



International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Operating Publisher
SciFormat Publishing Inc.
ISNI: 0000 0005 1449 8214

2734 17 Avenue SW,
Calgary, Alberta, T3E0A7,
Canada
+15878858911
editorial-office@sciformat.ca

ARTICLE TITLE	BURNOUT AMONG HEALTHCARE WORKERS IN THE POST-COVID-19 ERA: A SYSTEMATIC REVIEW OF PREVALENCE, RISK FACTORS, AND TECHNOLOGICAL INTERVENTIONS
----------------------	---

DOI	https://doi.org/10.31435/ijitss.2(50).2026.5855
------------	---

RECEIVED	29 March 2026
-----------------	---------------

ACCEPTED	22 June 2026
-----------------	--------------

PUBLISHED	30 June 2026
------------------	--------------

LICENSE



The article is licensed under a **Creative Commons Attribution 4.0 International License**.

© The author(s) 2026.

This article is published as open access under the Creative Commons Attribution 4.0 International License (CC BY 4.0), allowing the author to retain copyright. The CC BY 4.0 License permits the content to be copied, adapted, displayed, distributed, republished, or reused for any purpose, including adaptation and commercial use, as long as proper attribution is provided.

BURNOUT AMONG HEALTHCARE WORKERS IN THE POST-COVID-19 ERA: A SYSTEMATIC REVIEW OF PREVALENCE, RISK FACTORS, AND TECHNOLOGICAL INTERVENTIONS

Wiktoria Czyż (Corresponding Author, Email: victoria.czyz2@gmail.com)

Samodzielny Publiczny Zakład Opieki Zdrowotnej w Myślenicach, Poland

ORCID ID: 0009-0006-6675-2389

Natalia Ostruszka

Szpital im. Stefana Żeromskiego w Krakowie, Poland

ORCID ID: 0009-0002-3641-2800

Julia Pilecka

Szpital Praski p.w. Przemienienia Pańskiego, Poland

ORCID ID: 0009-0007-4484-1716

Sabina Kolawa

Medycyna Praktyczna, Poland

ORCID ID: 0009-0004-8847-7037

Jędrzej Wojciechowski

Szpital Praski p.w. Przemienienia Pańskiego, Poland

ORCID ID: 0009-0001-7575-1816

Maria Marusińska

5 Wojskowy Szpital Kliniczny z Polikliniką SP ZOZ w Krakowie, Poland

ORCID ID: 0009-0001-8421-115X

Michał Karpiński

Szpital im. Stefana Żeromskiego w Krakowie, Poland

ORCID ID: 0009-0007-1306-5275

Wojciech Markiewicz

Szpital Specjalistyczny im. Ludwika Rydygiera w Krakowie, Poland

ORCID ID: 0009-0009-2472-1543

Arnold Borowiec

Independent Researcher, Poland

ORCID ID: 0009-0008-4236-8694

Michał Parzniewski

Szpital Miejski Specjalistyczny im. G. Narutowicza, Poland

ORCID ID: 0009-0006-4209-5564

ABSTRACT

Healthcare workers continue to experience high levels of occupational burnout, a crisis fueled by the COVID-19 pandemic and the systemic cracks it exposed. To combat this, digital interventions are increasingly being used to manage mental health and stress. This narrative review shows recent evidence on the prevalence and risk factors of burnout in healthcare workers. We also wanted to show the effectiveness of digital and digitally assisted interventions, with focusing on resilience-oriented and mindfulness-based approaches. Randomized trials for apps such as PsyCovidApp, Headspace, Vitalk show small to moderate benefits for distress and selected burnout dimensions but they often struggle with low user engagement and can't bypass the bigger issues: crushing workloads and lack of institutional support. Overall, digital tools appear to be useful, but they are not system-level strategies to mitigate burnout.

