



Buczko W, Paszke N, Wiśniewski P, Gajewski J, Machelski G, Mędrek M, Mika M, Mąkosa K. Physical Activity and Burnout-Related Outcomes in Healthcare Workers: A Narrative Review of Current Evidence and Practical Implications. *Quality in Sport*. 2026;67:74353. <https://doi.org/10.12775/QS.2026.67.74353>

ARTICLE TIMELINE

Received: 15.07.2026. Revised: 02.08.2026. Accepted: 02.08.2026. Published: 10.08.2026.

The journal has been awarded 20 points in the parametric evaluation by the Polish Ministry of Higher Education and Science (Annex to the announcement of 05.01.2024, No. 32553). Unique Journal Identifier: 201398. Scientific disciplines assigned: Economics and finance (Field of social sciences); Management and Quality Sciences (Field of social sciences).

Punkty Ministerialne z 2019 – aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398. Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych). © The Authors 2026.

OPEN ACCESS · CC BY-NC-SA 4.0 This article is published with open access under the License Open Journal Systems of Nicolaus Copernicus University in Toruń, Poland, and is distributed under the terms of the Creative Commons Attribution Non-commercial Share Alike License (<http://creativecommons.org/licenses/by-nc-sa/4.0/>), which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the work is properly cited. The authors declare no conflict of interest regarding the publication of this paper.

Physical Activity and Burnout-Related Outcomes in Healthcare Workers: A Narrative Review of Current Evidence and Practical Implications

Wiktor Buczko, ORCID <https://orcid.org/0009-0003-4213-1172>
wiktorbuczko1@gmail.com

CRIDO Radiology and Diagnostic Imaging Center, Gliwice, Poland

Natalia Paszke, ORCID <https://orcid.org/0009-0008-1638-130X>
natalia.paszke21@gmail.com

Provincial Specialist Hospital No. 5 named after St. Barbara, Sosnowiec, Poland

Piotr Wiśniewski, ORCID <https://orcid.org/0009-0004-0805-4772>
wisniewskipiotr lukasz@gmail.com

Municipal Hospitals Complex in Chorzów, Chorzów, Poland

Jan Gajewski, ORCID <https://orcid.org/0009-0002-4761-0300>
j.gajewski99@gmail.com

Municipal Hospital in Zabrze, Zabrze, Poland

Grzegorz Machelski, ORCID <https://orcid.org/0009-0003-5341-8208>
grzegorzomachelski@gmail.com

Municipal Hospital in Zabrze, Zabrze, Poland

Marzena Mędrek, ORCID <https://orcid.org/0009-0004-6668-7447>
marzenamedrek@onet.eu

Municipal Hospitals Complex in Chorzów, Chorzów, Poland

Mariola Mika, ORCID <https://orcid.org/0009-0004-4642-1318>
mariolamika4@gmail.com

Municipal Hospitals Complex in Chorzów, Chorzów, Poland

Kacper Mąkosa, ORCID <https://orcid.org/0009-0001-3218-2676>
Kmakosa023@gmail.com

Ludwik Rydygier Specialist Hospital in Kraków, Kraków, Poland

Corresponding Author

Wiktor Buczko, wiktorbuczko1@gmail.com

Abstract

Background. Burnout among healthcare workers is associated with impaired well-being, workforce retention, and quality of care. Physical activity may support recovery, but its role in burnout prevention remains uncertain.

Aim. To synthesize current evidence on physical activity and burnout-related outcomes among healthcare workers.

Material and methods. A narrative review of systematic reviews, observational and intervention studies, and selected guidelines was conducted using PubMed, Scopus, Web of Science, Google Scholar, and the Cochrane Library.

Results. Observational studies generally reported more favorable burnout-related outcomes among physically active healthcare workers, particularly for emotional exhaustion and depersonalization, although findings were inconsistent. Evidence for professional efficacy or personal accomplishment was limited. Intervention studies showed more consistent improvements in stress and sleep than in burnout itself. Predominantly cross-sectional designs and substantial heterogeneity limited causal interpretation and prevented identification of an optimal exercise type or dose.

Conclusions. Physical activity may be a feasible recovery-oriented element of multilevel strategies addressing burnout-related outcomes. Programs should be voluntary, accessible, compatible with shift work, and implemented alongside organizational measures addressing workload, staffing, leadership, and recovery opportunities.

Key words: burnout; physical activity; healthcare workers; exercise; occupational health.

1. Introduction

1.1. Overview

Burnout is classified in the ICD-11 as an occupational phenomenon arising from chronic workplace stress that has not been successfully managed, rather than as a medical condition (World Health Organization, 2019). It is characterized by exhaustion, increased mental distance from work or cynicism, and reduced professional efficacy (World Health Organization, 2019). In the Maslach model, the related dimensions are emotional exhaustion, depersonalization, and reduced personal accomplishment (Maslach & Jackson, 1981; Maslach et al., 2001). In this context, depersonalization refers to a detached or impersonal attitude toward recipients of care and should not be interpreted as a dissociative disorder. Accordingly, this review uses the terms “burnout symptoms,” “burnout dimensions,” and “burnout-related outcomes” to describe questionnaire-based occupational outcomes rather than clinically diagnosed mental disorders (Maslach & Jackson, 1981; Maslach et al., 2001; World Health Organization, 2019).

Healthcare workers are particularly vulnerable because of high workload, emotional demands, shift work, administrative burden, responsibility for patient outcomes, and insufficient recovery time (De Hert, 2020; Søvold et al., 2021). Although prevalence estimates vary according to professional group, measurement instrument, and cutoff criteria, substantial burnout levels have been reported among medical students, resident physicians, and practicing physicians (Dyrbye et al., 2014; Rotenstein et al., 2018). Burnout affects both healthcare workers and healthcare delivery. It is associated with lower work engagement, job dissatisfaction, turnover intention, reduced professionalism, patient-safety incidents, poorer quality of care, absenteeism, and economic costs (Han et al., 2019; Hodkinson et al., 2022; Salvagioni et al., 2017; Shanafelt et al., 2015). Prevention should therefore combine support for individual recovery with measures addressing occupational and organizational stressors (Cohen et al., 2023; Panagioti et al., 2017; West et al., 2016).

