


BMJ Open Workplace interventions to improve well-being and reduce burnout for nurses, physicians and allied healthcare professionals: a systematic review

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ABSTRACT

There is a growing need for interventions to improve well-being in healthcare workers, particularly since the onset of COVID-19.

Objectives To synthesise evidence since 2015 on the impact of interventions designed to address well-being and burnout in physicians, nurses and allied healthcare professionals.

Design Systematic literature review.

Data sources Medline, Embase, Emcare, CINAHL, PsycInfo and Google Scholar were searched in May–October 2022.

Eligibility criteria for selecting studies Studies that primarily investigated burnout and/or well-being and reported quantifiable preintervention and postintervention outcomes using validated well-being measures were included.

Data extraction and synthesis Full-text articles in English were independently screened and quality assessed by two researchers using the Medical Education Research Study Quality Instrument. Results were synthesised and presented in both quantitative and narrative formats. Meta-analysis was not possible due to variations in study designs and outcomes.

Results A total of 1663 articles were screened for eligibility, with 33 meeting inclusion criterion. Thirty studies used individually focused interventions, while three were organisationally focused. Thirty-one studies used secondary level interventions (managed stress in individuals) and two were primary level (eliminated stress causes). Mindfulness-based practices were adopted in 20 studies; the remainder used meditation, yoga and acupuncture. Other interventions promoted a positive mindset (gratitude journaling, choirs, coaching) while organisational interventions centred on workload reduction, job crafting and peer networks. Effective outcomes were reported in 29 studies, with significant improvements in well-being, work engagement, quality of life and resilience, and reductions in burnout, perceived stress, anxiety and depression.

Conclusion The review found that interventions benefitted healthcare workers by increasing well-being, engagement and resilience, and reducing burnout. It is noted that the outcomes of numerous studies were impacted by design limitations that is, no control/waitlist control, and/or no post intervention follow-up. Suggestions are made for future research.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This review analysed various workplace well-being strategies, both individually and organisationally focused interventions for physicians, nurses and allied healthcare workers.
- ⇒ The reported evidence in this review builds on previous evidence in the literature that focused on specific well-being interventions such as mindfulness-based practices and contrasts these results against other types of workplace well-being interventions.
- ⇒ A quantitative meta-analysis was not possible due to the marked variation in study designs and reported outcomes implemented by the eligible studies.
- ⇒ Organisationally focused interventional studies were under-represented in this review with only three meeting the inclusion criteria.

INTRODUCTION

Widely acknowledged as the cost of caring, healthcare workers report higher rates of absences due to psychological distress and job burnout than workers in other sectors.^{1–6} Psychosocial hazards such as chronic exposure to occupational stress, place healthcare workers at greater risk of presenteeism (reduced productivity), anxiety and depression.^{3 7–9} Occupational stress relates to workplace interferences that can disturb a worker's well-being physically and mentally, thereby fostering the potential for burnout.^{1 10} Moreover, the financial constraints of healthcare systems within developed countries are further pressurised by an ageing patient population, technological advances and poor worker retention.^{10–12} The Australian Institute of Health and Safety estimated in 2019, that worker's absenteeism due to poor mental health, cost between \$13 and \$17 billion per year.¹³ These figures were exponentially compounded throughout the recent COVID-19 pandemic.^{9 10 14} For example, in a study conducted in England during the first



wave of COVID-19, sickness absences due to poor mental health in National Health Service staff, increased from 519807 days in March–April of 2019 to 899730 days 12 months later.¹⁴

The reduced productivity of healthcare professionals in the workplace can lead to suboptimal delivery of care to patients and therefore poorer treatment outcomes.^{6 10} Consequently, there is growing interest in boosting healthcare worker wellness, resiliency and self-care, globally.⁶ The framework for occupational health and safety is moving beyond traditional workplace hazards and now seeks to include emerging demographic factors such as mental health conditions.¹⁵ This view is reflected in the 2030 United Nations Goal that employment respects the ‘... physical and mental integrity of the worker in the exercise of his or her employment’.¹⁵ Additionally, in July 2022, Safe Work Australia released new codes of practice for managing psychosocial hazards at work, including risks to workers’ mental health.¹⁶ Using theoretical frameworks such as the Job Demands-Resources (JD-R) model or Watson’s Human Caring theory, researchers are developing support strategies that aim to improve well-being as well as understand worker’s wellness and exhaustion.^{7 17} Both these validated frameworks are invaluable to well-being researchers as the JD-R model explains how increasing job resources can buffer job strain in workers, while Watson’s theory of Human Caring aims to create a holistic or mind-body-soul approach to human care.^{17–19} The literature demonstrates that workers who receive treatment for absenteeism and presenteeism, for example, through workplace well-being interventions, report higher levels of productivity, which can then lead to higher levels of job satisfaction.³ Furthermore, workplace interventions that focus on self-care, worker empowerment and access to mental health services such as mindfulness sessions or meditation, have been found to decrease levels of psychological stress, anxiety and burnout in healthcare workers.²⁰

Workplace interventions may be designed and applied based on the level at which behavioural changes are targeted, for example, the individual worker, manager or the organisation itself.²¹ Interventions designed to target health behaviours for the individual, such as mindfulness-based practices, gratitude journaling, meditation or yoga are increasingly popular among researchers.^{8 22–24} As such, several recent systematic reviews have reported the benefit of individual focused interventions in healthcare, predominantly highlighting the effectiveness of mindfulness-based practices to improve well-being.^{22–24} Organisational interventions designed to target the source of occupational stress such as reducing workloads, increasing autonomy or job crafting (physical and cognitive changes individuals make in the task or relational boundaries of their work²⁵), are less explored.²¹ The predominant view in the literature is that interventions designed to alter health behaviours in the individual, may be a reactive strategy to occupational stress, whereas organisational change may be far more proactive

in promoting worker well-being in the long term.^{21 25} A recent surge in the understanding of workplace wellness and causes of occupational stress further promotes the need to explore and invest in organisational strategies.^{26 27} As it stands, institutions may be reluctant to implement large organisational changes without strong literature evidence supporting the effectiveness and long-term benefits to employees.^{26 27}

A second approach to implementing workplace well-being interventions can be achieved through first identifying the presence and likely cause of occupational stress and then applying the intervention at either the primary, secondary or tertiary level.²⁸ Primary interventions may be implemented in a largely preventative manner as they aim to eliminate occupational stress or change the cause of stress such as through workload reductions.²⁸ Secondary and tertiary interventions are designed to treat workers who are already showing signs of occupational stress. Secondary interventions aim to help workers minimise the effects of occupational stress through methods such as relaxation training and tertiary interventions aim to treat workers who have already developed stress-related health issues such as anxiety or depression.²⁸

To date, a multitude of systematic reviews have investigated the effects of mindfulness-based education or yoga interventions for healthcare professionals in a wide array of contexts. For example, Lomas *et al*²² conducted a meta-analysis investigating the impact of mindfulness-based interventions on healthcare workers, Cocchiara *et al*²⁹ investigated the use of yoga to manage stress and burnout in healthcare workers and Klein *et al*³⁰ investigated the benefits of mindfulness-based interventions on burnout among health professionals. Other systematic reviews have focused on specific populations, for example, DeChant *et al*³¹ investigated the effect of organisation-directed workplace interventions on physician burnout and Murray *et al*³² investigated interventions to improve the psychological well-being of general practitioners. To the authors knowledge, no systematic review has been conducted to provide an overview of all types of well-being interventions for allied healthcare professionals, including physicians and nurses. The authors also acknowledge the effects that COVID-19 has had on healthcare practices as well as healthcare worker mental well-being.¹⁴ Therefore, in order to include all above-stated professional groups and types of interventions in this review, as well as sampling the most recent research (including 5 years prior to the onset of COVID-19), the search criterium for this review was restricted to 2015.

This systematic review therefore aims to identify and analyse all positive outcome measures produced by workplace interventional strategies designed to support well-being and reduce burnout for nurses, physicians and allied health professionals since 2015.

METHODOLOGY

A search strategy was developed by the research team and validated by an institutional research librarian using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines prior to searching the literature and we used the PRISMA checklist when writing our report.^{33 34} The full search protocol, including the search terms, can be found in online supplemental appendix. Title and abstract screening as well as full-text screening was carried out by two members of the research team (CC, JC). Where there were disagreements or uncertainty, a third, senior member of the research team was available for resolution if reconciliation sessions were unsuccessful.

Patient and public involvement

There was no patient or public involvement in this research.