KEYWORDS

Burnout, Healthcare Workers, Post-COVID-19, AI Mental Health, Wearable Technology, Digital Mindfulness

CITATION

Wiktoria Czyż, Natalia Ostruszka, Julia Pilecka, Sabina Kolawa, Jędrzej Wojciechowski, Maria Marusińska, Michał Karpiński, Wojciech Markiewicz, Arnold Borowiec, Michał Parzniewski. (2026) Burnout Among Healthcare Workers in the Post-COVID-19 Era: a Systematic Review of Prevalence, Risk Factors, and Technological Interventions. *International Journal of Innovative Technologies in Social Science*. 2(50). doi: 10.31435/ijitss.2(50).2026.5855

COPYRIGHT

© The author(s) 2026. This article is published as open access under the **Creative Commons Attribution 4.0 International License (CC BY 4.0)**, allowing the author to retain copyright. The CC BY 4.0 License permits the content to be copied, adapted, displayed, distributed, republished, or reused for any purpose, including adaptation and commercial use, as long as proper attribution is provided.

Introduction

Recent cross-sectional data confirm a substantial and persistent burden of burnout across healthcare roles. In a web-based survey of 1,135 intensive care nurses in French-speaking Belgium during the first COVID-19 wave, 68% screened positive for burnout risk on the Maslach Burnout Inventory (Bruyneel et al., 2021). Logistic regression showed that a 1:3 nurse-to-patient ratio increased the odds of emotional exhaustion by 77% and depersonalization by 38% (Bruyneel et al., 2021). Shortages of personal protective equipment were associated with a similar elevation in emotional-exhaustion risk (OR 1.78, 95% CI 1.35–3.34) (Bruyneel et al., 2021).

A nationwide study among over 2000 healthcare workers in Poland assessed burnout using the BAT-12 and stress via the PSS-4 (Izdebski et al., 2023). Burnout prevalence ranged from 27.7% in other non-medical staff to 36.5% among nurses (Izdebski et al., 2023). After adjusting for age and gender, both physicians and nurses were more likely to meet burnout thresholds than non-medical staff (Izdebski et al., 2023). Despite substantial symptomatology, only about 7% of respondents actually sought formal psychological help (Izdebski et al., 2023).

Most reviews agree that high job demands, emotional strain, insufficient resources and organizational culture are central drivers of burnout in healthcare settings (Aye et al., 2024; Adam et al., 2023; Bruyneel et al., 2021; Izdebski et al., 2023; Profit et al., 2021). The scoping review on digital burnout-prevention programs for nurses and physicians identified only seven eligible intervention studies since 2017, despite the scale of the crisis and noted that most interventions focus on individual coping rather than altering systemic stressors (Adam et al., 2023).

Methods

This study is a narrative review of selected literature on burnout among healthcare workers in the Post-Covid-19 Era and usage of technological interventions. Relevant articles were identified through searches in databases such as PubMed and Google Scholar using keywords including “burnout,” “AI mental health,” “healthcare workers,” “resilience” and “digital mindfulness.”

The selection focused on the recent studies in Post-Covid-19 Era.

Overview of Digital and Digitally Assisted Interventions Resilience-Oriented Online and Blended Programs

A recent systematic review of digital resilience interventions targeting healthcare personnel screened over 7,600 records and included 55 eligible studies using online or blended formats (Larsson et al., 2025). Interventions ranged from psychoeducation and meditation to mindfulness, cognitive-behavioral components, apps and many others (Larsson et al., 2025). Most studies reported improvements in mental health (Larsson et al., 2025). However, only three fully online trials (two mindfulness-based and one CBT-based) achieved a strong global rating on the EPHPP tool (Larsson et al., 2025). In these higher-quality trials, mindfulness programs compared to simple brochures significantly increased resilience and decreased burnout, while the CBT intervention substantially lowered stress (Larsson et al., 2025).