Physical activity includes bodily movement that increases energy expenditure, whereas exercise is a planned, structured, and repetitive form of physical activity undertaken to improve or maintain physical fitness (Caspersen et al., 1985). Regular physical activity has established benefits for several mental-health and sleep-related outcomes in general adult populations, although these findings do not directly establish an effect on burnout among healthcare workers (Bull et al., 2020; Pearce et al., 2022; Schuch et al., 2018; Xie et al., 2021). These outcomes are relevant to burnout research because sleep disturbance, impaired recovery, and prolonged occupational stress are closely related to emotional exhaustion (De Hert, 2020; Sonnentag & Fritz, 2015).

Healthcare workers who are more physically active often report more favorable burnout-related outcomes, particularly in the domains of emotional exhaustion and depersonalization (Mincarone et al., 2024; Naczinski et al., 2017). However, most available studies are cross-sectional and rely on self-reported activity measures, preventing causal interpretation (Mincarone et al., 2024). Longitudinal evidence suggests that changes in physical activity may accompany changes in burnout symptoms, although the direction and magnitude of this relationship remain uncertain (Lindwall et al., 2014). Exercise interventions have produced more consistent improvements in psychological stress and sleep than in burnout itself, and the optimal modality or dose remains unknown (Martland et al., 2024). Evidence from broader occupational populations also indicates that voluntary leisure-time activity should be distinguished from physically demanding occupational work, which may increase fatigue rather

than support recovery (de Vries & Bakker, 2022). A focused synthesis is therefore needed to clarify the potential contribution of physical activity to burnout prevention and its practical relevance for healthcare workplaces.

From a sport, exercise, and health-promotion perspective, the relevance of this topic lies not only in general lifestyle advice but also in the practical design of recovery-oriented physical activity strategies. These may include exercise prescription, active commuting, brief movement breaks, supervised group activity, digital exercise options, and workplace-supported programs adapted to shift work, fatigue, baseline fitness, and recovery needs.

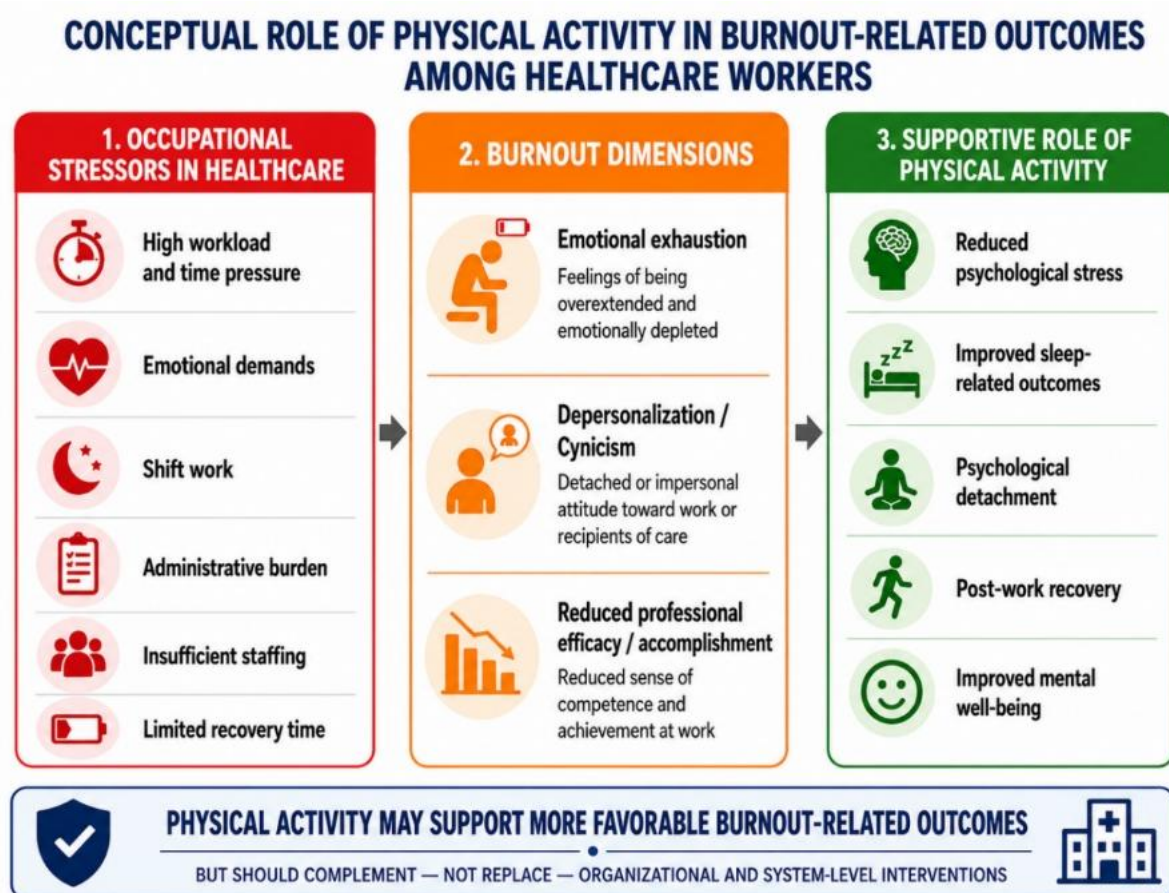


Figure 1. Conceptual role of physical activity in burnout-related outcomes among healthcare workers.

Healthcare workers are exposed to multiple occupational stressors that may contribute to emotional exhaustion, depersonalization, and reduced professional efficacy (De Hert, 2020; Maslach & Jackson, 1981; Maslach et al., 2001; Søvdal et al., 2021; World Health Organization, 2019). Physical activity may support psychological detachment, perceived stress reduction, sleep-related outcomes, post-work recovery, and mental well-being (Martland et al., 2024; Mincarone et al., 2024; Sonnentag & Fritz, 2007, 2015), although these pathways should be interpreted as plausible mechanisms rather than proven causal effects on burnout. Physical activity should therefore be understood as complementary to organizational and system-level interventions addressing workplace conditions (Cohen et al., 2023; Panagioti et al., 2017; West et al., 2016; World Health Organization, 2022; World Health Organization & International Labour Organization, 2022).

1.2. Research objective

The objective of this narrative review was to synthesize current evidence on physical activity and burnout-related outcomes among healthcare workers. The review examined associations with burnout dimensions, evidence from exercise-based interventions, recovery-related mechanisms, and practical implications for healthcare workplaces and exercise-based health promotion.

1.3. Research questions

This review addresses the following research questions:

1. Is physical activity associated with more favorable burnout-related outcomes among healthcare workers?
2. Which burnout dimensions have been reported in relation to physical activity among healthcare workers?
3. What reported effects have physical activity and exercise interventions had on burnout and related outcomes, particularly stress and sleep, among healthcare workers?
4. What are the practical implications of the available evidence for healthcare workplaces, occupational health programs, and physical activity- or exercise-based health promotion?