Eligibility criteria

Population

All studies in which the sampled population included either allied health personnel, physicians or nurses were included in this review. Studies that contained mixed populations that is, healthcare workers as well as patients, were included, however, data not pertaining to healthcare workers were excluded. Studies that did not confirm that healthcare workers, physicians or nurses were involved in the intervention, were also excluded. A summary of the allied health professions included in this review, both regulated by the Australian Health Practitioner Regulation Agency and self-regulated, as per the Australian Government Department of Health can be found in online supplemental file 1.³⁵

Interventions

This review accepted all studies reporting the outcomes of either organisationally or individually focused workplace well-being interventions. Studies whereby improving employee well-being or reducing burnout was not the primary focus of the intervention, were excluded. Studies that suggested workplace interventions but did not implement them were also excluded.

Outcome measures

All study designs were accepted if objective and quantifiable preintervention and postintervention outcome measures such as observer ratings were reported, using a valid and reliable well-being or burnout survey inventory. Systematic literature reviews were not included in the initial synthesis; however, they were included in the discussion and summary of study findings. Studies published prior to 2015 were also excluded to ensure the most up to date literature was reviewed (while still including 5 years prior to the onset of COVID-19) as well as including all well-being intervention types for nurses, physicians and allied healthcare professionals.

Literature search

Five healthcare/medicine databases (CINAHL, Embase, Emcare, Medline, PsycInfo) were searched on 2 May 2022 and again on 5 October 2022 using a three-step (Population, Intervention, Outcome) systematic approach (see inclusion criteria for details). A secondary search of Google Scholar was also performed with results limited to the first five pages of articles (n=50). The outcomes of the literature search are outlined in figure 1.

Study selection

Data extraction was performed by the first author (CC) and verified by all other members of the research team (EB, JC, SP and MT). The extracted data was summarised into an Excel spreadsheet and comprised study design, objectives, location, participants (numbers and characteristics), sample size justification, number of institutions, outcome measurement tools, intervention used (type, repeatability, random or blinded), data collection time-frame, ethical approval, rate of attrition, quantitative data results and study outcomes.

Quality assessment

Quality assessment of the articles was also carried out independently by two members of the research team (CC and JC) using the Medical Education Research Study Quality Instrument (MERSQI).³⁶ The MERSQI is a long-standing and validated quality assessment tool that is applicable to a wide array of study designs.³⁵ Papers were given scores (out of a maximum of 18) based on study design, number of institutions, response, type, validity of the methods, sophistication of data analysis, appropriateness and reported outcomes.³⁶

Meta-analysis

It was not possible to perform a meta-analysis due to a marked variation in study designs, interventions employed, survey instruments used and statistical analyses performed.

RESULTS

The database searches produced 1596 total articles for screening. A grey literature search of Google Scholar as well as Pearling reference lists generated a further 67 papers. In total, 545 articles were marked as duplicates. Of the remaining 1118 articles, 921 were removed during title and abstract screening. Of the 197 full-texts articles, 40 were included in this review. Following quality assessment, seven papers that scored 12 points or lower were excluded from data synthesis leaving 33 articles for analysis.

Characteristics and quality of studies

The full results of the quality assessment are available in online supplementary table 1. All articles in this review were published between 2015 and 2022 with most studies (n=22) based in the USA.^{1 4 7 17 26 37-53} Two studies were based in Australia,^{54 55} two in the Netherlands^{56 57} and

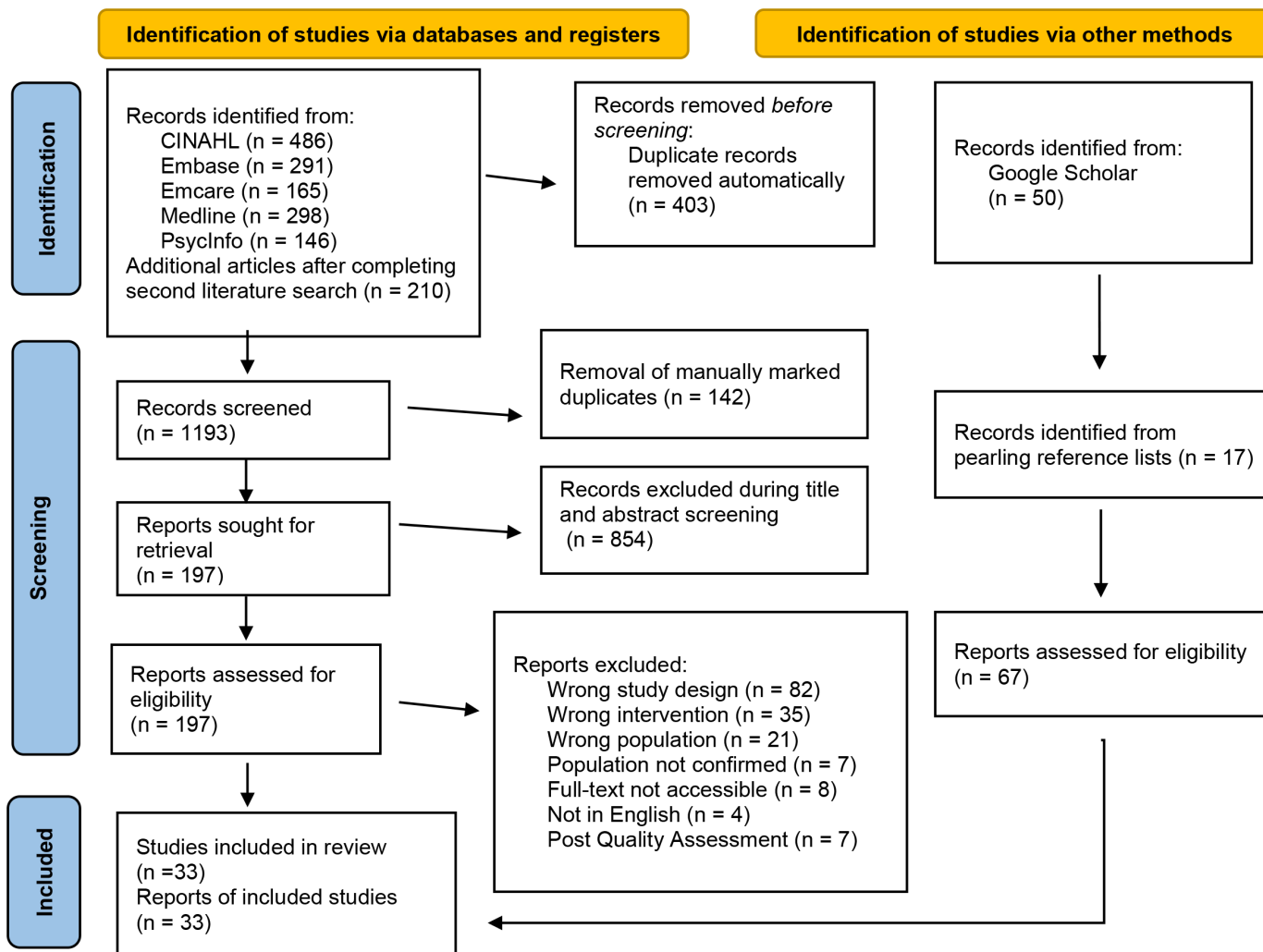


Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses³⁴ statement for article selection.

one each from Ireland,⁵⁸ Italy,⁵⁹ Portugal,⁶⁰ Brazil,⁶¹ Hong Kong,¹² Japan⁶² and Iran.⁶³ Twenty-seven^{1 4 7 12 26 37–52 54 58–61 63} studies had participants that were predominantly female, two^{56 57} reported more male than female participants and four^{17 46 53 55} did not specify gender. A total of 16^{17 37 39 42 44 46–48 50–54 60 61 63} articles reported that nurses were the sole participants in their studies, 5^{26 38 43 56 57} reported physicians only, 1⁵⁹ reported sampling both physicians and nurses, 5^{1 12 40 49 55} sampled a variety of healthcare workers (including allied health) and 6^{4 7 41 45 58 62} articles used generic terminology such as healthcare professionals, hospital staff or clinical/non-clinical roles.

In the five studies that sampled various allied healthcare professionals, three^{1 40 55} studies listed social workers, three^{12 49 55} included occupational therapists, two^{1 55} mentioned psychologists/therapists, two^{12 49} reported physiotherapists, two^{40 49} included pharmacists and one⁴⁹ study mentioned technologists/technicians. Sample sizes ranged from 9⁵⁵ to 228⁴⁹ with 11^{7 12 39 43 44 48 49 52 57 60 62} studies providing a power analysis to sample size justification.