A separate narrative review of self-help digital mental-health interventions for healthcare workers focused on 12 randomized controlled trials of web-based or app-based programs (Aye et al., 2024). Across 16 RCTs considered in the synthesis, 10 reported statistically significant improvements in mental-health outcomes (such as depression, anxiety or stress), and five observed meaningful reductions in burnout or its components (Aye et al., 2024). Studies that explicitly assessed acceptability generally found positive user evaluations (Aye et al., 2024).

These findings show a wider digital-health meta-review, which concluded that synchronous and asynchronous communication, computerised therapies or cognitive training show promising effects for a range of mental-health conditions (Philippe et al., 2021). Although mobile apps and virtual reality tools require more rigorous evaluation (Philippe et al., 2021). Within healthcare populations specifically, digital resilience interventions appear beneficial overall, but the evidence base remains methodologically uneven (Larsson et al., 2025; Aye et al., 2024; Taylor et al., 2022).

Digitally Assisted Mindfulness and Self-Regulation

Mindfulness-based approaches feature prominently in digital interventions for healthcare workers. A systematic review and meta-analysis of mindfulness-based interventions in 2,506 healthcare workers pooled 27 RCTs and found small to large beneficial effects on anxiety, stress, depression, psychological distress, job strain and various positive psychological constructs such as self-compassion and empathy (Ong et al., 2024). Short-term improvements in stress-related outcomes were consistent, although long-term follow-up beyond one month showed more variable maintenance of gains (Ong et al., 2024).

A scoping review of digital mindfulness-based interventions for workers, including many healthcare staff, synthesized 56 studies of app-based and web-delivered mindfulness or self-compassion programs (Bégin et al., 2022). Interventions typically combined psychoeducation with guided meditation, practical exercises, instructions and reminders (Bégin et al., 2022). Digital mindfulness-based formats were seen as attractive due to lower cost and greater flexibility, yet low engagement, motivational challenges and confidentiality concerns were frequent obstacles (Bégin et al., 2022).

Beyond standard apps and web programs, we identified 66 experimental studies employing smart technologies such as artificial-intelligence-driven virtual coaches, chatbots, extended-reality environments and brain-sensing headbands to support self-regulation training (Mitsea et al., 2023). Across diverse clinical and at risk populations, these technologies were able to enhance emotional, cognitive and behavioral self-regulation and to promote broader mental well-being (Mitsea et al., 2023). Although not limited to healthcare workers, these findings suggest substantial scope for more technologically sophisticated resilience and mindfulness tools in occupational settings.

Effects of Mobile and Web-Based Interventions on Burnout

A systematic review and meta-analysis specifically evaluated mobile applications targeting burnout, compassion fatigue and compassion satisfaction in healthcare professionals (Deriglazov et al., 2025). Fourteen studies (11 RCTs, 3 quasi-experimental) were included, with sample sizes between 20 and 2,182 (Deriglazov et al., 2025). Most interventions delivered mindfulness or meditation (7 trials) or resilience-focused curricula (3 trials) (Deriglazov et al., 2025). The pooled analysis indicated that mobile interventions yielded a moderate enhancement in the personal-accomplishment dimension of burnout (Hedges' g 0.51), while results for emotional exhaustion became significant after sensitivity analyses improved homogeneity (Deriglazov et al., 2025). Effects on depersonalization, compassion fatigue and compassion satisfaction were inconsistent, and evidence for these domains remains limited (Deriglazov et al., 2025).

At the individual trial level, several well-characterized digital interventions illustrate the pattern of outcomes.

