (3.22)
HADS-anxiety	6.33 (3.82)	6.12 (3.69)	6.45 (4.00)
Family support	51.40 (8.88)	51.50 (8.82)	52.50 (8.66)

of depression and/or anxiety. Cronbach's alphas were $\alpha_{t1} = 0.74$, $\alpha_{t2} = 0.79$ and $\alpha_{t3} = 0.79$ for depression, and $\alpha_{t1} = 0.84$, $\alpha_{t2} = 0.83$ and $\alpha_{t3} = 0.85$ for anxiety; the respective McDonald's

TABLE 2 Correlations of demographics (T1) with MBI-GS (T3) and cognitive tasks (T3) ($N = 104$).

Variable	Exh.	CY	PE	TCFT-del.	Stroop-CW
Hours/week-main	−0.34**	0.37**	ns	ns	0.33*
Hours/week-second	ns	ns	ns	0.28*	ns
Sector		ns	ns	ns	0.29*
Years of working experience	−0.42**	ns	ns	ns	−0.36**
Family status	−0.34**	ns	ns	ns	−0.30*
No of children	−0.36**	ns	ns		
Age	−0.32*	ns	ns	ns	−0.45**
Gender	ns	ns	0.33*	ns	ns

Exh, Exhaustion; CY, Cynicism; PE, Personal Efficacy; TCFT-del., Taylor Complex Figure Test—delay condition; Stroop CW, Stroop Color-Word condition; Hours/week-main, Working hours for the main occupation; Hours/week, Working hours for the second occupation; Sector, Public and Private; Family Status, Single, In a Relationship, Cohabiting, Married, Separated, Divorced; ns, non-significant.

** $p < 0.01$ level (2-tailed); * $p < 0.05$ level (2-tailed).

omegas were: $\omega_{t1} = 0.74$, $\omega_{t2} = 0.79$, $\omega_{t3} = 0.74$ for depression $\omega_{t1} = 0.84$, $\omega_{t2} = 0.84$, $\omega_{t3} = 0.85$ for anxiety.

The Julkunen Family Support Scale (FSS) (68) consists of 13 items and assesses individual's subjective feelings of perceived family support; scores > 37 suggest high sense of perceived family support. Cronbach's alphas were $\alpha_{t1} = 0.81$, $\alpha_{t2} = 0.80$ and $\alpha_{t3} = 0.82$, and McDonald's omegas were $\omega_{t1} = 0.90$, $\omega_{t2} = 0.81$, $\omega_{t3} = 0.80$.

Cognitive functioning

Seven different cognitive tasks were administered for assessing a wide variety of cognitive functions. Executive functions (i.e., inhibition, interference control, cognitive flexibility, switching, attention/speed of processing) were tested using the Stroop task and the Trail Making test (parts A and B) (69, 70). Auditory working memory was tested with the Digit Span task from Wechsler's Adult Intelligence Scale Revised (WAIS-R) (71) while visuospatial working memory was assessed using the Corsi Block—Tapping Span task (backwards) (72). Visuospatial skills and visuospatial short-term and long-term memory were measured with the Taylor Complex Figure Test (73). Episodic memory was tested with the Short Story (immediate and delayed recall of a short story) (74). Prospective memory was examined with the use of a self-made test advised by Eskildsen et al. (12).

All tests were administered in a standardized sequence at all three measurements.

Statistical analysis

All statistical analyses were performed on SPSS (v.21). One-way ANOVA compare means were conducted to explore for any

potential differences between the participants who continued with the follow-ups and the participants who dropped out. Linear mixed model analysis was performed in order to examine for potential predictive relationships. One advantage of this type of analysis is that it uses the full dataset to estimate the examined associations reducing the *post hoc* volunteer bias (75). The random effects model was chosen. Model selection was based in an unstructured covariance type. The random effects model was chosen for two reasons: (1) we wanted to examine the effects of the predictor variable to the dependent across the three time points and (2) due to the importance of allowing the intercepts for each participant to be different in longitudinal studies (76). Specifically, we specified both participants and time to be correlated with random effects with a scaled identity repeated covariance type. Next, the three MBI-GS subscales were set as covariates and each cognitive task, the total scores on the HADS (depression and anxiety separately) and FSS were considered as dependent variables. Additionally, the total HADS and FSS scores (independently) were set as covariates and each cognitive task and each of the three MBI-GS subscales were set as dependent variables. As not all participants were living with someone else, the linear mixed models, where the FSS total score had been set as the predictive factor, were based on a smaller sample size ($N = 80$). Statistically significant results were examined for reversed associations. P -values < 0.05 were considered as statistically significant.