Eight^{4 12 37 41 43 63} studies used randomised controlled trials (RCTs), six^{26 40 43 44 57 60} used quasi-experimental study designs and nineteen^{17 17 42 45–55 58 59 61 62} used a single group pretest/post-test study design method. Of the 14 studies that implemented a control group, 3^{4 12 44} used an active control method, 4^{26 39 43 63} chose no treatment control groups and 7^{37 38 40 41 56 57 60} implemented waitlist control groups. Seventeen^{4 37 38 40 42 44 45 47 50 51 53–55 57 59 60 63} studies implemented interventions incorporating mindfulness based education (MBE) such as stress management, resiliency training, emotional intelligence training, or improving mindfulness and self-compassion. Three^{7 17 41} studies opted for MBE combined with yoga and one³⁹ study used yoga only. The remaining studies implemented a myriad of well-being interventions including gratitude journaling,^{12 49 62} meditation sessions,^{48 61} workload reduction,^{26 56} massage chairs,⁴⁶ choir singing,⁵⁸ acupuncture,¹ professional coaching⁴³ and a peer support network (PSN).⁵²

The longest intervention period was 6 months,⁴⁴ and the shortest intervention period was 90 min.⁵⁰ In each study, participants were issued surveys at baseline and

immediately following the intervention. Several studies also issued additional follow-up surveys at either 1, 3, 6 or 12 months postintervention. Overall, attrition rates were low across the studies with 19^{12 17 39–44 46 47 49–51 55 58 59 61–63} reporting they experienced 0% participant dropout and only 5^{1 45 52 53 60} recording 25% or greater attrition. For some studies, it was difficult to quantify attrition rates, for example, Bevan and Emerson⁴² reported 0% attrition yet also stated that two out of three mindfulness sessions were not attended by all participants (session one 53% and session two 85% attendance). In another web-based study,³⁷ 10 out of 52 experimental participants did not withdraw from the study but never actually logged online to use the programme. All studies provided sufficient details regarding the interventions used, to ensure repeatability. All outcome measures relating to well-being or burnout were evaluated for this review, however burnout, perceived stress, depression, and anxiety as well as resilience, quality of life and work engagement levels were of particular interest to the authors. A full summary of the wellbeing interventions analysed in this review are outlined below in [table 1](#).

Organisationally focused interventions

Three^{26 52 56} of the thirty-three studies implemented workplace interventions focused on the organisation altering daily practices and protocols to enhance worker well-being. Two^{26 56} of these studies used interventions designed to eradicate or eliminate stress in the workplace and were therefore categorised as primary level interventions and one⁵² was secondary that is, participants were managed for symptoms of occupational stress. Gordon *et al*⁵⁶ implemented general job crafting strategies based around weekly goals to promote teamwork and increase quality of care for medical specialists and nurses, through training and setting personal goals. In the study conducted by Gregory *et al*²⁶ workloads for physicians were reduced, by employing a certified medical assistant to run appointments, manage pharmaceutical refill requests, triage and coordinate care activities.

Finally, a three-tiered PSN programme was delivered by Wahl *et al*⁵² which consisted of departmental peer supporters, a trained peer support team and mental health experts.⁵² The key goals of this study were to develop a PSN, identify at-risk colleagues, and understand and deliver therapeutic communications by developing keywords and phrases.⁵²

The duration of these interventions varied from 3 weeks⁵⁶ to 3 months⁵² with only one²⁶ conducting an additional follow-up, 3 months after the intervention. All three studies showed positive results; however, comparison and contrast of efficacy is difficult due to the significant heterogeneity of data collection methods and outcomes measured (see for a summary of all study outcomes). Both Gregory *et al*²⁶ and Gordon *et al*⁵⁶ implemented quasi-experimental study designs with non-randomised, no treatment and waitlist control groups. Wahl *et al*⁵² implemented a single group pretest/post-test

study design method and recorded a significantly smaller sample size of just 20 participants compared with the other two organisational studies (107⁵⁶ and 69,²⁶ respectively). All three studies reported on multiple well-being outcomes by using more than one validated survey instrument, however, there was not a wellness inventory (survey tool) that was implemented in all three studies. Gregory *et al*²⁶ and Gordon *et al*⁵⁶ measured levels of emotional exhaustion (EE) for their participants using the Maslach Burnout Inventory (MBI) and the Oldenburg Burnout Inventory (OLBI).

Both studies demonstrated statistically significant reductions in EE for participants following the intervention in comparison to the control groups, the reduction in EE was also sustained at the 6-month follow-up in the study by Gregory *et al*.²⁶ In the study by Wahl *et al*⁵² a reduction in the burnout subscale of the Professional Quality of Life Scale (ProQOL-5) was reported by participants following the PSN intervention but it was not significant.⁵² A significant improvement in mean scores was reported for the Compassion Satisfaction (CS) subscale of the Compassion Practice Instrument (CPI), however, it was noted that comparison of the CS subscales for the ProQOL-5 and the CPI revealed contradictory results in that CS scores decreased following the intervention as measured by the ProQOL-5. It is thought that the CPI may be more sensitive for measuring CS and therefore able to discern more subtle differences.⁵²

Individually focused interventions

Thirty^{1 4 7 12 17 37–51 53–55 57–63} studies in this review implemented secondary level well-being interventions that targeted individual behavioural changes by aiming to minimise the effects of stress in participants through such techniques as relaxation training or promoting a positive mindset.

Relaxation techniques

Various relaxation techniques accounted for 25 of the individually focused intervention studies. MBE was the most consistently implemented (n=20),^{4 7 17 37 38 40–42 44 45 47 50 51 53–55 57 59 60 63} followed by meditation,^{45 48} yoga,³⁹ acupuncture¹ and massage chairs.⁴⁶

Of the 20 intervention studies involving MBE, 10^{4 7 38 40–42 44 50 54 63} held in-person educational sessions, 7^{17 50 51 53 55 59 60} applied a combination of in-person education sessions followed by individual practices at home and 4^{4 37 45 47} used online delivery methods either via a smartphone application or web-based programmes. In the study performed by Mistretta *et al*,⁴ two intervention groups were structured to implement MBE both in-person and via a smartphone application and therefore has been listed two times. Study durations for MBE ranged from 2 to 16 weeks, with a single outlier study running for 6 months (McNulty *et al*⁴⁴ implemented four MBE sessions throughout a 6-month nursing residency programme). The number of sessions delivered in

Table 1 Wellbeing intervention studies

Study	Location	Level of well-being intervention	Target of behavioural change	Intervention type	Intervention timeframe	Sample size (n)	Attrition rates	Focus of intervention
Alexander <i>et al</i> ³⁹ 2015	United States	Secondary	Individual	Yoga	8 weeks	Intervention: 20 Control: 20	0%	Yoga sessions focused on conscious breathing.
Bevan & Emerson ⁴² 2020	United States	Secondary	Individual	Mindfulness-based practices	2 weeks	Intervention: 13	0%	Participants attended 3x4 hour sessions designed to address moral distress and increase empowerment using Freirean-based conscientisation.
Bianchini & Copeland ¹⁷ 2021	United States	Secondary	Individual	Yoga and Mindfulness-based practices	12 weeks	Intervention: 86	0%	Didactic course of 2x1 hour education/training sessions. Participants were able to access two mindfulness videos, 3 stretching videos and one brief yoga sequence video for beginners at their leisure.
Bonamer & Aquino Russell ⁴⁸ 2019	United States	Secondary	Individual	Meditation	16 weeks	Intervention: 27	11%	Introductory class of transcendental meditation followed by a preparatory lecture, personal interview and four consecutive days of 90–120 min of personal and group instruction. Participants then completed 2x20 min sessions of meditation daily.
Buchanan <i>et al</i> ¹ 2018	United States	Secondary	Individual	Acupuncture	16 weeks	Intervention: 112	62.5%	Five auricular acupuncture sessions lasting 30 min were conducted in a quiet, peaceful setting. Needles were placed, according to the NADA protocol designed to treat people who have been exposed to traumatic events, in five specific points on the external ear.
Caponnetto <i>et al</i> ⁵⁹ 2018	Italy	Secondary	Individual	Mindfulness-based practices	16 weeks	Intervention: 28	0%	Eight 180 min autogenic stress management sessions were held twice a month for 16 weeks. Followed by individual practice and diary recordings.
Cheng <i>et al</i> ¹² 2015	Hong Kong	Secondary	Individual	Gratitude	4 weeks. FU at 3 months.	Intervention: 34 Control: 34 Hassle: 34	0%	Random assignment into three conditions: gratitude, hassle, and no treatment. A no diary group served as control. In both the gratitude and hassle condition, participants wrote diaries about work-related events twice a week for four consecutive weeks.