PsyCovidApp

PsyCovidApp is a smartphone application combining psychoeducational content, mindfulness exercises and modules on healthy lifestyle, burnout and social support for healthcare workers treating COVID-19 patients (Fiol-deRoque et al., 2021). In a blinded, parallel-group RCT with 482 participants in Spain, two weeks of PsyCovidApp use was compared with a control app offering general mental-health advice (Fiol-deRoque et al., 2021). The primary endpoint was a composite score on the Depression Anxiety Stress Scales-21 with insomnia, burnout (Maslach Burnout Inventory), PTSD, self-efficacy and subscale scores as secondary outcomes (Fiol-deRoque et al., 2021). In the full sample, no statistically significant differences emerged between groups on the primary composite or secondary outcomes at two weeks (Fiol-deRoque et al., 2021). However, prespecified subgroup analyses revealed that among participants taking psychotropic medication, PsyCovidApp produced moderate improvements in the composite outcome (SMD -0.29 , 95% CI -0.48 to -0.09) and in PTSD, sleep disturbance, anxiety and stress (Fiol-deRoque et al., 2021). Similar patterns were observed among users concurrently engaged in psychotherapy (SMD -0.25 , 95% CI -0.49 to -0.02) (Fiol-deRoque et al., 2021). Usability ratings were high (mean 87.21/100), and over 94% of intervention participants requested renewed access after the trial, pointing to high acceptability despite modest overall efficacy (Fiol-deRoque et al., 2021).

Headspace

A definitive RCT among 2,182 National Health Service staff in England tested Headspace, an unguided digital mindfulness-based self-help app, versus an active control website (Moodzone) over approximately 4.5 months (Taylor et al., 2022). Stress, assessed via the DASS-21 stress subscale, was designated the primary outcome; additional measures included among others depression, anxiety, well-being, mindfulness, self-compassion, compassion for others (Taylor et al., 2022). Intention-to-treat analyses showed that Headspace led to significantly greater reductions in stress than Moodzone (regression coefficient -0.31 , 95% CI -0.47 to -0.14), as well as small improvements in depression, anxiety, well-being, mindfulness and others (Taylor et al., 2022). There were no significant effects on any of the MBI burnout subscales, ruminative brooding or sickness absence (Taylor et al., 2022). Mediation analyses indicated that both app engagement (practice days per week) and increases in self-compassion during the initial 6 weeks accounted for part of the stress reduction, whereas improvements in mindfulness, rumination (Taylor et al., 2022).

Chatbot-Based Support: Vitalk

The Vitalk app is an interactive mental-health chatbot evaluated in an eight-week, two-arm RCT among Malawian healthcare workers across eight professional cadres (Kleinau et al., 2023). Participants in the intervention arm used Vitalk, while controls received links to generic online resources (Kleinau et al., 2023). Outcomes were measured with validated scales for anxiety, depression, burnout (Oldenburg Burnout Inventory), loneliness, resilience and resilience-building activities (Kleinau et al., 2023). Difference-in-differences analyses indicated that Vitalk reduced depressive symptoms by 0.68 points (95% CI -1.15 to -0.21) and anxiety by 0.44 points (95% CI -0.88 to 0.01) relative to controls, as well as lowering burnout by 0.58 points (95% CI -1.32 to 0.15) (Kleinau et al., 2023). Resilience increased by 1.47 points (95% CI 0.05 – 2.88) and engagement in resilience-promoting behaviors rose by 1.22 points (95% CI 0.56 – 1.87) (Kleinau et al., 2023). Effect size estimates suggested a medium impact of Vitalk compared with a small effect for the control condition (Kleinau et al., 2023). Baseline data emphasized the need for such tools: approximately three-quarters of participants met criteria for burnout, and one in eight reported anxiety and depression, in a context with limited access to traditional psychological care (Kleinau et al., 2023).

Mindfulness and Resilience Apps in Clinical Staff

A four-week, audio-based mindfulness program delivered via smartphone (Mindful Senses) to Thai healthcare personnel with moderate to high burnout and stress produced substantial short-term benefits (Mitsea et al., 2023). Compared with self-help reading alone, the combined intervention resulted in very large between-group effect sizes at week 4 for burnout (Cohen's d 1.33), stress (1.42), anxiety (1.04), depression (1.14), dispositional mindfulness (0.70) and quality of life (1.03); moderate to large gains persisted at week 8 (Mitsea et al., 2023). Attrition was low (4.4%) and participants rated the intervention as both usable and satisfactory (Mitsea et al., 2023).