2. Review materials and methods

2.1. Review design and search strategy

This study was conducted as a narrative review examining current evidence on physical activity and burnout-related outcomes among healthcare workers. The final literature search was conducted on 12 July 2026 using PubMed, Scopus, Web of Science, the Cochrane Library, and Google Scholar. Google Scholar was used as a supplementary source, and the reference lists of relevant systematic reviews and primary studies were screened to identify additional eligible publications.

Search terms were combined using the Boolean operators “AND” and “OR.” An example PubMed search strategy was: (“burnout” OR “occupational burnout” OR “professional

burnout” OR “emotional exhaustion” OR “depersonalization” OR “personal accomplishment” OR “professional efficacy”) AND (“physical activity” OR “exercise” OR “aerobic exercise” OR “resistance training” OR “leisure-time physical activity”) AND (“healthcare workers” OR “health personnel” OR “health professionals” OR “medical staff” OR “physicians” OR “nurses” OR “resident physicians” OR “allied health professionals”). Supplementary searches also combined terms related to physical activity or exercise with “psychological stress,” “sleep,” “recovery,” “occupational health,” “workplace intervention,” and “burnout prevention.” The search syntax was adapted to the requirements of each database.

Priority was given to systematic reviews, meta-analyses, randomized controlled trials, longitudinal studies, and observational studies directly addressing the review questions. Records were screened iteratively rather than through a predefined systematic-review screening protocol, in accordance with the narrative review design.

2.2. Eligibility and study selection

The main search focused on English-language peer-reviewed publications published between January 2010 and 12 July 2026, including systematic reviews, meta-analyses, randomized controlled trials, longitudinal studies, and observational studies. Older seminal publications were retained when required to define burnout, describe measurement instruments, or present relevant theoretical frameworks. Selected documents issued by the World Health Organization, the International Labour Organization, the National Academies of Sciences, Engineering, and Medicine, and other relevant authoritative organizations were also considered.

Studies were eligible as core evidence if they examined healthcare workers, assessed physical activity or exercise, and reported burnout or at least one burnout-related dimension. Publications addressing psychological stress, sleep, recovery, occupational health, theoretical mechanisms, or workplace interventions were included as supporting evidence when they contributed to the interpretation of findings or practical recommendations.

Studies were excluded from the core evidence base if they did not involve healthcare workers, did not assess physical activity or exercise, or did not report burnout-related outcomes. Evidence concerning medical or healthcare students was used only as supplementary evidence and was not considered part of the core healthcare-worker evidence base.

Duplicate records were removed before screening. Titles and abstracts were assessed for relevance, followed by full-text evaluation of potentially eligible publications. Study selection was guided by the predefined eligibility criteria, directness of the evidence, study design, and availability of sufficient methodological and outcome data. A total of 48 sources were included in the final narrative synthesis.

2.3. Information extraction and synthesis

For empirical studies, relevant information was extracted on study design, professional population, sample size, physical activity exposure or intervention, burnout assessment instrument, outcome definition, statistical estimates, and main findings. For intervention studies, information on intervention modality, duration, comparator, and the main outcomes related to burnout, stress, sleep, or recovery was summarized when reported.

The extracted quantitative information, including sample sizes, exposure definitions, odds ratios, confidence intervals, regression coefficients, and p values, was checked against the original publications before inclusion in the Results section.

The evidence was synthesized descriptively according to study design, professional group, physical activity frequency and duration, burnout dimension, intervention modality, and recovery-related outcomes. Because of substantial heterogeneity in populations, exposures, interventions, and outcome measures, no meta-analysis was undertaken.

Because this article was designed as a narrative review rather than a systematic review, no PRISMA flow diagram, formal risk-of-bias assessment, or certainty-of-evidence grading was performed. The methods were intended to support a structured narrative synthesis of current evidence rather than to produce a pooled quantitative estimate of effect. Consequently, the conclusions should be interpreted as evidence-informed and hypothesis-generating, particularly where the available studies are observational, heterogeneous, or based on self-reported physical activity.

3. Results

3.1. Characteristics of the evidence base

The evidence specifically examining physical activity and burnout among healthcare workers remains dominated by observational research. A systematic review identified 21 independent studies involving a total of 15,782 healthcare workers, with individual sample sizes ranging from 60 to 7,197 participants. Nine studies focused specifically on resident physicians, and all included studies used a cross-sectional design. Only 2 of the 21 studies were designed primarily to investigate the association between physical activity and burnout, whereas the remaining studies assessed physical activity as one of several lifestyle, occupational, or psychosocial factors (Mincarone et al., 2024).

Considerable heterogeneity was observed in the assessment of both physical activity and burnout. The reported prevalence of burnout ranged from 7% to 83%, while the proportion of participants classified as physically active ranged from 44% to 87%. Only 3 of the 21 studies used structured physical activity questionnaires, whereas 18 relied on ad hoc questions concerning exercise frequency, intensity, duration, or achievement of a predefined activity threshold. Burnout was most commonly assessed using the Maslach Burnout Inventory, although some studies used alternative instruments, including the Copenhagen Burnout Inventory. Differences in conceptual frameworks, scoring methods, and cutoff values substantially limited comparability between studies (Kristensen et al., 2005; Maslach & Jackson, 1981; Maslach et al., 2001; Mincarone et al., 2024). In the Maslach framework, the third dimension is expressed as reduced personal accomplishment, whereas the ICD-11 refers to reduced professional efficacy (Maslach et al., 2001; World Health Organization, 2019). Therefore, the available evidence should be interpreted primarily as indicating a pattern of association rather than establishing a preventive effect of physical activity on burnout among healthcare workers.

3.2. Frequency and duration of physical activity

The studies summarized below were included in the systematic review by Mincarone et al. (2024) and are presented as illustrative examples rather than as an independent evidence set. Among the selected examples, the largest study involved 2,411 physicians and nurses working

in intensive care units; exercise once weekly was associated with lower odds of burnout compared with less frequent or no exercise (OR = 0.66; 95% CI: 0.45–0.95). The corresponding estimates were OR = 0.56 (95% CI: 0.39–0.80) for exercise every 2–3 days and OR = 0.52 (95% CI: 0.36–0.75) for daily exercise (Hu et al., 2021).