Continued

Table 1 Continued

Study	Location	Level of well-being intervention	Target of behavioural change	Intervention type	Intervention timeframe	Sample size (n)	Attrition rates	Focus of intervention
Colgan <i>et al</i> ⁴⁰ 2018	United States	Secondary	Individual	Mindfulness-based practices	8 weeks. FU at 3 months.	Intervention: 16 Control: 15	0%	Eight 60 min weekly mindfulness-based sessions designed to improve resilience, mindfulness, and self-compassion were delivered onsite directly following weekly team meetings.
Craigie <i>et al</i> ⁵⁴ 2016	Australia	Secondary	Individual	Mindfulness-based practices	4 weeks. FU at 1 month.	Intervention: 21	5%	1 day compassion fatigue prevention educational workshop, followed by a series of weekly mindfulness training seminars.
Dobie <i>et al</i> ⁵⁵ 2016	Australia	Secondary	Individual	Mindfulness-based practices	8 weeks	Intervention: 9	0%	Daily 15 min mindfulness-based stress reduction training interspersed with three 30 min education sessions developed by the authors.
Dos Santos <i>et al</i> ⁶¹ 2016	Brazil	Secondary	Individual	Meditation	6 weeks. FU at 6 weeks.	Intervention: 13	0%	60 min stress reduction meditation sessions, four times a week for 6 weeks.
Duarte & Pinto-Gouveia ⁶⁰ 2016	Portugal	Secondary	Individual	Mindfulness-based practices	6 weeks. FU at 3 months.	Intervention: 29 Control: 19	49%	Six, 2 hour group sessions, involved didactic and experiential exercises. Participants received a CD with a variety of guided meditations, to practice at least 15 min per day.
Duchemin <i>et al</i> ⁴¹ 2015	United States	Secondary	Individual	Yoga and Mindfulness-based practices	8 weeks	Intervention: 16 Control: 16	0%	Didactic introduction/discussion and a combination of mindfulness and yoga practices with music at each session. All sessions were 60 min except week five which was 2 hours and included mindful eating.
Dutton & Kozachik ⁴⁷ 2020	United States	Secondary	Individual	Mindfulness-based practices	8 weeks	Intervention: 31	0%	The web based BREATHE stress management programme consisted of six modules that described, identified, and helped nurses manage stress. Participants were asked to use the BREATHE framework as regularly as possible.

Continued

Table 1 Continued

Study	Location	Level of well-being intervention	Target of behavioural change	Intervention type	Intervention timeframe	Sample size (n)	Attrition rates	Focus of intervention
Dyrbye <i>et al</i> ⁴³ 2019	United States	Secondary	Individual	Professional coaching	5 months	Intervention: 44 Control: 44	0%	Six coaching sessions facilitated by a professional coach. 1 hour initial consultation followed by five 30 min professional coaching sessions occurred every 2–3 weeks for 5 months.
Gordon <i>et al</i> ⁶⁶ 2018	Netherlands	Primary	Organisation	Job Crafting	3 weeks	Intervention: 48 Control: 71	10%	Job crafting intervention consisted of weekly goals based around the successful implementation of effective teamwork and quality of care.
Gregory <i>et al</i> ²⁶ 2018	United States	Primary	Organisation	Reducing workloads	3 months. FU at 6 months	Intervention: 37 Control: 32	13%	Reduced workloads by employing a Certified Medical Assistant (CMA) to run appointments, manage other clinical activities, triage, pharmaceutical refill requests and other care coordination activities.
Hand <i>et al</i> ⁴⁶ 2019	United States	Secondary	Individual	Massage chair	6 months	Intervention: 51	0%	A mechanical massage chair was available for 20 min sessions in a secure room and nurses self-recorded their perceived stress.
Hersch <i>et al</i> ³⁷ 2016	United States	Secondary	Individual	Mindfulness-based practices	3 months	Intervention: 52 Control: 52	13%	A web-based stress management programme consisted of six modules that described, identified, and helped nurses manage stress. Group participants were encouraged to use the web-based programme as much as they could over a 3 month period.
Hevezi ⁵¹ 2016	United States	Secondary	Individual	Mindfulness-based practices	4 weeks	Intervention: 15	0%	Education session on compassion fatigue, compassion satisfaction, burnout, self-care, and mindfulness followed by a 16 min mindful breathing meditation. Participants then practiced the meditations 5 days per week for a 4 week period.
Komase <i>et al</i> ⁶² 2019	Japan	Secondary	Individual	Gratitude	3 weeks. FU at 6 weeks.	Intervention: 145	0%	50 min gratitude workshop followed by 3 weeks of sending gratitude lists via email. Participants sent two work related things they were grateful for, three times a week for 3 weeks.

Continued

Table 1 Continued

Study	Location	Level of well-being intervention	Target of behavioural change	Intervention type	Intervention timeframe	Sample size (n)	Attrition rates	Focus of intervention
McNulty <i>et al</i> ⁴⁴ 2022	United States	Secondary	Individual	Mindfulness-based practices	6 months	Intervention: 131 Control: 69	0%	Mindfulness training integrated at four points throughout a 6 month residency programme.
Mistretta <i>et al</i> ⁴ 2018	United States	Secondary	Individual	Mindfulness-based practices	6 weeks. FU at 3 months.	Intervention: 20 Control: 20	10%	In-person mindfulness-based resiliency training (2 hour sessions once a week for 6 weeks) or a resiliency-based smartphone intervention for 6 weeks.
Moss & O'Donoghue ⁵⁸ 2020	Ireland	Secondary	Individual	Choir singing	12 weeks	Intervention: 54	0%	12 weeks of choir rehearsals once per week.
Ofei-Dodoo <i>et al</i> ⁷ 2020	United States	Secondary	Individual	Yoga and Mindfulness-based practices	8 weeks	Intervention: 43	2%	Workplace, group mindfulness-based yoga sessions led by an experienced yoga instructor. 1 hour weekly sessions attended for 8 weeks.
Rodrigues <i>et al</i> ⁵⁰ 2018	United States	Secondary	Individual	Mindfulness-based practices	90 mins	Intervention: 33	0%	90 min programme focused on helping patients to deal with pain but also helped nurses to improve their own self-care practices.
Sabzevar <i>et al</i> ⁶³ 2016	Iran	Secondary	Individual	Mindfulness-based practices	3 weeks	Intervention: 62 Control: 73	0%	Training package of emotional intelligence implemented during 6 sessions of 2 hours, 2 days per week.
Schroeder <i>et al</i> ³⁸ 2018	United States	Secondary	Individual	Mindfulness-based practices	4 weeks. FU at 3 months.	Intervention: 16 Control: 17	15%	A 13-hour weekend MMC training programme plus 2 hour follow-up sessions scheduled at 2 and 4 weeks after the weekend.
Sexton & Adair ⁴⁹ 2019	United States	Secondary	Individual	Gratitude	4 weeks. FU at 1, 6 & 12 months.	Intervention: 228	0%	Participants kept a log of things that go well for 15 days. Participants chose to share their good things with other participants or not.
Van Horne <i>et al</i> ⁶³ 2020	United States	Secondary	Individual	Mindfulness-based practices	-	Intervention: 193	90% attended less than 3 OASIS sessions.	Six modules (10 min presentations delivered during staff meetings) followed the OASIS educational programme. Participants practiced learnt self-care strategies in a quiet room created for the intervention.

Continued

Table 1 Continued

Study	Location	Level of well-being intervention	Target of behavioural change	Intervention type	Intervention timeframe	Sample size (n)	Attrition rates	Focus of intervention
Verweij <i>et al</i> ⁵⁷ 2016	Netherlands	Secondary	Individual	Mindfulness-based practices	8 weeks	Intervention: 25 Control: 25	14%	MBSR training designed for issues faced by general practitioners. Participants attended a 2.5 hour session each week for 8 weeks and a 1 day silent retreat between the sixth and seventh session as well as daily MBSR practice.
Wahl <i>et al</i> ⁶² 2018	United States	Secondary	Organisation	Peer Support Network (PSN)	6 weeks	Intervention: 33	39%	Participants completed an online module focused specifically on development of a PSN. They then attended a 3 hour in person workshop including 2 hours of resiliency and 1 hour PSN team roles, and scenario review.
Werneburg <i>et al</i> ⁴⁵ 2018	United States	Secondary	Individual	Mindfulness-based practices	12 weeks. FU at 3 months.	Intervention: 159	25%	60–90 min SMART educational sessions attended over 12 consecutive weeks. Sessions were held over the lunch hour.