In a pediatric emergency department, a three-month resilience curriculum delivered through a smartphone app was evaluated in a pilot RCT against a waitlist control (Monfries et al., 2022). Among the 20 participants included in the final analysis, those receiving the app-based curriculum experienced a mean reduction of 5.88 points in emotional-exhaustion scores on the Maslach Burnout Inventory and a 0.51-point increase in mindfulness scores, both statistically significant ($p < 0.001$) (Monfries et al., 2022). Although limited

by small sample size, these findings suggest that smartphone-mediated resilience content can feasibly reduce elements of burnout (Monfries et al., 2022).

Another randomized trial among emergency-department staff tested a four-week protocol of daily 10-minute app-guided mindfulness with three-month follow-up (Fiol-deRoque et al., 2021). Despite only 48% of participants maintaining regular practice, intention-to-treat analyses indicated significant improvements over time in perceived stress and all three MBI burnout dimensions, albeit with small effect sizes (Fiol-deRoque et al., 2021).

Exercise and Web-Based Resilience Programs

Beyond psychological content, application-based physical-activity interventions have also been tested. A 12-week randomized clinical trial in 288 Canadian healthcare workers examined a home-based exercise program facilitated by a suite of mobile apps (body-weight interval training, yoga, barre and running) (Boucher et al., 2023). Participants were asked to perform four 20-minute sessions per week (Boucher et al., 2023). By week 12, the exercise group demonstrated small-to-medium improvements in depressive symptoms (Feingold effect size -0.41 , 95% CI -0.69 to -0.13) and consistent reductions in cynicism (ES -0.33 , 95% CI -0.53 to -0.13) and emotional exhaustion (ES -0.39 , 95% CI -0.64 to -0.14) relative to waitlisted controls (Boucher et al., 2023). A modest reduction in absenteeism was also observed ($r = 0.15$, 95% CI 0.03 – 0.26) (Boucher et al., 2023). However, adherence to the target of 80 minutes per week decreased from 54.9% at week 2 to 23.2% at week 12, underscoring the challenge of sustaining engagement (Boucher et al., 2023).

The WISER (Web-based Implementation for the Science of Enhancing Resilience) program offers a brief, web-delivered resilience intervention evaluated in a cluster RCT across two cohorts of neonatal intensive care units (Profit et al., 2021). At one month, WISER participants showed a mean burnout reduction of 5.27 points relative to controls (95% CI -10.44 to -0.10 ; $p=0.046$) (Profit et al., 2021). When to sum it up, the proportion of healthcare workers with concerning burnout scores decreased by 6.3 percentage points (95% CI -11.6% to -1.0% ; $p=0.008$), with parallel declines in depression (-5.2 percentage points, 95% CI -10.8 to -0.4 ; $p=0.022$) and poor work-life integration (-11.8 percentage points, 95% CI -17.9 to -6.1 ; $p<0.001$) (Profit et al., 2021). Improvements persisted through six months (Profit et al., 2021). These data suggest that even relatively short, web-based interventions can produce durable changes in burnout-related outcomes when well integrated into clinical teams.

CBT-Based and Job-Crafting Digital Courses

A recent multi-site randomized non-inferiority trial compared two six-week digital health interventions for occupational burnout among 465 healthcare professionals across 20 NHS providers: one grounded in cognitive-behavioral therapy and the other in job-crafting principles (Delgadillo et al., 2025). Both arms involved weekly one-hour webinars plus online coping-skills modules, with burnout measured using the Oldenburg Burnout Inventory at baseline, six weeks and six months (Delgadillo et al., 2025). At six weeks, the adjusted mean difference in burnout favored the CBT-based program but did not meet non-inferiority criteria (0.47 , 95% CI -0.25 to 1.20 ; $p=0.197$) (Delgadillo et al., 2025). By six months, the CBT intervention showed superior outcomes (adjusted mean difference 0.80 , 95% CI 0.05 to 1.54 ; $p=0.036$), indicating greater sustained improvement compared with job crafting (Delgadillo et al., 2025). Both formats nonetheless illustrate the feasibility of delivering structured psychological content digitally to busy healthcare teams.