In another study of 108 radiology residents, exercising at least once per week was associated with lower unadjusted odds of high depersonalization (OR = 0.33; 95% CI: 0.13–0.78), low personal accomplishment (OR = 0.43; 95% CI: 0.19–0.97), and overall burnout (OR = 0.29; 95% CI: 0.10–0.77). After adjustment, weekly exercise remained associated with lower odds of high depersonalization (adjusted OR = 0.38; 95% CI: 0.15–1.00; $p = 0.04$) (Bin Dahmash et al., 2020).

In a study of 180 orthopedic surgeons and residents, exercising for no more than 1 hour per week was associated with higher odds of burnout than exercising for more than 1 hour per week (OR = 2.30; 95% CI: 1.24–4.48) (Ghoraishian et al., 2022). Among 76 internal medicine residents, achieving at least 150 minutes of physical activity per week was associated with lower odds of high scores on burnout subscales (OR = 0.38; 95% CI: 0.147–0.99) (Olson et al., 2014).

Not all associations remained significant after adjustment. Among 185 plastic surgery residents, physical activity at least once within a two-week period was associated with lower odds of burnout in univariable analysis (OR = 0.41; 95% CI: 0.22–0.77), but the association was no longer significant in the multivariable model (Panse et al., 2020).

Overall, these findings suggest that relatively low thresholds of leisure-time activity may be associated with more favorable burnout-related outcomes in some healthcare-worker groups. Nevertheless, inconsistent adjustment for confounders and reliance on cross-sectional data prevent conclusions about dose-response effects. These findings should therefore be interpreted as associations between reported activity levels and burnout-related scores, not as evidence that increasing physical activity would necessarily reduce burnout risk (Mincarone et al., 2024; Naczenski et al., 2017).

3.3. Associations with individual burnout dimensions

In one resident-based study of 267 ophthalmology residents, performing at least 150 minutes of physical activity per week was associated with a higher probability of low emotional

exhaustion ($p = 0.02$). No significant associations were found for depersonalization ($p = 0.32$), personal accomplishment ($p = 0.29$), or overall burnout classification ($p = 0.13$) (Feng et al., 2018).

In a study of 447 physicians, regular exercise was defined as moderate- or vigorous-intensity activity performed at least 5 days per week for a minimum of 10 minutes per session. Approximately 76% of participants met this definition. Regular exercise was associated with lower personal burnout scores (regression coefficient = -9.882 ; $p < 0.001$) and lower patient-related burnout scores (regression coefficient = -6.932 ; $p = 0.004$), but not with work-related burnout. These associations remained significant after adjustment for other variables (Ng et al., 2020). Because the Copenhagen Burnout Inventory conceptualizes burnout differently from the Maslach Burnout Inventory, these findings should be compared cautiously with studies using emotional exhaustion, depersonalization, and personal accomplishment/professional efficacy (Kristensen et al., 2005; Maslach et al., 2001).

Among 171 emergency-department nurses, 49% reported daily physical activity. Nurses who did not exercise daily had higher depersonalization scores ($p = 0.005$), while differences in emotional exhaustion ($p = 0.09$) and personal accomplishment ($p = 0.48$) were not significant. Lack of daily activity remained independently associated with higher depersonalization after adjustment (Portero de la Cruz et al., 2020).

In contrast, a study of 259 physicians, nurses, and technical staff in a cardiology hospital found no significant association between physical activity and emotional exhaustion, depersonalization, or personal accomplishment. In that study, 34% of participants reported at least 40 minutes of off-work activity on three or more days per week (Vinnikov et al., 2019).

Table 1. Selected observational findings on physical activity and burnout among healthcare workers

Study and population	Physical activity measure	Main finding
Hu et al. (2021); ICU physicians and nurses, n = 2,411	Exercise once weekly, every 2–3 days, or daily	Lower odds of burnout: OR = 0.66, 0.56, and 0.52 , respectively, compared with less frequent or no exercise
Bin Dahmash et al. (2020); radiology residents, n = 108	Exercise at least once per week	Lower overall burnout (OR = 0.29) and depersonalization (adjusted OR = 0.38)
Ghoraishian et al. (2022); orthopedic surgeons and residents, n = 180	≤1 versus >1 hour/week	≤1 hour/week associated with higher burnout odds (OR = 2.30)
Olson et al. (2014); internal medicine residents, n = 76	≥150 min/week	Lower odds of high burnout-subscale scores (OR = 0.38)
Feng et al. (2018); ophthalmology residents, n = 267	≥150 min/week	Lower emotional exhaustion (p = 0.02); other dimensions not significant
Ng et al. (2020); physicians, n = 447	Moderate or vigorous activity ≥5 days/week	Lower personal (– 9.882) and patient-related burnout (– 6.932); work-related burnout not significant
Portero de la Cruz et al. (2020); emergency nurses, n = 171	Daily physical activity	Lack of daily activity associated with higher depersonalization (p = 0.005)
Vinnikov et al. (2019); cardiology staff, n = 259	≥40 min on ≥3 days/week	No significant association with burnout dimensions

Note. OR = odds ratio; ICU = intensive care unit. Full confidence intervals and selected statistical details are reported in the main text. The studies were included in the systematic review by Mincarone et al. (2024) and are presented as selected examples rather than as an independent evidence set.

3.4. Longitudinal evidence

Longitudinal evidence remains limited. Lindwall et al. (2014) followed 3,717 Swedish healthcare workers over four measurement points across six years and found that changes in physical activity were associated with changes in burnout, depression, and anxiety. However, within-person associations were weak, indicating that physical activity and mental-health

changes tended to travel together over time but did not establish a strong individual-level causal effect (Lindwall et al., 2014).

Similarly, Naczenski et al. (2017) reported moderately strong evidence of an inverse longitudinal association between physical activity and exhaustion, although most included studies were of limited methodological quality. Overall, the limited longitudinal evidence supports a possible relationship between physical activity and lower burnout symptoms, but it does not establish that increasing physical activity directly prevents burnout (Lindwall et al., 2014; Naczenski et al., 2017).

3.5. Evidence according to physical activity modality

3.5.1. Conventional exercise and general physical activity interventions

Unlike the observational studies summarized above, intervention studies provide a more direct basis for evaluating the potential effects of physical activity programs. Nevertheless, their interpretation remains limited by small samples, heterogeneous protocols, variable control conditions, and differences in outcome assessment. A systematic review identified 16 physical activity or exercise-intervention studies involving healthcare workers, including 11 randomized controlled trials. The interventions included aerobic exercise, resistance training, mixed exercise, non-aerobic exercise, general physical activity programs, and other movement-based approaches (Martland et al., 2024).