Note. Level of wellbeing intervention refers to the level at which the intervention was targeted i.e. primary, secondary, or tertiary. Target of behavioural change refers to the level at which interventions target behavioural changes i.e. individual or organisation. CD (Compact Disc), FU (Follow up in addition to post intervention surveys), MBSR (Mindfulness-Based Stress Reduction), MMC (Mindful Medicine Curriculum), n (number of participants), NADA (National Acupuncture Detoxification Association), OASIS program: consists of psychoeducation grounded in positive psychology and awareness cognitive bias, SMART program: (a) awareness of neural predispositions to stress, b) attention training to improve the depth and intentionality of attention and c) learning 5 core principles to enhance emotional resiliency (gratitude, compassion, acceptance, meaning and forgiveness).

each MBE programme also varied greatly from a single seminar⁵⁰ to a 12-session education programme.⁶² Most delivered between 4 and 12 sessions. Nine out of the twenty studies implementing MBE interventions used control groups and of these, six^{37 38 40 41 50 60} implemented a waitlist style control, two^{4 44} were active and one³⁷ group received no treatment. The largest sample size was reported by McNulty *et al*⁴⁴ with 131 participants in the intervention group and 69 in the active control group. The smallest sample was 13.⁴² All programmes that delivered in-person group-based MBE education reported at least one statistically significant, positive outcome. Four^{4 7 38 50} studies documented EE levels as measured by the MBI with three^{4 38 50} reporting improvements following the intervention. Although not statistically significant, EE levels did improve in participants in the study by Ofei-Dodoo *et al*⁷ who also noted that baseline MBI scores were low. This study did show significant reductions in depression, anxiety and stress scores as measured by the Depression Anxiety and Stress Scale (DASS-21) following the intervention, as well as significant improvements in levels of Personal Accomplishment. Changes in stress (DASS-21), as well as levels of perceived stress (Perceived Stress Scale (PSS)) were reported in 7^{4 7 38 41 44 45 54} of the 11 studies. Of these seven, six were statistically significant with Schroeder *et al*.³⁸ Werneburg *et al*⁴⁵ and Mistretta *et al*⁴ all reporting that reductions in levels of stress were maintained at the 3-month follow-up. Mistretta *et al*⁴ also reported improvements in well-being as measured by the WHO Well-being Index (WHO-5) for the in-person intervention group. Schroeder *et al*³⁸ and Colgan *et al*⁴⁰ both reported improvements in resiliency levels using the Brief Resilience Scale for participants following the MBE sessions compared with the control groups. A substantial increase in resiliency levels was reported by Colgan *et al*⁴⁰ following the intervention, however, the increase in resiliency for participants in the study by Schroeder *et al*³⁸ was not enough to be significant. Werneburg *et al*⁴⁵ and Ofei-Dodoo *et al*⁷ also both reported changes in resiliency levels using the Connor Davidson Resilience Scale (CD-RISC) and the Resilience Scale (RS-14), respectively. Neither study employed a control group however both reported substantial improvements in resiliency following the interventions which were maintained at the 3-month follow-up in Werneburg *et al*'s study.⁴⁵

Of the seven studies that implemented a combination of in-person MBE followed by self-directed practice, six^{17 51 53 57 59 60} reported on levels of burnout using either the MBI or the ProQOL-5 and of these, two^{50 60} employed a waitlist control group. Statistically significant reductions in burnout were reported postintervention in the studies by Duarte and Pinto-Gouveia⁶⁰ and Hezezi.⁵¹ There were significant reductions in EE as well as Depersonalisation (DP) levels but not overall burnout in the study by Caponnetto *et al*⁵⁹ with Verweij *et al*⁵⁷ documenting significantly reduced DP levels only. Van Horne *et al*⁶³ reported a reduction in burnout for participants who attended three or more OASIS sessions versus those who

reported not attending any sessions, however, this study did not report all mean scores. Dobie *et al*⁵⁵ and Duarte and Pinto-Gouveia⁶⁰ documented significantly reduced stress levels in participants following the intervention as measured by the DASS-21 and Caponnetto *et al*⁵⁹ also reported a significant reduction in perceived stress as measured by the PSS. It is worth noting however, that the study by Dobie *et al*⁵⁵ had strong limitations in that they recruited the smallest sample size of just nine participants. Bianchini and Copeland¹⁷ employed the largest sample size (143 participants) yet did not report any statistically significant change in outcome measures following the 12-week didactic intervention. Of the four studies that implemented MBI practices in an online or solely self-directed manner, two^{37 47} used the web-based BREATHE programme designed to help nurses manage stress. Both studies reported statistically significant changes in levels of stress as measured by the Nurse Stress Scale (NSS) despite the varied study designs.^{37 47} Hersch *et al*³⁷ implemented an RCT design with a total of 104 participants while Dutton and Kozachik⁴⁷ used a single group pretest/posttest study design with 31 participants. Participants in both studies were encouraged to login and use the online programme as much as possible within a 2-month⁴⁷ and 3-month³⁷ period.

The smartphone intervention group in the study by Mistretta *et al*⁴ reported less significant changes in outcome measures compared with the in-person MBE intervention group. Significant improvements in well-being were reported as measured by the WHO-5, however, this was not maintained at the 6-month follow-up.⁴ Reductions in stress, anxiety and depression were not enough to be significant for the smartphone group. Two^{48 61} of the thirty individually focused studies implemented a meditation intervention and one³⁹ implemented yoga. Three^{7 17 62} of the twenty MBE studies also incorporated yoga as part of the overall mindfulness education programme with one study by Duchemin *et al*⁴¹ using a combination of MBE, yoga and meditation. Neither of the meditation studies used a control group and both had relatively small sample sizes (13 and 27 participants). Burnout levels were reported to be significantly reduced in both studies using the MBI⁵⁸ and the ProQOL-5 burnout subscale.⁴⁸ dos Santos *et al*⁶¹ additionally reported significant reductions in perceived stress as well as trait anxiety using the State-Trait Anxiety Inventory (STAI) which were all further maintained at the 6-week follow-up. Bonamer and Aquino-Russell⁴⁸ reported that resiliency scores (CD-RISC) significantly increased following the meditation intervention and demonstrated a correlation between resiliency combined with burnout and CS (ProQOL-5).

In the single yoga study by Alexander *et al*³⁹ the intervention group reported significant improvements in self-care as measured by the Health Promoting Lifestyle Profile (HPLP II) and mindfulness as measured by the Freiburg Mindfulness Inventory (FMI) as well as significant reductions in EE and DP postintervention. Yoga was also incorporated into three of the MBE studies with

Ofei-Dodoo *et al*⁷ implementing group mindfulness-based yoga sessions 1 hour a week for 8 weeks. The 43 participants in this study reported significant improvements in depression, anxiety and stress (DASS-21) as well as increased resilience (RS-14) and compassion as measured by the Santa Clara Brief Compassion Scale (SCBCS).⁷ The other two^{17 41} MBE studies that incorporated yoga both implemented a control group, and both reported no significant change in burnout (MBI) or perceived stress. Statistically significant reductions in both state anxiety and trait anxiety (STAI) were reported following the auricular (around the ear) acupuncture intervention, and total work engagement scores as measured by the Utrecht Work Engagement Scale (UWES) also showed significant improvement for the 112 participants.¹ The study using a massage chair intervention reported substantial reductions in all outcome measures (perceived stress, heart rate, systolic and diastolic blood pressure) for the 51 study participants.

Promoting a positive mindset

Five of the thirty individually focused studies implemented interventions designed to promote a positive mindset in participants including gratitude journaling,^{12 49 62} choir singing⁵⁸ and professional coaching.⁴³ Gratitude journaling interventions are designed to shift thoughts away from the negativity of stress and towards a more positive primary appraisal of a situation.¹² Similarly, choral singing research has shown that participants who regularly engage, may experience cognitive benefits through the addition of social routine and meaningful activity to everyday life.⁵⁸ The professional coaching intervention was also specifically implemented for participants to design and achieve goals, thereby strengthening personal resilience and mindset positivity.⁴³ All three studies that implemented a gratitude intervention had large recruitment numbers with the smallest sample size being 102.¹² Cheng *et al*¹² implemented a three-arm randomised control trial and overall scored the highest on the MERSQI for quality and design. In addition to a gratitude and control group, Cheng *et al*¹² employed a 'hassle group' to record only negative work-related events throughout the 4-week intervention. Postintervention, no significant interaction effects with time or other changes were found for the hassle group, suggesting it was indistinguishable from the control group.¹² The gratitude group reported significantly less perceived stress, following the intervention, which was also documented at the 3-month follow-up. A reduction in depressive symptoms was also seen over time for the gratitude group compared with the control group. Participants in the study by Komase *et al*⁶² attended a single 50 min gratitude workshop and were then asked to send lists of three work-related things they were grateful for, three times a week for three consecutive weeks. Gratitude, self-efficacy, psychological distress and job performance improved significantly postintervention. The gratitude study by Sexton and Adair⁴⁹ also reported significant improvements in both depressive symptoms

(Center for Epidemiologic Studies Depression Scale (CES-D)) and subjective happiness (Subjective Happiness Scale (SHS)) following participants keeping a log of everything that went well for 15 days. However, it was also noted in this study, the extent to which participants expressed their gratitude was not known as participants could opt to share their diaries or not.

The study by Moss and O'Donoghue⁵⁸ reported no significant improvement for any quantifiable outcome measure in this study, however, qualitative findings reported that a workplace choir can promote social connectedness, enjoyment at work and staff engagement.⁵⁸ Dyrbye *et al*⁴³ implemented professional coaching for 44 participants and assigned the same number of participants to a control group (no treatment). The proportion of participants in the intervention group with high EE, at 5-month follow-up decreased by 19.5% and increased by 9% in the control group. The intervention group also had a significant overall improvement in quality of life as measured by the Quality of Life Scale as well as resilience (CD-RISC) compared with the control group.