Barriers and Facilitators for Digital Adoption

Even when digital tools show efficacy, their impact depends on uptake and sustained use. An umbrella review of 108 systematic reviews on healthcare professionals adoption of digital health technologies identified recurring barriers and enablers (Nascimento et al., 2023). High-quality evidence indicated that infrastructural and technical limitations were commonly cited obstacles (relative frequency occurrence 6.4% , 95% CI 2.9 – 14.1), alongside psychological and personal reservations (5.3% , 95% CI 2.2 – 12.7) and concerns about increased workload or longer working hours (3.9% , 95% CI 1.5 – 10.1) (Nascimento et al., 2023). Conversely, training programs, perceived effectiveness and various incentive structures emerged as important facilitators, with a combined RFO of 3.8% (95% CI 1.8 – 7.9) (Nascimento et al., 2023). These findings echo the implementation lessons from HCW-specific DMHI reviews, which emphasize ease of use, flexible scheduling, cultural appropriateness, confidentiality and minimal yet responsive support as determinants of engagement (Aye et al., 2024; Adam et al., 2023; Bégin et al., 2022; Monfries et al., 2022).

More broadly, a scoping review of digital technologies for mental-health support during the COVID-19 pandemic concluded that although most interventions reported positive effects on general psychological well-being or specific symptoms, relatively few were explicitly grounded in standardized psychotherapeutic framework, and many lacked rigorous designs (Li, 2023). The review called for more theory-driven and methodologically robust studies to delineate which digital features yield the greatest benefit in crisis contexts (Li, 2023).

Discussion

Healthcare worker burnout isn't just a "bad day" at the office—it's a systemic crisis. Recent data shows that about a third of clinicians are struggling, a number that spiked to two-thirds for ICU nurses during the pandemic. While heavy workloads and traumatic shifts drive this exhaustion, organizational support can act as a much-needed buffer (Bruyneel et al., 2021; Izdebski et al., 2023).

A massive wave of digital tools—think mindfulness apps, chatbots and online resilience training—has arrived to help. For the most part, they work: they're reliable at lowering general stress and anxiety (Larsson et al., 2025; Aye et al., 2024; Deriglazov et al., 2025; Ong et al., 2024; Bégin et al., 2022; Agarwal et al., 2024; Taylor et al., 2022).

However, burnout is a bit tricky. While these tools boost personal resilience, they are not that successful in deeper issues like depersonalization or feeling emotionally drained (Taylor et al., 2022).

Even the best designed apps, such as PsyCovidApp or Headspace face two major hurdles. One that benefits may concentrate in subgroups already engaged in mental-health care (Fiol-deRoque et al., 2021; Taylor et al., 2022). Second, it is hard to stay engaged with an exercise or meditation app while the healthcare working system is exhausting, which leads to high drop-off rates (Fiol-deRoque et al., 2021; Boucher et al., 2023).

Conclusions

The bottom line, digital tools are a great addition to the toolkit but they are not the perfect and only solution for the problem. Their success depends heavily on the culture and tech-readiness of the institution (Adam et al., 2023; Bégin et al., 2022; Nascimento et al., 2023). An app can help breathe through a panic attack but cannot fix a wider problem. Future efforts need to focus on integrating these tools into a broader strategy that addresses the actual root causes of burnout.

Conflict of interest: The authors declare no conflicts of interest.