The direction of findings differed according to the outcome assessed. All three randomized trials evaluating psychological stress reported favorable effects, while three of four trials assessing sleep reported improvement. By contrast, findings concerning burnout, depression, fatigue, traumatic stress, anxiety, and overall mental well-being were less consistent. These differences suggest that stress and sleep may be more responsive to short-term physical activity interventions than burnout itself, although improvements in stress or sleep should not be treated as equivalent to a reduction in occupational burnout (Martland et al., 2024). This distinction is important because burnout is a multidimensional occupational outcome influenced not only by individual recovery but also by workload, staffing, leadership, organizational culture, and recovery opportunities (Cohen et al., 2023; Panagioti et al., 2017; West et al., 2016; World Health Organization, 2022).

The available evidence does not permit conclusions about the comparative effectiveness of aerobic, resistance, mixed, or other exercise modalities. Intervention duration, frequency, intensity, supervision, adherence, and comparator conditions varied substantially between studies, preventing meaningful direct comparison. In addition, most observational studies reported only the frequency or duration of physical activity and did not specify the activity modality. Consequently, separate effect estimates for aerobic and resistance exercise could not be established (Martland et al., 2024; Mincarone et al., 2024). At present, conventional exercise and general physical activity programs may be regarded as potentially supportive approaches, particularly for stress- and sleep-related outcomes, but the evidence does not support a specific exercise prescription for burnout prevention (Martland et al., 2024).

3.5.2. Supplementary evidence from yoga and mind–body movement

Yoga-based interventions were considered separately because they combine physical movement with breathing exercises, relaxation, attention regulation, and meditative components (Ciezar-Andersen et al., 2021; Cocchiara et al., 2019). Studies focused exclusively on yoga or qigong were excluded from the systematic review of conventional physical activity because their effects could not be attributed solely to physical exertion (Mincarone et al., 2024).

Systematic reviews of yoga-based interventions among healthcare workers and students reported favorable changes in perceived stress, anxiety, depressive symptoms, musculoskeletal complaints, and selected burnout-related outcomes (Ciezar-Andersen et al., 2021; Cocchiara et al., 2019). However, the studies generally involved small samples, heterogeneous protocols, variable outcome measures, short follow-up periods, and limited use of active control groups. Evidence concerning healthcare students should also be interpreted as supplementary because their occupational demands and working conditions differ from those of employed healthcare professionals.

The multimodal nature of yoga limits conclusions about which component was responsible for the reported effects. Improvements may reflect the combined influence of movement, breathing, relaxation, social participation, and attention regulation rather than physical activity alone. The available evidence therefore does not permit a reliable estimate of yoga's independent effect on burnout or a direct comparison with conventional aerobic, resistance, or mixed exercise interventions (Ciezar-Andersen et al., 2021; Cocchiara et al., 2019).

3.5.3. Cross-modality summary

Across the intervention modalities examined, favorable findings were reported more consistently for psychological stress and sleep than for burnout itself. This pattern was observed across conventional physical activity or exercise interventions and was also reflected in supplementary yoga and mind–body evidence, although yoga-based interventions combine physical movement with breathing, relaxation, and attentional components (Ciezar-Andersen et al., 2021; Cocchiara et al., 2019; Martland et al., 2024).

Substantial heterogeneity in intervention duration, frequency, intensity, supervision, control conditions, and outcome measurement prevented reliable comparison between modalities. No exercise type demonstrated clear superiority, and the available evidence did not permit identification of an optimal frequency, intensity, or duration for burnout-related outcomes among healthcare workers (Martland et al., 2024).

4. Discussion

4.1. Interpretation of findings

The observational evidence indicates that physical activity is associated with more favorable burnout-related outcomes among healthcare workers, but it does not establish a preventive causal effect (Mincarone et al., 2024; Naczenski et al., 2017). Favorable associations were reported for emotional exhaustion and depersonalization, whereas evidence for professional efficacy, personal accomplishment, and overall burnout was less consistent (Mincarone et al., 2024). Intervention studies reported more consistent improvements in psychological stress and sleep than in burnout itself, a pattern compatible with a possible recovery-related pathway (Martland et al., 2024; Sonnentag & Fritz, 2015). Because most intervention studies were short, heterogeneous, and not primarily designed to assess burnout as a long-term outcome, improvements in stress or sleep should not be interpreted as evidence of sustained burnout prevention (Martland et al., 2024).

Physical activity may provide an opportunity for psychological detachment and post-work recovery, although this mechanism remains more plausible than definitively proven in relation to burnout prevention. Detachment and relaxation are recognized components of recovery from

occupational demands and may help replenish resources depleted during work (Sonnentag & Fritz, 2007, 2015). Within the Job Demands–Resources framework, physical activity can therefore be interpreted as a potential individual recovery resource rather than a direct solution to occupational causes of burnout (Bakker & Demerouti, 2017; Demerouti et al., 2001).

Broader occupational evidence also indicates that leisure-time physical activity should be distinguished from physically demanding occupational work. Occupational physical demands may increase fatigue and impair recovery rather than provide the psychological benefits associated with voluntary exercise (de Vries & Bakker, 2022). This distinction is important because interpreting physical activity as a cure for burnout could shift responsibility from healthcare organizations to individual workers.

4.2. Practical implications for healthcare workplaces

Physical activity programs may be considered as low-threshold occupational health-promotion options rather than as exercise prescriptions of proven superiority. Potentially feasible formats include protected walking or mobility breaks, voluntary group-based activity, active-commuting support, digitally delivered exercise options, and low-intensity mind–body movement programs where acceptable to staff. These approaches should be adapted to shift work, fatigue, baseline fitness, physical capacity, and individual preferences. Current evidence suggests that such programs may be feasible and may improve selected recovery-related outcomes, particularly stress and sleep, although it does not identify one optimal modality, intensity, frequency, or duration for burnout prevention (Ciezar-Andersen et al., 2021; Cocchiara et al., 2019; Martland et al., 2024).