Individual job crafting

Finally, the second intervention group within the study by Gordon *et al*⁵⁶ implemented individual job crafting to improve work engagement and lower burnout. Participants in the individual job crafting group reported improved work engagement (UWES) as well as significantly lowered levels of EE (OLBI) compared with the waitlist control group.⁵⁶ Results were comparable to the first group who received a generalised job crafting intervention and therefore no variation in positive study outcomes was reported between the two job crafting treatment groups.⁵⁶ A detailed breakdown of all study outcomes is outlined below in table 2.

As it is difficult to compare results to determine the overall impact of these studies, table 3 was created to highlight four positive attributes of the studies reviewed, partially informed by the MERSQI guidelines for quality studies. As demonstrated, only four^{4 12 26 60} studies reported statistically significant positive outcomes while implementing a large sample size, control group and postintervention follow-up.

DISCUSSION

Overall, the studies included in this review scored moderate-highly on the MERSQI rating system yet were markedly heterogeneous pertaining to intervention types, study designs, outcome measures and sample sizes implemented. The literature suggests that organisationally focused well-being interventions may be more effective in promoting and maintaining worker well-being however, with only three studies falling under the organisational umbrella, this review cannot confirm or refute this notion. Each organisational intervention reported at least one statistically significant positive outcome, however only the study by Gregory *et al*²⁶ conducted a follow-up

Table 2 Detailed breakdown of study outcomes

Study	Intervention type	Well-being survey tool	Control group	Mean scores of significance (Pre/post-test±FU)	Study outcomes
Alexander <i>et al</i> ⁶⁹ 2015	Yoga	(HPLP 11), (FMI), (MBI).	Random: No treatment	HPLP II 2.69–3.08, FMI 39.80–43.60, MBI EE 17.60–12.95, MBI DP 4.05–2.50.	Self-care and mindfulness showed significant improvement pre- to post-yoga intervention, as well as significantly reduced emotional exhaustion and depersonalisation. Based on reported effect size, this yoga intervention was promising with future research needed.
Bevan & Emerson ⁴² 2020	Mindfulness-based practices	(MDS-R), (PES), (CWEQ-II).	–	MDS Total 132–111, MDS Frequency 38–34, MDS Intensity 65–72, PES Meaning 14–16.	Nurses scored significantly lower means in overall moral distress and frequency after the intervention. However, intensity scores were significantly higher following the intervention. There were no change in scores for perceived personal or group empowerment. There was an improvement seen in the ‘meaning’ subscale of the PES, a measure of a person’s own evaluation pertaining to the importance of their work.
Bianchini & Copeland ¹⁷ 2021	Yoga and Mindfulness-based practices	(MBI), (PSS).	–	–	Post 12 week intervention, nurses reported a 11% reduction in perceived stress and reduced burnout levels. PSS scores following the intervention were still 3.1% higher than population norms. Burnout was higher in personal accomplishment than emotional exhaustion or depersonalisation. Although there were some improvement in MBI scores, they were not statistically significant.
Bonamer & Aquino Russell ⁴⁸ 2019	Meditation	(ProQOL-5), (CD-RISC).	–	ProQOL-5 CS 37.7–41.2, ProQOL-5 STS 22.7–19.4, ProQOL-5 Burnout 24.5–20.0, CD-RISC 70.4–81.2.	Resilience scores were significantly higher after 4 months compared with baseline scores. All subscales of ProQOL-5 showed significant improvements post intervention. Burnout and compassion satisfaction subscales showed significant correlations with resilience ($p=0.001$, $p=0.025$, respectively).
Buchanan <i>et al</i> ¹ 2018	Acupuncture	(STAI), (UWES-9).	–	STAI S Anxiety 37.64–32.6, STAI T Anxiety 38.14–34.62, UWES Total 37.93–42.21, UWES Dedication 4.51–4.80.	State anxiety and trait anxiety significantly decreased following the intervention. Total engagement scores also showed significant improvement. All UWES subscales trended towards improvement but only dedication was significant.
Caponnetto <i>et al</i> ⁶⁹ 2018	Mindfulness-based practices	(PSS), (MBI), (QOL), (VAS).	–	PSS 21.3–16.3, MBI EE 26.83–19.21, MBI DP 17.76–8.25, QOL 48.3–76.01, VAS 51.2–70.89.	Statistically significant improvements from baseline were observed for PSS, Euro QOL, and MBI (EE & DP) scores. Stress management by autogenic training appeared to be an inexpensive strategy, quite effective for emergency room staff.

Continued

Table 2 Continued

Study	Intervention type	Well-being survey tool	Control group	Mean scores of significance (Pre/post-test±FU)	Study outcomes
Cheng <i>et al</i> ¹² 2015	Gratitude Journaling (CES-D), (PSS).	(CES-D), (PSS).	Random: Active – Random: No treatment		Interaction effects with time or main effects were not found for the 'hassle group', suggesting it was indistinguishable from control group in terms of depressive symptoms and stress. Results suggested a decline in depressive symptoms and perceived stress over time for the 'gratitude group' but that the difference between gratitude and control increased over time. The gratitude group reported lower depressive symptoms at FU and less perceived stress post intervention.
Colgan <i>et al</i> ⁴⁰ 2018	Mindfulness-based practices	(BRS), (FFMQ), (SCS).	Waitlist	BRS 18.23–23.06–24.14, FFMQ Total 51.76–51.86–55.36.	Significant improvements in resilience post intervention as well as mindfulness non-reactivity of internal experience. Themes resulting from the open-ended survey questions for the treatment group included a) increased nonreactive awareness, b) improved adaptive coping, c) enhanced team cohesion, d) enhanced quality of patient-provider communication, e) increased quality of life, f) participants' perceived importance of integrating informal mindfulness practices into the workday and g) participants' recommendations for longer and more frequent sessions.
Craigie <i>et al</i> ⁵⁴ 2016	Mindfulness-based practices	(ProQOL-5), (DASS-21), (CD-RISC).	–	DASS Depression 4.2–2.7–3.1, ProQOL-5 Burnout 23.8–20–20.5.	Significant reductions at post intervention for depression and burnout. Scores were maintained at 1 month follow-up for burnout but not depression. A significant improvement in compassion satisfaction was also seen. Secondary traumatic stress, anxiety and general resilience did not reduce post intervention.
Dobie <i>et al</i> ⁵⁵ 2016	Mindfulness-based practices	(DASS-21), (KIMS).	–	DASS Anxiety 8.0–3.6, DASS Stress 11.6–6.0, DASS Total 24.7–12.2.	Post intervention, there were statistically significant reductions in DASS Total, Anxiety and Stress scores. Decreases in self-reported levels of depression approached significance (p=0.06). There was no significant change in KIMS total score over time. Thematic analysis of participants' written feedback was generally positive, and all participants reported positive outcomes. All participants found that they learnt more about stress management.

Continued

Table 2 Continued

Study	Intervention type	Well-being survey tool	Control group	Mean scores of significance (Pre/post-test±FU)	Study outcomes
Dos Santos <i>et al</i> ⁶¹ 2016	Meditation	(BDI), (PSS), (MBI), (STAI), (SCS), (WSS).	–	BDI 14.54–8.46, PSS 23.85–17.08–15.62, MBI Total 50.23–38.23–37.85, STAI T Anxiety 48.92–41.38–39.30.	Significant reduction in depression, perceived stress, burnout, and anxiety (trait) post intervention, also maintained at 6 week follow-up. Intervention appeared to have a positive influence on nursing work, by altering the activities and relationships in the hospital environment. Most participants also reported improvement in their reactivity to inner experiences.
Duarte & Pinto-Gouveia ⁶⁰ 2016	Mindfulness-based practices	(ProQOL-5), (DASS-21), (SCS).	Waitlist	ProQOL-5 Burnout 26.57–24.29, CF 25.71–23.07, DASS Stress 7.03–5.28.	Statistically significant improvement in compassion fatigue was reported for the treatment group but not for the control group. Burnout and stress showed statistically significant reductions. 72.5% of participants reported they made a change in their lifestyle because of the intervention, 80.4% reported their relationship with thoughts and emotional states improved.
Duchemin <i>et al</i> ⁴¹ 2015	Yoga and Mindfulness-based practices	(PSS), (DASS-21), (MBI), (ProQOL-5).	Waitlist	–	PSS scores did not significantly change post intervention. No changes in DASS Anxiety, or DASS depression subscale scores post intervention. DASS Stress scores reduced by 25% post intervention vs no change in the control group. Compassion satisfaction subscale of the ProQOL significantly increased in the intervention group. Salivary alpha amylase levels were also 40% less in the intervention group.
Dutton & Kozachik ⁴⁷ 2020	Mindfulness-based practices	(NSS).	–	NSS Total 74.9–62.1, Death & Dying 16.2–12.7, Conflict with MD 10.9–8.4, Workload 15.6–13.5, Treatment Uncertainty 10.9–8.5.	Statistically significant improvement in total stress as measured by the NSS was reported. post intervention. Several subscales also showed improvements including: stress related to death and dying, conflict with physicians, workload, and uncertainty-related treatment.
Dyrbye <i>et al</i> ⁴³ 2019	Professional Coaching	(MBI), (CD-RISC), (QOL).	Random: No treatment	MBI EE 32.8–27.6, CD-RISC 31.0–32.3, QOL 5.9–7.1.	Participants in coaching intervention showed greater reductions in emotional exhaustion scores vs those in the control group. Proportion of physicians with high emotional exhaustion at 5 months decreased by 19.5% in intervention group and increased by 9% in control group. DP and PA scores showed no statistically significant change. The intervention group also reported significant improvements in overall QOL and resilience compared with control group.