REFERENCES

- Adam, D., Berschick, J., Schiele, J., Bogdanski, M., Schröter, M., Steinmetz, M., Koch, A., Schouli, J., Reschke, S., Stritter, W., Kessler, C., & Seifert, G. (2023). Interventions to reduce stress and prevent burnout in healthcare professionals supported by digital applications: A scoping review. *Frontiers in Public Health*, 11, Article 1231266. <https://doi.org/10.3389/fpubh.2023.1231266>
- Agarwal, A., Southwick, L., Gonzales, R., Bellini, L., Asch, D., Shea, J., Mitra, N., Yang, L., Josephs, M., Kopinsky, M., Kishton, R., Balachandran, M., Wolk, C., Becker-Haimes, E., & Merchant, R. (2024). Digital engagement strategy and health care worker mental health. *JAMA Network Open*, 7, Article e2410994. <https://doi.org/10.1001/jamanetworkopen.2024.10994>
- Aye, L., Tan, M., Schaefer, A., Thurairajasingam, S., Geldsetzer, P., Soon, L., Reininghaus, U., Bärnighausen, T., & Su, T. (2024). Self-help digital mental health intervention in improving burnout and mental health outcomes among healthcare workers: A narrative review. *Digital Health*, 10. <https://doi.org/10.1177/20552076241278313>
- Bégin, C., Berthod, J., Martinez, L., & Truchon, M. (2022). Use of mobile apps and online programs of mindfulness and self-compassion training in workers: A scoping review. *Journal of Technology in Behavioral Science*, 7, 477–515. <https://doi.org/10.1007/s41347-022-00267-1>
- Boucher, V., Haight, B., Hives, B., Zumbo, B., Merali-Dewji, A., Hutton, S., Liu, Y., Nguyen, S., Beauchamp, M., Black, A., & Puterman, E. (2023). Effects of 12 weeks of at-home, application-based exercise on health care workers' depressive symptoms, burnout, and absenteeism: A randomized clinical trial. *JAMA Psychiatry*. <https://doi.org/10.1001/jamapsychiatry.2023.2706>
- Bruyneel, A., Smith, P., Tack, J., & Pirson, M. (2021). Prevalence of burnout risk and factors associated with burnout risk among ICU nurses during the COVID-19 outbreak in French-speaking Belgium. *Intensive & Critical Care Nursing*, 65, Article 103059. <https://doi.org/10.1016/j.iccn.2021.103059>
- Delgadillo, J., Laker, V., Simmonds-Buckley, M., Southgate, A., Parkhouse, L., Davis, B., Furlong-Silva, J., King, N., Keeble, S., Davis, O., Royal, P., Lucock, M., Aguirre, E., Thwaites, R., Flint, B., Osborne, T., Bell, F., Devon, M., & Barkham, M. (2025). Digital health interventions for occupational burnout in healthcare professionals: A multisite randomised non-inferiority trial. *Behaviour Research and Therapy*, 195, Article 104919. <https://doi.org/10.1016/j.brat.2025.104919>
- Deriglazov, D., Halamová, J., & Kernová, L. (2025). Burnout, compassion fatigue, and compassion satisfaction interventions via mobile applications: A systematic review and a meta-analysis. *Worldviews on Evidence-Based Nursing*, 22. <https://doi.org/10.1111/wvn.70033>