Programs should prioritize recovery-oriented, voluntary leisure-time or workplace-supported activity rather than increasing physical demands during already strenuous clinical work (de Vries & Bakker, 2022). This distinction is particularly important in nursing and other physically demanding healthcare roles, where musculoskeletal complaints such as spinal pain have been described as a serious occupational health problem and where preventive programs have been recommended (Baumgart et al., 2015; de Vries & Bakker, 2022). Such programs should be integrated with organizational measures rather than implemented in isolation. This systems-based framing is consistent with recommendations that treat clinician burnout as a shared organizational and professional responsibility rather than solely as an individual resilience problem (National Academies of Sciences, Engineering, and Medicine, 2019; Shanafelt &

Noseworthy, 2017). Individually directed interventions are unlikely to address burnout fully when workload, staffing shortages, administrative burden, leadership problems, and insufficient recovery opportunities remain unresolved (Awa et al., 2010; Cohen et al., 2023; Panagioti et al., 2017; West et al., 2016). Evidence on individual-level occupational-stress interventions in healthcare workers also suggests that individual approaches should be interpreted within the broader workplace context (Tamminga et al., 2023). International recommendations also emphasize combining individual support with organizational action addressing psychosocial risks and working conditions (World Health Organization, 2022; World Health Organization & International Labour Organization, 2022). Supplementary evidence concerning medical trainees and early-career physicians in Poland also supports attention to structural and workplace-related contributors to burnout (Karbowski et al., 2026).

4.3. Limitations and future research

The available evidence is limited by the predominance of cross-sectional studies, self-reported physical activity, heterogeneous burnout definitions, inconsistent cut-off points, and relatively small intervention samples (Martland et al., 2024; Mincarone et al., 2024; Naczenski et al., 2017). These limitations restrict causal interpretation and prevent reliable identification of an optimal exercise modality, intensity, frequency, or duration. Reverse causation remains possible, because healthcare workers with lower burnout may be more able to maintain regular physical activity (Mincarone et al., 2024; Naczenski et al., 2017). Residual confounding is also likely, as physically active workers may differ from inactive workers in baseline health, schedule control, workload, social support, motivation, and access to recovery opportunities (Mincarone et al., 2024; Naczenski et al., 2017).

This review also has limitations related to its narrative design. Study selection may have been affected by selection bias, and the reviewed literature may be subject to publication bias. No formal risk-of-bias assessment or certainty-of-evidence grading was conducted. The conclusions should therefore be interpreted as a structured narrative synthesis of current evidence rather than a definitive estimate of intervention effectiveness.

Future studies should prioritize longitudinal and randomized designs, standardized burnout instruments, validated or objective physical activity measures, and burnout as a primary outcome. Analyses should also consider professional group, shift pattern, baseline burnout severity, occupational physical demands, intervention adherence, and recovery opportunities.

5. Conclusions

Physical activity appears to be a feasible and potentially useful supportive component of strategies addressing burnout-related outcomes among healthcare workers, although current evidence does not establish a direct preventive effect (Martland et al., 2024; Mincarone et al., 2024). Favorable associations have been most frequently reported for emotional exhaustion and depersonalization, although findings vary across populations, activity measures, and burnout instruments (Mincarone et al., 2024). Evidence concerning professional efficacy or personal accomplishment remains limited (Mincarone et al., 2024). Intervention studies have reported more consistent improvements in psychological stress and sleep than in burnout itself, suggesting that physical activity may influence burnout-related outcomes partly through recovery-related mechanisms rather than through a uniform direct effect on burnout (Martland et al., 2024; Sonnentag & Fritz, 2015). Physical activity programs should therefore be voluntary, accessible, recovery-oriented, adapted to shift work and individual capacity, and integrated with organizational measures addressing workload, staffing, leadership, administrative burden, workplace culture, and recovery opportunities (Cohen et al., 2023; Panagioti et al., 2017; West et al., 2016; World Health Organization, 2022; World Health Organization & International Labour Organization, 2022).

Disclosure

The authors declare that they have no relevant financial or non-financial interests to disclose.

Authors' Contributions

Conceptualization: Natalia Paszke, Wiktor Buczko, Jan Gajewski.

Methodology: Piotr Wiśniewski, Marzena Mędrek.

Formal analysis: Marzena Mędrek, Mariola Mika.

Investigation: Grzegorz Machelski.

Writing - original draft preparation: Natalia Paszke, Piotr Wiśniewski.

Writing - review and editing: Kacper Mąkosa, Wiktor Buczek, Grzegorz Machelski.

Supervision: Kacper Mąkosa, Jan Gajewski, Piotr Wiśniewski.

All authors have read and approved the final version of the manuscript.

Funding statement

The study received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

No original datasets were generated or analyzed in this narrative review. All sources used to support the findings are cited in the reference list.

Acknowledgements

Not applicable.

Conflict of Interest Statement

The authors report that there are no conflicts of interest.

Declaration of the use of generative AI and AI-assisted technologies in the writing process

During the preparation of this manuscript, OpenAI ChatGPT was used to support language editing, stylistic refinement and improvement of clarity. The authors reviewed, verified and edited all AI-assisted outputs and take full responsibility for the scientific content, interpretation of findings and final version of the manuscript.

References

- Awa, W. L., Plaumann, M., & Walter, U. (2010). Burnout prevention: A review of intervention programs. *Patient Education and Counseling*, 78(2), 184–190. <https://doi.org/10.1016/j.pec.2009.04.008>
- Bakker, A. B., & Demerouti, E. (2017). Job demands–resources theory: Taking stock and looking forward. *Journal of Occupational Health Psychology*, 22(3), 273–285. <https://doi.org/10.1037/ocp0000056>
- Baumgart, M., Radzimińska, A., Szpinda, M., Kurzyński, P., Goch, A., & Zukow, W. (2015). Dolegliwości bólowe kręgosłupa wśród personelu pielęgniarskiego = Spinal pain among nurses. *Journal of Education, Health and Sport*, 5(9), 633–646. <https://doi.org/10.5281/zenodo.31730>
- Bin Dahmash, A., Alorfi, F. K., Alharbi, A., Aldayel, A., Kamel, A. M., & Almoaiqel, M. (2020). Burnout phenomenon and its predictors in radiology residents. *Academic Radiology*, 27(7), 1033–1039. <https://doi.org/10.1016/j.acra.2019.09.024>
- Bull, F. C., Al-Ansari, S. S., Biddle, S., Borodulin, K., Buman, M. P., Cardon, G., Carty, C., Chaput, J.-P., Chastin, S., Chou, R., Dempsey, P. C., DiPietro, L., Ekelund, U., Firth, J., Friedenreich, C. M., Garcia, L., Gichu, M., Jago, R., Katzmarzyk, P. T., ... Willumsen, J. F. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *British Journal of Sports Medicine*, 54(24), 1451–1462. <https://doi.org/10.1136/bjsports-2020-102955>
- Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: Definitions and distinctions for health-related research. *Public Health Reports*, 100(2), 126–131. <https://pmc.ncbi.nlm.nih.gov/articles/PMC1424733/>
- Ciezar-Andersen, S. D., Hayden, K. A., & King-Shier, K. M. (2021). A systematic review of yoga interventions for helping health professionals and students. *Complementary Therapies in Medicine*, 58, 102704. <https://doi.org/10.1016/j.ctim.2021.102704>