Results

Descriptive characteristics

All variables were normally distributed as skewness and kurtosis indices were within the normal range. Mahalanobis distance (77) was used in order to identify for multivariate outliers. Two multivariate outliers were detected. However, considering that exclusion of outliers in studies with multiple observations can result in a restriction bias (78), we decided to include the two outliers in the analysis.

Table 1 shows participants' descriptive characteristics across the three time points. Although there was a statistically significant difference between groups at T1 and T3 as determined by one-way ANOVA [$F(2, 228) = 3.482$, $p = 0.032$], a Tukey *post-hoc* test did not reveal any significant differences between groups across the three time points. Thus, as the participants at all three time points were mainly missing at random, we expected unbiased estimates. Table 2 depicts the significant correlations observed between participants' descriptive characteristics at T1 and the scores on the MBI-GS (T3) and performance on the cognitive tasks (T3). Concerning participants' gender, male participants exhibited lower scores ($t = -2.54$, $p < 0.05$) on the personal efficacy subscale ($M = 4.50$, $SD = 1.33$) comparing to the female participants ($M = 5.18$, $SD = 0.64$). With respect to family status, as determined by

TABLE 3 Linear mixed model analysis of MBI-GS subscales as predictive factors ($N = 104$).

Parameter	Exhaustion			Cynicism			Personal Efficacy		
	<i>b</i>	<i>SE b</i>	95% <i>CI</i>	<i>b</i>	<i>SE b</i>	95% <i>CI</i>	<i>b</i>	<i>SE b</i>	95% <i>CI</i>
Depression	0.85 +	0.14	0.57, 1.13	0.83 +	0.13	0.55, 1.11	−0.81 +	0.29	−1.42, −0.21
Anxiety	1.07 +	0.16	0.73, 1.40	0.78 +	0.16	0.44, 1.12	−1.05 +	0.28	−1.62, −0.48
Family support	ns	ns	ns	−1.17*	0.48	−2.14, −0.01	ns	ns	ns
TCFT-copy	ns	ns	ns	−0.12*	0.05	−0.23, 0.01	ns	ns	ns
Stroop-W	ns	ns	ns	0.11*	0.05	0.00, 0.22	ns	ns	ns
Stroop-CW	ns	ns	ns	ns	ns	ns	0.01 +	0.00	0.00, 0.02

* $p < 0.05$; + $p < 0.01$, *b*, unstandardized coefficient; ns, non-significant; TCFT, Taylor Complex Figure Test; Stroop-W, Stroop Word; Stroop-CW, Stroop Color Word.

one-way ANOVA there was a statistical significant difference between participants' family status at T1 and exhaustion at T3 [$F(2, 228) = 4.423, p = 0.008$], and performance on the third condition on the Stroop test [$F(2, 228) = 3.408, p = 0.024$]. Particularly, married participants exhibited significantly lower scores on the exhaustion subscale ($M = 2.08, SD = 1.43$) compared to the single participants ($M = 3.65, SD = 1.56$). Married participants performed lower on the third Stroop condition ($M = -0.47, SD = 0.78$) compared to the single participants ($M = 0.37, SD = 0.96$). None of the participants' descriptive characteristics were associated with the scores on the HADS (T3) and FSS (T3) (see [Supplementary Material](#) for the correlations coefficients between burnout, depression screening, anxiety, perceived family support and cognitive tasks on each measurement point).

Linear mixed model analysis

Effects of burnout, depression, anxiety and family support on cognitive performance

As certain demographics were significantly correlated with the performance on certain cognitive tasks (see [Table 2](#)), we controlled for these variables. Exhaustion did not predict participants' cognitive performance in any of the cognitive tasks. Cynicism had significant effects on cognitive performance on the TCFT-copy condition (95% $CI = -0.23, -0.01, b = -0.12, p < 0.05$) and on the first condition of the Stroop task (95% $CI = 0.00, 0.22, b = 0.11, p < 0.05$) across the three time points. When we examined for reversed associations, TCFT-copy condition did not have significant effects on cynicism [$F(1, 5.179) = 3.60, p = 0.11$] while performance on the first Stroop condition had significant effects on cynicism (95% $CI = 0.00, 0.38, b = 0.19, p < 0.05$). Personal efficacy significantly predicted participants' performance on the incongruent Stroop condition (95% $CI = 0.00, 0.02, b = 0.01, p < 0.01$) (see [Table 3](#)). When examined for reversed associations, the incongruent Stroop