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Table 2 Continued

Study	Intervention type	Well-being survey tool	Control group	Mean scores of significance (Pre/post-test±FU)	Study outcomes
Gordon et al ⁶⁶ 2018	Job Crafting	(JCS), (UWES), (OLBI).	Waitlist	JCS DD 2.03–2.29, UWES 4.03–4.21, OLBI EE 1.93–1.86.	Study one intervention group reported significantly higher levels of work engagement and lower levels of exhaustion at FU compared with the control group.
Gordon et al ⁶⁶ 2018	Job Crafting	(JCS), (UWES), (OLBI).	Waitlist	JCS DD 2.03–2.41, UWES 4.10–4.68, OLBI EE 2.20–2.08.	In Study 2, the follow-up intervention group had significantly higher levels of work engagement as well as lowered levels of exhaustion compared with control group. Improvements in components of employee well-being were seen in both studies.
Gregory et al ²⁶ 2018	Workload	(MBI), (AWS).	No treatment	MBI EE 24.41–22.36–21.55, AWS Workload 2.5–2.99–2.62.	Emotional exhaustion decreased in physicians following the intervention. The workload subscale of the AWS increased, however was not sustained at the 6 month FU suggesting either the intervention had a short dose-response type of impact on participants or there was an underlying temporal trend in workload that over time would reduce the impact of the intervention.
Hand et al ⁴⁶ 2019	Massage Chair	(VAS), (BP), (HR).	–	VAS 4.6–2.6, HR 70.3–67.3, Systolic BP 121–113, Diastolic BP 72–68.2.	Statistically significant improvements in perceived stress as well as BP and HR were observed. A greater improvement in perceived stress was also reported for nurses who pre-scheduled appointments compared with those who attended spontaneous sessions.
Hersch et al ³⁷ 2016	Mindfulness-based practices	(NSS), (SDS), (COPE).	Random: Waitlist	NSS Full Scale 2.243–2.072.	Experimental group showed improvement compared with the control group, for the primary measure of nurses' stress. No other significant differences were found for secondary outcome measures including symptoms of distress and coping with stress.
Hevezi ⁵¹ 2016	Mindfulness-based practices	(ProQOL-5).	–	CS 36.6–39.3, STS 25.3–22.2, Burnout 26.4–22.2.	Significant increase in compassion satisfaction scores and decreased burnout. The effect size was large (d>0.5) despite the small sample. All participants reported increased feelings of relaxation, developing a sense of self-compassion, positive changes in physical, emotional, and mental reactions to stress, and a high likelihood of incorporating meditation into their self-care plans.

Continued

Table 2 Continued

Study	Intervention type	Well-being survey tool	Control group	Mean scores of significance (Pre/post-test±FU)	Study outcomes
Komase <i>et al</i> ⁶² 2019	Gratitude	(UWES), (GQ-5), (SES), (K6).	–	GQ-5 5.20–5.38–5.50.	Gratitude, self-efficacy, psychological distress, and job performance improved significantly post intervention. No improvement in work engagement. The extent to which participants expressed their gratitude is not known.
McNulty <i>et al</i> ⁴⁴ 2022	Mindfulness-based practices	(PSS), (OLBI), (MAAS).	Active	PSS 10.85–15.17, OLBI Total 1.73–2.14, MAAS 4.87–4.29.	Stress and burnout increased for both cohorts during the first 6 months of practice, in-keeping with the nature of a residency programme. However, post intervention, perceived stress and burnout were lower for intervention cohort. Mindfulness decreased in both groups over the 6 months but was still higher in the intervention group.
Mistretta <i>et al</i> ⁴ 2018	Mindfulness-based practices	(DASS-21), (WHO-5), (MBI-HSS), (SCS).	Random: Active	DASS Stress 8.18–5.86–5.82, WHO 12.05–14.45–15.36, MBI EE 27.09–20.27–17.64.	MBRT group showed significant reductions in stress and emotional exhaustion as well as significant improvements in well-being. Control group showed no sustained improvement in any outcome. Of those enrolled in an intervention, the greater the number of sessions attended, the greater the improvements in well-being and compassion for others.
Mistretta <i>et al</i> ⁴ 2018	Mindfulness-based practices	(DASS-21), (WHO-5), (MBI), (SCS).	Random: Active	DASS Stress 7.96–6.43–6.17, WHO-5 13.09–15.78–16.17, SCS 2.88–3.31–3.15.	Smartphone group showed significant reductions in stress and improvements in well-being and self-compassion after 6 weeks but did not maintain this at the 3 month follow-up. Control group showed no sustained improvement in any outcome.
Moss & O'Donoghue ⁵⁸ 2020	Choir Singing	(UWES), (PSS), (PHQ-8).	–	–	No statistically significant quantitative findings. Qualitative findings reported a workplace choir can promote social connectedness, enjoyment at work and staff engagement.
Ofei-Dodoo <i>et al</i> ⁷ 2020	Yoga and Mindfulness-based practices	(MBI), (DASS-21), (RS-14), (SCBC).	–	MBI PA 12.3–15.3, DASS Depression 4.7–1.4, DASS Anxiety 6.6–1.8, DASS Stress 9.7–4.1, RS-14 75.3–85.3, SCBC 27.3–30.3.	Baseline MBI scores were low. PA scores were significantly increased following the intervention. Significant improvements were also seen in depression, anxiety, and stress as well as resilience and compassion.

Continued

Table 2 Continued

Study	Intervention type	Well-being survey tool	Control group	Mean scores of significance (Pre/post-test±FU)	Study outcomes
Rodrigues et al ⁶⁰ 2018	Mindfulness-based practices	(SCS), (GHQ), (MBI).	–	SCS 38.58–41.81, GHQ 32.73–33.98, MBI DP 11.34–9.25, MBI EE 32.38–29.47.	Significant improvements in self-compassion, general health and emotional exhaustion were observed 3 months post intervention. Satisfaction ratings were high immediately following the intervention. Qualitative feedback included: “I plan to try some of these recommendations” and “it was a great idea to offer this workshop... thank you.”
Sabzevar et al ⁶³ 2016	Mindfulness-based practices	(ESI), (STAI).	Random: No treatment	ESI 319.06–350.11, STAI S 45.17–35.10, STAI T 39.77–34.06.	Significant improvements in both state and trait anxiety as well as emotional intelligence was seen in the intervention group. No significant change was reported for the control group. Results indicated that the interaction between emotional intelligence and anxiety was significant.
Schroeder et al ⁶⁸ 2018	Mindfulness-based practices	(MAAS), (BRS), (PSS), (SCBCS), (MBI).	Random: Waitlist	MAAS 3.42–3.62–4.04, PSS 19.43–17.93–13.23, MBI EE 26.68–22.46–17.15, MBI DP 20.87–16.80–13.0.	Participants reported significant improvements in stress, mindfulness, emotional exhaustion, and depersonalisation following the intervention. Results showed that brief mindfulness training for primary care physicians reduced stress and burnout and increased mindfulness.
Sexton & Adair ⁴⁹ 2019	Gratitude	(MBI EE), (CES-D), (SHS).	–	CES-D 8.17–6.1–6.44–6.28, SHS 5.28–5.59–5.33–5.57.	74% selected the option to share their responses with others. Participants’ evaluation of the intervention was overwhelmingly positive. Significant improvement was seen across all four metrics following intervention with notable improvement in depressive symptoms and subjective happiness.
Van Horne et al ⁶³ 2020	Mindfulness-based practices	(ProQOL-5), (BRS).	–	–	There was a statistically significant reduction in burnout and increase in compassion satisfaction for those who reported attending three or more education sessions compared with those who reported not attending any sessions. No statistically significant change was seen for resilience.
Verweij et al ⁵⁷ 2016	Mindfulness-based practices	(UBOS), (UWES), (JSE), (FFMQ).	Waitlist	UBOS DP 5.43–4.82, UWES Dedication 23.49–24.66, FFMQ Total 136.21–143.08.	The intervention group reported a greater decrease in the DP subscale of the MBI and a greater increase in mindfulness compared with the control group. An improvement in dedication subscale of UWES (p=0.01) was also reported.