9. Fiol-deRoque, M., Serrano-Ripoll, M., Jiménez, R., Zamanillo-Campos, R., Yañez-Juan, A., Bennasar-Veny, M., Leiva, A., Gervilla, E., García-Buades, M., García-Toro, M., Alonso-Coello, P., Pastor-Moreno, G., Ruiz-Pérez, I., Sitges, C., García-Campayo, J., Llobera-Cánaves, J., & Ricci-Cabello, I. (2021). A mobile phone-based intervention to reduce mental health problems in health care workers during the COVID-19 pandemic (PsyCovidApp): Randomized controlled trial. *JMIR mHealth and uHealth*, 9, Article e27039. <https://doi.org/10.2196/27039>
10. Izdebski, Z., Kozakiewicz, A., Białorudzki, M., Dec-Pietrowska, J., & Mazur, J. (2023). Occupational burnout in healthcare workers, stress, and other symptoms of work overload during the COVID-19 pandemic in Poland. *International Journal of Environmental Research and Public Health*, 20, Article 2428. <https://doi.org/10.3390/ijerph20032428>
11. Kleinau, E., Lamba, T., Jaskiewicz, W., Gorentz, K., Hungerbuehler, I., Rahimi, D., Kokota, D., Maliwichi, L., Jamu, E., Zumazuma, A., Negrão, M., Mota, R., Khouri, Y., & Kapps, M. (2023). Effectiveness of a chatbot in improving the mental wellbeing of health workers in Malawi during the COVID-19 pandemic: A randomized controlled trial. *PLOS ONE*, 19. <https://doi.org/10.1101/2023.01.24.23284959>
12. Larsson, M., Ho, D., Kirschner, M., Seifritz, E., & Manoliu, A. (2025). Digital resilience interventions for healthcare workers: A systematic review. *Frontiers in Psychiatry*, 16, Article 1519670. <https://doi.org/10.3389/fpsyt.2025.1519670>
13. Li, J. (2023). Digital technologies for mental health improvements in the COVID-19 pandemic: A scoping review. *BMC Public Health*, 23. <https://doi.org/10.1186/s12889-023-15302-w>
14. Mitsea, E., Drigas, A., & Skianis, C. (2023). Digitally assisted mindfulness in training self-regulation skills for sustainable mental health: A systematic review. *Behavioral Sciences*, 13, Article 1008. <https://doi.org/10.3390/bs13121008>
15. Monfries, N., Sandhu, N., & Millar, K. (2022). A smartphone app to reduce burnout in the emergency department: A pilot randomized controlled trial. *Workplace Health & Safety*, 71, 181–187. <https://doi.org/10.1177/21650799221123261>
16. Nascimento, I., Abdulazeem, H., Vasanthan, L., Martinez, E., Zucoloto, M., Østengaard, L., Azzopardi-Muscat, N., Zapata, T., & Novillo-Ortiz, D. (2023). Barriers and facilitators to utilizing digital health technologies by healthcare professionals. *NPJ Digital Medicine*, 6. <https://doi.org/10.1038/s41746-023-00899-4>
17. Ong, N., Teo, F., Ee, J., Yau, C., Thumboo, J., Tan, H., & Ng, Q. (2024). Effectiveness of mindfulness-based interventions on the well-being of healthcare workers: A systematic review and meta-analysis. *General Psychiatry*, 37. <https://doi.org/10.1136/gpsych-2023-101115>
18. Philippe, T., Sikder, N., Jackson, A., Koblanski, M., Liow, E., Pilarinos, A., & Vasarhelyi, K. (2021). Digital health interventions for delivery of mental health care: Systematic and comprehensive meta-review. *JMIR Mental Health*, 9, Article e35159. <https://doi.org/10.2196/35159>
19. Profit, J., Adair, K., Cui, X., Mitchell, B., Brandon, D., Tawfik, D., Rigdon, J., Gould, J., Lee, H., Timpson, W., McCaffrey, M., Davis, A., Pammi, M., Matthews, M., Stark, A., Papile, L., Thomas, E., Cotten, M., Khan, A., & Sexton, J. (2021). Randomized controlled trial of the “WISER” intervention to reduce healthcare worker burnout. *Journal of Perinatology*, 41, 2225–2234. <https://doi.org/10.1038/s41372-021-01100-y>
20. Taylor, H., Cavanagh, K., Field, A., & Strauss, C. (2022). Health care workers’ need for Headspace: Findings from a multisite definitive randomized controlled trial of an unguided digital mindfulness-based self-help app to reduce healthcare worker stress. *JMIR mHealth and uHealth*, 10, Article e31744. <https://doi.org/10.2196/31744>