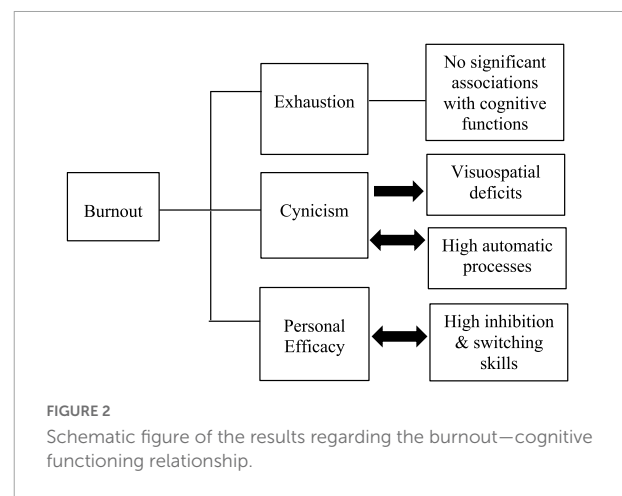


FIGURE 2
Schematic figure of the results regarding the burnout–cognitive functioning relationship.

condition also significantly predicted personal efficacy (95% $CI = 0.15, 0.53, b = 0.28, p < 0.01$) (see [Figure 2](#) for a schematic presentation of the results).

Effects of depression, anxiety on cognitive performance

No significant effects of depression screening and anxiety on cognitive performance were observed (all $ps > 0.05$).

Effects of burnout on depression, anxiety and perceived family support

Exhaustion significantly predicted both depression screening (95% $CI = 0.57, 1.13, b = 0.85, p < 0.01$) and anxiety (95% $CI = 0.73, 1.40, b = 1.07, p < 0.01$) while it did not have any effects on perceived family support. When examined for reversed associations, both depression screening (95% $CI = 0.89, 0.20, b = 0.149, p < 0.01$) and anxiety (95% $CI = 0.11, 0.21, b = 0.16, p < 0.01$) predicted exhaustion. Cynicism was found to have significant effects on depression screening (95% $CI = 0.55, 1.11, b = 0.83, p < 0.01$) anxiety

(95% CI = 0.44, 1.12, $b = 0.78$, $p < 0.01$) and perceived family support (95% CI = -2.14 , 0.20, $b = -1.17$, $p < 0.05$). Personal efficacy had significant effects on anxiety (95% CI = -1.62 , -0.48 , $b = -1.05$, $p < 0.01$) and depression screening (95% CI = -1.42 , -0.21 , $b = -0.81$, $p < 0.01$). No significant effects of personal efficacy in perceived family support were found (see Table 4). When examined for reversed associations, depression screening (95% CI = 0.12, 0.24, $b = 0.18$, $p < 0.01$), anxiety (95% CI = 0.10, 0.20, $b = 0.15$, $p < 0.01$) and perceived family support (95% CI = -0.06 , -0.07 , $b = -0.03$, $p < 0.05$) had significant effects on cynicism. Moreover, both depression screening (95% CI = -0.18 , -0.07 , $b = -0.12$, $p < 0.01$) and anxiety (95% CI = -0.09 , -0.20 , $b = -0.05$, $p < 0.01$) had significant effects on personal efficacy (see Tables 4, 5).

Effects of perceived family support on depression, anxiety and cognitive performance

Perceived family support significantly predicted anxiety (95% CI = -0.20 , -0.06 , $b = -0.13$, $p < 0.01$) and depression screening (95% CI = -0.20 , -0.07 , $b = -0.13$, $p < 0.01$). When examined for reversed associations, depression screening (95% CI = -1.30 , -0.46 , $b = -0.88$, $p < 0.01$) and anxiety (95% CI = -1.07 , -0.29 , $b = -0.68$, $p < 0.01$) also had significant effects on perceived family support. With respect to cognitive functioning, perceived family support had significant effects on participants' performance on the TCFT-delayed recall condition (95% CI = 0.00, 0.00, $b = 0.00$, $p < 0.01$). When examined for reversed associations, performance on the TCFT-delayed recall condition did not predict the levels of perceived family support [$F(1, 163.680) = 1.90$, $p = 0.16$] (see Tables 4, 5).