- Cocchiara, R. A., Peruzzo, M., Mannocci, A., Ottolenghi, L., Villari, P., Polimeni, A., Guerra, F., & La Torre, G. (2019). The use of yoga to manage stress and burnout in healthcare workers: A systematic review. *Journal of Clinical Medicine*, 8(3), 284. <https://doi.org/10.3390/jcm8030284>
- Cohen, C., Pignata, S., Bezak, E., Tie, M., & Childs, J. (2023). Workplace interventions to improve well-being and reduce burnout for nurses, physicians and allied healthcare professionals: A systematic review. *BMJ Open*, 13, e071203. <https://doi.org/10.1136/bmjopen-2022-071203>
- De Hert, S. (2020). Burnout in healthcare workers: Prevalence, impact and preventative strategies. *Local and Regional Anesthesia*, 13, 171–183. <https://doi.org/10.2147/LRA.S240564>
- de Vries, J. D., & Bakker, A. B. (2022). The physical activity paradox: A longitudinal study of the implications for burnout. *International Archives of Occupational and Environmental Health*, 95(5), 965–979. <https://doi.org/10.1007/s00420-021-01759-y>
- Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, 86(3), 499–512. <https://doi.org/10.1037/0021-9010.86.3.499>
- Dyrbye, L. N., West, C. P., Satele, D., Boone, S., Tan, L., Sloan, J., & Shanafelt, T. D. (2014). Burnout among U.S. medical students, residents, and early career physicians relative to the general U.S. population. *Academic Medicine*, 89(3), 443–451. <https://doi.org/10.1097/ACM.0000000000000134>
- Feng, S., Taravati, P., Ding, L., & Menda, S. (2018). Burnout in ophthalmology residency: A national survey. *Journal of Academic Ophthalmology*, 10(1), e98–e107. <https://doi.org/10.1055/s-0038-1666850>
- Ghoraishian, M., Zare Mehrjardi, H., Askari, J., Abrisham, S. M., & Sobhan, M. R. (2022). The frequency of burnout among Iranian orthopedic surgeons and residents. *Archives of Bone and Joint Surgery*, 10(1), 78–84. <https://doi.org/10.22038/abjs.2021.52914.2625>

- Han, S., Shanafelt, T. D., Sinsky, C. A., Awad, K. M., Dyrbye, L. N., Fiscus, L. C., Trockel, M., & Goh, J. (2019). Estimating the attributable cost of physician burnout in the United States. *Annals of Internal Medicine*, 170(11), 784–790. <https://doi.org/10.7326/M18-1422>
- Hodkinson, A., Zhou, A., Johnson, J., Geraghty, K., Riley, R., Zhou, A., Panagopoulou, E., Chew-Graham, C. A., Peters, D., Esmail, A., & Panagioti, M. (2022). Associations of physician burnout with career engagement and quality of patient care: Systematic review and meta-analysis. *BMJ*, 378, e070442. <https://doi.org/10.1136/bmj-2022-070442>
- Hu, Z., Wang, H., Xie, J., Zhang, J., Li, H., Liu, S., Li, Q., Yang, Y., & Huang, Y. (2021). Burnout in ICU doctors and nurses in mainland China—A national cross-sectional study. *Journal of Critical Care*, 62, 265–270. <https://doi.org/10.1016/j.jcrc.2020.12.029>
- Karbowiak, K., Nawrat, N., Makselan, N., Wijas, D., Kozdra, B., Kluś, M., Olszok, M., Handzel, K., & Anczyk, A. (2026). Burnout among medical students and young doctors in Poland: Risk factors and preventive strategies: A review of current literature. *Quality in Sport*, 52, 69376. <https://doi.org/10.12775/QS.2026.52.69376>
- Kristensen, T. S., Borritz, M., Villadsen, E., & Christensen, K. B. (2005). The Copenhagen Burnout Inventory: A new tool for the assessment of burnout. *Work & Stress*, 19(3), 192–207. <https://doi.org/10.1080/02678370500297720>
- Lindwall, M., Gerber, M., Jonsdottir, I. H., Börjesson, M., & Ahlborg, G. (2014). The relationships of change in physical activity with change in depression, anxiety, and burnout: A longitudinal study of Swedish healthcare workers. *Health Psychology*, 33(11), 1309–1318. <https://doi.org/10.1037/a0034402>
- Maslach, C., & Jackson, S. E. (1981). The measurement of experienced burnout. *Journal of Organizational Behavior*, 2(2), 99–113. <https://doi.org/10.1002/job.4030020205>
- Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology*, 52, 397–422. <https://doi.org/10.1146/annurev.psych.52.1.397>
- Martland, R. N., Ma, R., Paleri, V., Valmaggia, L., Riches, S., Firth, J., & Stubbs, B. (2024). The efficacy of physical activity to improve the mental wellbeing of healthcare workers: A

systematic review. *Mental Health and Physical Activity*, 26, 100577. <https://doi.org/10.1016/j.mhpa.2024.100577>

Mincarone, P., Bodini, A., Tumolo, M. R., Sabina, S., Colella, R., Mannini, L., Sabato, E., & Leo, C. G. (2024). Association between physical activity and the risk of burnout in health care workers: Systematic review. *JMIR Public Health and Surveillance*, 10, e49772. <https://doi.org/10.2196/49772>

Naczenski, L. M., de Vries, J. D., van Hooff, M. L. M., & Kompier, M. A. J. (2017). Systematic review of the association between physical activity and burnout. *Journal of Occupational Health*, 59(6), 477–494. <https://doi.org/10.1539/joh.17-0050-RA>

National Academies of Sciences, Engineering, and Medicine. (2019). Taking action against clinician burnout: A systems approach to professional well-being. The National Academies Press. <https://doi.org/10.17226/25521>

Ng, A. P., Chin, W. Y., Wan, E. Y., Chen, J., & Lau, C. S. (2020). Prevalence and severity of burnout in Hong Kong doctors up to 20 years post-graduation: A cross-sectional study. *BMJ Open*, 10(10), e040178. <https://doi.org/10.1136/bmjopen-2020-040178>