Discussion

The objectives of the present study were to examine (1) the causality between non-clinical burnout and cognitive functioning, (2) the causality between self-reported depression and anxiety with cognitive performance, (3) the nature of the relationship between burnout and depression screening, and burnout and anxiety, and (4) the role of perceived family support in mental health and cognition.

Associations between burnout and cognitive functioning

Our results did not provide robust evidence that non-clinical burnout affects cognitive performance. However, some interesting results were observed. Contrary to our expectations and previous studies (22), baseline exhaustion was not a

TABLE 4 Linear mixed model analysis of depression and anxiety as predictive factors ($N = 104$).

Parameter	Depression			Anxiety		
	<i>b</i>	<i>SE b</i>	95% CI	<i>b</i>	<i>SE b</i>	95% CI
Exhaustion	0.14 +	0.02	0.08, 0.20	0.16 +	0.02	0.11, 0.21
Cynicism	0.18 +	0.03	0.12, 0.24	0.15 +	0.02	0.10, 0.20
Personal efficacy	-0.12 +	0.02	-0.18 , -0.07	-0.05 +	0.01	-0.09 , -0.02
Family support	-0.88 +	0.21	-1.30 , -0.46	-0.68 +	0.19	-1.07 , -0.29

+ $p < 0.01$, *b*, unstandardized coefficient.

TABLE 5 Linear mixed model analysis of perceived family support as a predictive factor ($N = 80$).

Parameter	<i>b</i>	<i>SE b</i>	95% CI
Cynicism	-0.03^*	0.01	-0.06 , -0.00
Depression	-0.13 +	0.03	-0.20 , -0.07
Anxiety	-0.13 +	0.03	-0.20 , -0.06
TCFT-delayed	0.00 +	0.00	0.00, 0.00

* $p < 0.05$; + $p < 0.01$, *b*, unstandardized coefficient; TCFT-delayed, Taylor Complex Figure Test-delayed recall condition.

predictive factor of cognitive functioning. Nonetheless, both cynicism and personal efficacy had significant effects on participants' performance in certain cognitive tasks (see Figure 2). Particularly, cynicism negatively affected visuospatial abilities while it had positive effects on automatic processes. When we examined for reciprocal associations, visuospatial skills did not predict cynicism, suggesting that decreased visuospatial skills are a consequence of burnout; a cognitive deficit that has been observed in clinical burnout as well (79). By way of contrast, automatic processes had a positive and bidirectional relationship with cynicism. This observation is in line with—and somewhat can be explained by—the findings of Van Dam et al. (80). Specifically, the researchers showed that employees who reported high burnout levels were able to efficiently perform on cognitive tasks and applied high-effort strategies but they also experienced greater distress during task performance. Thus, current results could reflect employees' struggles to apply high-effort strategies (i.e., by increasing their automatic processing skills) in order to cope with the given task. A positive and reciprocal relationship between personal efficacy and executive functions (inhibition and switching) was also observed. This result is similar to the study of Morgan et al. (81) who observed that greater personal efficacy levels were associated with greater executive functions suggesting that employees' perception of personal efficacy might be responsible for maintaining optimal cognitive performance.

In line with the CR (33) and self-regulation (34) theories, we argued that successful self-regulation enables employees to activate their cognitive reserve processes in order to optimize their performance. Perhaps, when employees who experience

high cynicism levels start to become aware of a depletion of their mental and physical energy, they start to deploy more cognitive resources such as automatic processing skills, which are effortless and implicit and thus, easier to employ. Automatic processing is based on well-learned information (e.g., word reading) and is cue-driven (i.e., is triggered by the context and it is not intentional). Hence, it is an unconscious process which requires few attentional resources and it is more likely to occur among consistent learning environments (82). Greater performance on cognitive tasks that are reliant on automatic processing, such as the Stroop task (83), could indicate that employees who are high on both cynicism and personal efficacy do not yet lack the emotional resources that are needed in order to engage in greater cognitive efforts. Self-efficacy concerns individuals' judgments on how sufficient they are in accomplishing a task (84) and it has been found to be related with a greater sense of purpose and control (85). Perhaps, employees who are at the initial burnout stages (i.e., high cynicism levels), but also experience a high sense of self-competency, are able to successfully regulate themselves and deploy more cognitive resources in order to compensate for their difficulties.