Olson, S. M., Odo, N. U., Duran, A. M., Pereira, A. G., & Mandel, J. H. (2014). Burnout and physical activity in Minnesota internal medicine resident physicians. *Journal of Graduate Medical Education*, 6(4), 669–674. <https://doi.org/10.4300/JGME-D-13-00396>

Panagioti, M., Panagopoulou, E., Bower, P., Lewith, G., Kontopantelis, E., Chew-Graham, C., Dawson, S., van Marwijk, H., Geraghty, K., & Esmail, A. (2017). Controlled interventions to reduce burnout in physicians: A systematic review and meta-analysis. *JAMA Internal Medicine*, 177(2), 195–205. <https://doi.org/10.1001/jamainternmed.2016.7674>

Panse, N., Panse, S., Ravi, S., Mankar, H., Karanjkar, A., & Sahasrabudhe, P. (2020). Burnout among plastic surgery residents in India: An observational study. *Indian Journal of Plastic Surgery*, 53(3), 387–393. <https://doi.org/10.1055/s-0040-1719238>

Pearce, M., Garcia, L., Abbas, A., Strain, T., Schuch, F. B., Golubic, R., Kelly, P., Khan, S., Utukuri, M., Laird, Y., Mok, A., Smith, A., Tainio, M., Brage, S., & Woodcock, J. (2022).

Association between physical activity and risk of depression: A systematic review and meta-analysis. *JAMA Psychiatry*, 79(6), 550–559. <https://doi.org/10.1001/jamapsychiatry.2022.0609>

Portero de la Cruz, S., Cebrino, J., Herruzo, J., & Vaquero-Abellán, M. (2020). A multicenter study into burnout, perceived stress, job satisfaction, coping strategies, and general health among emergency department nursing staff. *Journal of Clinical Medicine*, 9(4), 1007. <https://doi.org/10.3390/jcm9041007>

Rotenstein, L. S., Torre, M., Ramos, M. A., Rosales, R. C., Guille, C., Sen, S., & Mata, D. A. (2018). Prevalence of burnout among physicians: A systematic review. *JAMA*, 320(11), 1131–1150. <https://doi.org/10.1001/jama.2018.12777>

Salvagioni, D. A. J., Melanda, F. N., Mesas, A. E., González, A. D., Gabani, F. L., & Andrade, S. M. (2017). Physical, psychological and occupational consequences of job burnout: A systematic review of prospective studies. *PLOS ONE*, 12(10), e0185781. <https://doi.org/10.1371/journal.pone.0185781>

Schuch, F. B., Vancampfort, D., Firth, J., Rosenbaum, S., Ward, P. B., Silva, E. S., Hallgren, M., Ponce De Leon, A., Dunn, A. L., Deslandes, A. C., Fleck, M. P., Carvalho, A. F., & Stubbs, B. (2018). Physical activity and incident depression: A meta-analysis of prospective cohort studies. *American Journal of Psychiatry*, 175(7), 631–648. <https://doi.org/10.1176/appi.ajp.2018.17111194>

Shanafelt, T. D., Hasan, O., Dyrbye, L. N., Sinsky, C. A., Satele, D., Sloan, J., & West, C. P. (2015). Changes in burnout and satisfaction with work-life balance in physicians and the general U.S. working population between 2011 and 2014. *Mayo Clinic Proceedings*, 90(12), 1600–1613. <https://doi.org/10.1016/j.mayocp.2015.08.023>

Shanafelt, T. D., & Noseworthy, J. H. (2017). Executive leadership and physician well-being: Nine organizational strategies to promote engagement and reduce burnout. *Mayo Clinic Proceedings*, 92(1), 129–146. <https://doi.org/10.1016/j.mayocp.2016.10.004>

Sonnentag, S., & Fritz, C. (2007). The Recovery Experience Questionnaire: Development and validation of a measure for assessing recuperation and unwinding from work. *Journal of Occupational Health Psychology*, 12(3), 204–221. <https://doi.org/10.1037/1076-8998.12.3.204>

Sonnentag, S., & Fritz, C. (2015). Recovery from job stress: The stressor-detachment model as an integrative framework. *Journal of Organizational Behavior*, 36(S1), S72–S103. <https://doi.org/10.1002/job.1924>

Søvold, L. E., Naslund, J. A., Kousoulis, A. A., Saxena, S., Qoronfleh, M. W., Grobler, C., & Münter, L. (2021). Prioritizing the mental health and well-being of healthcare workers: An urgent global public health priority. *Frontiers in Public Health*, 9, 679397. <https://doi.org/10.3389/fpubh.2021.679397>

Tamminga, S. J., Emal, L. M., Boschman, J. S., Levasseur, A., Thota, A., Ruotsalainen, J. H., Schelvis, R. M. C., van Nieuwenhuijsen, K., & van der Molen, H. F. (2023). Individual-level interventions for reducing occupational stress in healthcare workers. *Cochrane Database of Systematic Reviews*, 5, CD002892. <https://doi.org/10.1002/14651858.CD002892.pub6>

Vinnikov, D., Dushpanova, A., Kodashbaev, A., Romanova, Z., Almukhanova, A., Tulekov, Z., Toleu, E., & Ussatayeva, G. (2019). Occupational burnout and lifestyle in Kazakhstan cardiologists. *Archives of Public Health*, 77, Article 13. <https://doi.org/10.1186/s13690-019-0345-1>

West, C. P., Dyrbye, L. N., Erwin, P. J., & Shanafelt, T. D. (2016). Interventions to prevent and reduce physician burnout: A systematic review and meta-analysis. *The Lancet*, 388(10057), 2272–2281. [https://doi.org/10.1016/S0140-6736\(16\)31279-X](https://doi.org/10.1016/S0140-6736(16)31279-X)

World Health Organization. (2019, May 28). Burn-out an “occupational phenomenon”: International Classification of Diseases. World Health Organization. <https://www.who.int/news/item/28-05-2019-burn-out-an-occupational-phenomenon-international-classification-of-diseases>

World Health Organization. (2022). WHO guidelines on mental health at work. World Health Organization. <https://www.who.int/publications/i/item/9789240053052>

World Health Organization & International Labour Organization. (2022). Mental health at work: Policy brief. World Health Organization. <https://www.who.int/publications/i/item/9789240057944>

Xie, Y., Liu, S., Chen, X. J., Yu, H. H., Yang, Y., & Wang, W. (2021). Effects of exercise on sleep quality and insomnia in adults: A systematic review and meta-analysis of randomized controlled trials. *Frontiers in Psychiatry*, 12, 664499. <https://doi.org/10.3389/fpsyt.2021.664499>