The reverse association between automatic processes and inhibition at T1 and cynicism, and personal efficacy at T3, respectively, also emphasize the role of executive control in burnout onset. According to the strain vulnerability hypothesis (86), individuals with poor cognitive abilities are more susceptible to stressful stimuli; a hypothesis that has been supported by other researchers as well (19). That is, employees with greater executive functions probably are less intimidated by the stressful working conditions (e.g., high job demands), they are more capable in adjusting their behavior when they face new or challenging work-related tasks and as a result, they experience greater personal efficacy; resulting in a positive spillover effect (87). An observation which could also explain the cognitive resilience among non-clinical burnout populations.

Present results extend our baseline findings (32) by indicating that high scores on certain burnout dimensions can be long-lasting and emphasize the complexity of the nature of relationship between burnout and cognitive functions. Current findings could explain the results of Castaneda et al. (31) who observed positive associations between burnout and cognitive performance, but the cross-sectional design of their study did not allow for the examination of reciprocal associations. Hence, it is possible that participants' high executive functions led to better cognitive performance. Our findings are in contrast with previous longitudinal studies which suggested that executive functioning deficits are a burnout consequence (22, 23). However, Lemonaki et al. (23) indicated that poorer cognitive flexibility is associated with a later burnout onset. Moreover, our results are also in disagreement with cross-sectional studies that did not observe any significant links between burnout and cognitive functioning (30, 88) as well as with the cross-sectional

study of van Dijk et al. (29) who found that non-clinical burnout employees exhibited lower performance comparing to healthy individuals on demanding working memory tasks.

An additional remark concerns the arguments of previous studies regarding the inclusion of cognitive impairments as a core burnout dimension (5, 6). Current findings give partial support to the burnout conceptualization which considers cognitive impairments as a core burnout dimension. Although, visuospatial skills were identified as a burnout consequence, present results show that the relationship between burnout and cognitive functioning is more complex than previously might have been thought. Future studies need not only to investigate the dynamic relationship between burnout and cognitive functions but also need to explore a wide range of cognitive domains in order to gain a more complete picture of this relationship before we consider cognitive impairments as a burnout dimension.

The relationship of depression, anxiety and perceived family support with cognitive functioning

Present results did not show any effects of self-reported depression and anxiety on cognitive functioning; a result that comes in contrast with studies that observed cognitive impairments in individuals suffering from depression (89) and anxiety (90). Most studies identifying cognitive deficits in depression and anxiety examined clinical populations. In the present study the participants reported mostly mild depression and anxiety feelings. Thus, it is possible that cognitive impairment is mainly observed among clinical populations either as a consequence or a cause of depression and/or anxiety. Indeed, it is possible that individuals who experience cognitive deficits might manifest depressive and/or anxiety symptoms due to the realization of those deficits (91). Importantly, as depression and anxiety patients often receive medication treatments, one cannot rule out the possibility that the cognitive deficits could emerge as a result of the medication the patients receive and not from their clinical condition *per se*.

Concerning perceived family support, it had a positive impact on long-term visuospatial memory. Other studies have also shown the beneficial effects levels of family (59) and social (92) support on cognitive performance. It has been proposed that perceived support and social engagement challenge our cognitive system by stimulating it through the interaction with the members of our social and family networks (93) and thus, enhances individuals' cognitive reserve (33). Hence, this cognitive stimulation through our social interactions could result to better cognitive performance. The importance of social support becomes evident from research evidence which suggests that psychosocial factors can influence the cognitive functioning of individuals who are at-risk in developing dementia (94).

Burnout, depression, anxiety and perceived family support

Present results revealed reciprocal associations between burnout and depression screening, and burnout and anxiety displaying significant and positive longitudinal stability. These results are in agreement with previous longitudinal studies where a reciprocal relationship between burnout and depression was observed (43). Importantly, all three burnout components were significantly associated with both depression screening and anxiety suggesting that the two latter psychological phenomena are related equally to overall burnout levels and not to specific burnout components; results that indicate the importance of research studies taking into consideration the multifactorial dimension of burnout and not only its certain components. However, the effect sizes among the variables when the three burnout components were set as the predictors were very strong while the effect sizes when depression screening and anxiety predicted burnout were weaker. This observation advocates toward the hypothesis that burnout could be a precursor of these two psychological phenomena, giving support to the approach of Tavella et al. (39) who argued that depressive symptoms might arise as a consequence of burnout's effects. Indeed, burned-out employees might be more susceptible in developing depression and anxiety. Hakanen and Schaufeli (41) in their three-wave study showed that burnout predicts depression and not the opposite. However, considering the fact that most longitudinal studies support reciprocal paths, this view cannot be considered strong enough to support the hypothesis that burnout is an antecedent of depression and anxiety. More longitudinal studies examining the reciprocal associations of burnout with depression and anxiety are needed in order to gain a better understanding of how these associations develop over time. Moreover, the investigation of the role of the context (i.e., work-specific and context-general) and how it affects individuals' mental health could provide further insights on the nature of the two relationships (41).

An additional goal of this study was to examine the bidirectional influences of perceived family support with burnout, depression screening and anxiety. Our results showed robust evidence that perceived family support has reciprocal associations with certain aspects of burnout, depression screening and anxiety in the directions expected. Specifically, high levels of perceived family support were found to decrease cynicism, depression screening and anxiety over time whereas high cynicism, depression screening and anxiety levels negatively affected perceived family support. Nevertheless, the effects of perceived family support on these three factors were higher comparing to the opposite path. These results emphasize the importance of family context in mental health as it can either protect against the development of psychological problems or it can be disrupted by pre-existing psychological difficulties. This observation could be explained on the basis of the conservation

of resources model (COR) (95). COR model's key tenet is that individuals are prompted to protect their resources (i.e., everything they value such as energy, relationships etc.) and when these resources are either threatened or lost, then stress emerges. The COR model indicates the importance of social support which acts as a resource pool when the personal resources have been exhausted (96). Present results recognize the role of perceived family support as a potential protective mechanism against mental health problems. That is, distressed individuals might turn to their family members in order to help them compensate for their lost resources. The COR model could also explain this reversed effect. When negative feelings start to emerge, then individuals start to avoid interactions with their family members as an attempt to preserve their energy resources; as quality family relationships involve active participation among family members, posing demands on the distressed individual's already limited resources. The reversed associations also give support to Coyne's interactional theory of depression (1976) and indicate that, not only depression, but other mental health difficulties as well can result in negative interactions with family members and poorer quality of family relations.

Surprisingly, perceived family support was significantly associated only with cynicism, but not with the exhaustion and personal efficacy burnout dimensions. The main conceptual burnout model posits that the three burnout dimensions develop in a subsequent order. That is, high exhaustion feelings lead to high cynicism levels which, consequently, leads to inefficacy (97). However, others have considered cynicism as a coping mechanism against stress and burnout (98, 99). It has been proposed that cynicism can result in negative associations with prosocial behavior and interpersonal conflicts (100, 101). Prosocial behavior is a social behavior that enhances both the wellbeing and integrity of other people or society as a whole *via* committing in positive behaviors such as helping, cooperating and supporting (102). Hence, a possible interpretation is that high levels of cynicism could result in a more cynical behavior toward family members.

Practical implications

The results indicate that visuospatial functioning deficits are a non-clinical burnout consequence. Visuospatial functions are responsible for the mental representation of objects and spatial relationships, and they allow us to navigate through our environment (103). Thus, these observations posit significant concerns regarding employees' personal (e.g., driving) and work life, especially for those occupations where integral visuospatial abilities are of importance such as professional drivers, engineers and surgeons as diminished visuospatial skills could put at risk client and patient safety [for a mini review see Koutsimani and Montgomery (104)]. Executive functions

are also of importance when encountering stressful situations in the workplace while well-established skills can facilitate performance at the initial burnout stages. As prevention is more desirable than intervention, the building of prevention strategies focusing on the enhancement of executive functions as well as employees' cognitive strengths could help tackle those conditions resulting in burnout. Although we observed significant links between burnout and cognitive functions, our results are not robust enough to suggest that cognitive impairments could be a core burnout dimension. Moreover, present results support the notion that burnout is distinct from both depression and anxiety. However, these three mental health problems have reciprocal reinforcing associations. Practitioners could build intervention programs focusing on the alleviation of the symptoms of all three psychological phenomena, as all three appear to spill over to individuals' work and personal life areas. Based on the reinforcing associations, intervention programs could focus on diminishing depression and anxiety feelings by helping employees to gain a more positive perspective toward life which could lead toward a more satisfied outlook of their work, and vice versa. Considering the mutual relationships between perceived family support, cynicism, depression and anxiety, practitioners should consider in adapting techniques focusing on the enhancement of one's family ties; referring individuals with mental health problems to family therapy could be beneficial for both patients and their families. Finally, practitioners could also consider integrating the strengthening of family ties within cognitive training and neurorehabilitation programs.

Overall, the results of the present study offer important insights on the relationship of burnout with cognitive functioning, depression screening and anxiety and they also underline the important role of family context. Future longitudinal studies are needed in order to disentangle the role of these factors.

Limitations

The present study is not without limitations. The sample size was relatively small, thus making our results more susceptible in Type I error. Future studies with larger sample sizes will allow a better comprehension of the variables' predictive associations. Considering that we used the snowball sampling method we cannot rule out the possibility of a potential sampling bias and a higher margin of error. Although no statistically significant differences were observed between the participants who continued with the study and the participants who dropped out, there was a 50% dropout rate at T3 which could result in a bias dropout and thus, to a loss of representativeness of the sample. Indeed, participants at T3 reported higher cynicism levels hence, suggesting that participants' non-response occurred not

at random (NMAR) (105). Moreover, burnout, depression, anxiety and perceived family support were examined through self-reported questionnaires, thus participants' answers could be affected by potential self-report biases. In addition to this, both depression and anxiety were assessed *via* a single scale; i.e., the HADS. Although HADS has been found to be appropriate for non-clinical populations (67), the scale covers a limited array of the symptoms characterizing both depression and anxiety. Scales that cover the full range of depression and anxiety symptoms could have provided different results. Even though we measured all studied variables across three different time points, we cannot infer causality. Due to practical reasons, we chose to assess the variables of interest in an 8 and 17-month period interval after the baseline examination. However, the chosen time lags between each wave might not have been sufficient to detect real changes. Indeed, the lack of consensus on the appropriate time lags and thus, the arbitrary time points that are chosen is in itself a methodological limitation in longitudinal studies (106); longer, or shorter, time frames between time intervals in future longitudinal studies could provide further information on the exact associations among these relationships. Lastly, although we examined a broad range of cognitive functions of varying difficulty, more complex cognitive tasks when examining non-clinical burnout employees in future studies should be considered. In fact, although our results show that visuospatial deficits are a cynicism outcome, we cannot overlook the possibility of other cognitive functions underlying this relationship. That is, we assessed visuospatial skills with the administration of a constructional task (i.e., TCFT-copy condition); a task that integrates visual perception with motor response and thus, it includes a spatial component (107). Performance on constructional tasks can be affected by other functions including basic attentional abilities (i.e., sustained and visual attention, alertness and focus). Motor skill performance has been associated with attention (visual and alertness) (108). Although we measured for executive attention (*via* the Stroop task and TMT—part B) and visual attention (*via* TMT part—A), it is possible that deficits in these areas might have been missed due to the lack of complexity of the tasks on the general population. The TCFT—copy condition demands competent attention and focus in order to recognize the complex figure and approach the visual information (109). Thus, basic attention deficits that might went undetected could have mediated the relationship between cynicism and visuospatial skills; emphasizing the need for thorough cognitive screening when examining healthy populations.

Conclusion

As non-clinical burnout refers to the early burnout stages where employees are still working, it is of importance to detect

its symptoms at this early phase in order to prevent individuals from reaching clinical stages. This study emphasizes the role of executive functions in employees' mental (emotional and cognitive) resilience while they also reveal the adverse effects of non-clinical burnout in visuospatial abilities; a cognitive domain that has not received much attention in the relevant literature. Although moderate burnout levels (i.e., high cynicism levels) are sufficient to affect optimal cognitive performance, high executive function abilities can protect against both cognitive decline and certain burnout aspects. Our evidence points to the distinction of burnout from depression and anxiety but also support that burnout is not independent from the two psychological syndromes. Additionally, the findings of this study highlight the role of other psychosocial non-work-related factors in both mental health and cognition. Overall, present findings reveal the practical implications of the early detection of burnout and the role of perceived support in both cognitive functioning and mental health. It is of importance to know which factors can affect cognitive performance and mental health, as this will help in the development of more targeted intervention programs.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

Author contributions

PK and AM: conceptualization, methodology, resources, software, and visualization. PK: data curation, formal analysis,

funding acquisition, investigation, and writing—original draft. AM: project administration, supervision, validation, and writing—review and editing. Both authors have read and agreed to the published version of the manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsy.2022.978566/full#supplementary-material>

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