Continued

Table 2 Continued

Study	Intervention type	Well-being survey tool	Control group	Mean scores of significance (Pre/post-test \pm FU)	Study outcomes
Wahl <i>et al</i> ⁶² 2018	Peer Support Network	(ProQOL-5), (CPI).	–	CPI CS 4.06–4.58.	All subscales showed improvement but only CPI CS was significant. Paired-sample statistics showed that ProQOL-5 CS scores decreased post intervention but that the change was not significant.
Werneburg <i>et al</i> ⁴⁵ 2018	Mindfulness-based practices	(CD-RISC), (PSS), (GAD-7), (QOL).	–	CD-RISC 65.3–76.1–78.5, PSS 26.7–18.2–17.4, GAD 7.2–3.4–3.5.	Statistically significant improvements from baseline to 3FU were reported for all well-being outcomes among study completers. The largest effect size from baseline to 3FU was observed for resiliency and perceived stress.

Note. (AWS) Areas of Work life Scale, (BDI) Beck's Depression Inventory, (BP) Blood Pressure, (BRS) Brief Resilience Scale, (CES-D) Chinese version of the Center for Epidemiologic Studies-Depression Scale, (CF) Compassion Fatigue, (CPI) Compassion Practice Instrument, (CS) Compassion Satisfaction, (CWEQ-II) Conditions of Work Effectiveness Questionnaire, (CD-RISC) Connor Davidson Resilience Scale, (COPE) Coping with Stress Scale, (DD) Decreasing Demands, (DP) Depersonalisation, (DASS-21) Depression Anxiety and Stress Scales, (ESI) Bar-on Emotional Intelligence, (EE) Emotional Exhaustion, (FFMQ) Five Facet Mindfulness Questionnaire, (FMI) Freiburg Mindfulness Inventory, (GHQ) General Health Questionnaire, (GAD-7) Generalised Anxiety Disorder, (GQ-5) Gratitude Questionnaire, (HPLP II) Health Promoting Lifestyle, (HR) Heart Rate, (JSE) Jefferson Scale of Empathy, (JCS) Job Crafting Scale, (KIMS) Kentucky Inventory of Mindfulness Skills, (K6) Kessler Psychological Distress Scale, (MBI) Maslach Burnout Inventory, (MAAS) Mindful Attention Awareness Scale, (MDS-R) Moral distress scale, (NSS) Nurse Stress Scale, (OLBI) Oldenburg Burnout inventory, (PSS) Perceived Stress Scale, (PA) Personal Achievement, (PHQ-8) Personal Health Questionnaire Depression Scale, (ProQOL-5) Professional Quality of Life, (PES) Psychological empowerment scale, (QOL) Quality of Life, (RS-14) 14-item Resilience Scale, (SCBC) Santa Clara Brief Compassion Scale, (STS) Secondary Traumatic Stress, (SCS) Self-Compassion Scale, (SES) Self-Efficacy Scale, (STAI) State-Trait Anxiety Inventory, (SHS) Subjective Happiness Scale, (SDS) Symptoms of Distress Scale, (UBOS) Dutch Version of the MBI, (UWES) Utrecht Work Engagement Scale, (VAS) Visual Analog Scale, (WSS) Work Stress Scale, (WHO-5) World Health Organisation Wellbeing Index.

**Table 3** Positive study attributes to determine overall impact of intervention

Intervention	Study	Sample size>30	Control group	Post intervention follow-up	Positive outcome (p<0.05)
ORGANISATION-FOCUSED					
Job Crafting	Gordon <i>et al</i> ⁵⁶ 2018	✓	✓		✓
Workload	Gregory <i>et al</i> ²⁶ 2018	✓	✓	✓	✓
Peer Support	Wahl <i>et al</i> ⁵² 2018	✓			✓
INDIVIDUAL-FOCUSED					
Mindfulness-Based	Bevan & Emerson ⁴² 2020				✓
Education	Colgan <i>et al</i> ⁴⁰ 2019		✓	✓	✓
	Craigie <i>et al</i> ⁵⁴ 2016			✓	✓
	Duchemin <i>et al</i> ⁴¹ 2015		✓		✓
	Sabzevar <i>et al</i> ⁶³ 2016	✓	✓		✓
	McNulty <i>et al</i> ⁴⁴ 2022	✓	✓		✓
	Mistretta <i>et al</i> ⁴ 2018	✓	✓	✓	✓
	Ofei-Dodoo <i>et al</i> ⁷ 2020	✓			✓
	Rodrigues <i>et al</i> ⁵⁰ 2018				✓
	Schroeder <i>et al</i> ³⁸ 2018		✓	✓	✓
	Werneburg <i>et al</i> ⁴⁵ 2018	✓		✓	✓
	Bianchini & Copeland ¹⁷ 2021	✓	✓		
	Caponnetto <i>et al</i> ⁵⁹ 2018				✓
	Dobie <i>et al</i> ⁵⁵ 2016				✓
	Duarte & Pinto-Gouveia ⁶⁰ 2016	✓	✓	✓	✓
	Hevezi ⁵¹ 2016				✓
	Van Horne <i>et al</i> ⁵³ 2020	✓			
	Verweij <i>et al</i> ⁵⁷ 2016	✓	✓		✓
	Dutton & Kozachik ⁴⁷ 2020				✓
	Hersch <i>et al</i> ³⁷ 2016	✓	✓		✓
Gratitude Journaling	Cheng <i>et al</i> ¹² 2015	✓	✓	✓	✓
	Komase <i>et al</i> ⁶² 2019	✓		✓	✓
	Sexton & Adair ⁴⁹ 2019	✓		✓	✓
Meditation	Bonamer & Aquino Russell ⁴⁸ 2019				✓
	Dos Santos <i>et al</i> ⁶¹ 2016			✓	✓
Yoga	Alexander <i>et al</i> ³⁹ 2015	✓	✓		✓
Acupuncture	Buchanan <i>et al</i> ¹ 2018	✓			✓
Choir singing	Moss & O'Donoghue ⁵⁸ 2020	✓			
Massage chair	Hand <i>et al</i> ⁴⁶ 2019	✓			
Professional coaching	Dyrbye <i>et al</i> ⁴³ 2019	✓	✓		✓

beyond the finalisation of the intervention whereby one outcome (workload) had nearly reverted to the baseline measurement (2.5-2.99-2.62).

Both Gordon *et al*⁵⁶ and Gregory *et al*²⁶ also implemented waitlist style control groups and the final organisational peer support study (Wahl *et al*⁵²) did not implement

a control group at all. The literature reports growing concerns over the use of waitlist style control groups in psychotherapy research, as the outcomes of the interventions may be over-estimated with this type of control.⁶⁴

Organisational intervention studies that target work conditions and create a preventative or primary approach

to reducing occupational stress are more effective in promoting healthier workplaces yet are far more difficult to feasibly implement.²¹ Perhaps this explains why all but three of the intervention studies in this review used secondary, individually focused interventions designed to manage the effects of stress in individual workers. These interventions may be implemented for employers who are concerned about staff productivity and retention or to mitigate employee health costs, however, do not address any underlying contributors to occupational stress such as work conditions or environments.²¹ Three out of 26 studies implementing relaxation techniques, did not report a positively significant outcome nor did one study that promoted a positive mindset. Overall, MBE interventions were successful with all but two reporting significantly positive outcomes, however, out of 20 MBE studies, only 6 conducted follow-ups beyond the intervention period and only two implemented active style control groups.

Many of the studies in this review that implemented MBE interventions reported reductions in participant levels of burnout, perceived stress and anxiety as well as increased resiliency. However, there were limited validation factors implemented to suggest these improvements were the true result of the intervention itself (ie, comparison against an appropriate control group and follow-up conducted beyond the intervention period). Multiple systematic reviews conducted by Lomas *et al*²²⁻²³ achieved similar results with overall study findings reporting that mindfulness was generally associated with positive outcomes in relation to most measures, however, the quality of assessed studies was inconsistent, especially noting the lack of RCT study designs that were eligible for inclusion. Kriakous *et al*²⁴ also found that mindfulness based stress reduction techniques were effective in reducing healthcare professionals' experiences of anxiety, depression and stress but were less effective at reducing burnout or improving resiliency. MBE interventions can be implemented quite sustainably as they are generally performed in the workplace (during scheduled breaks) or through self-directed practices.²²⁻²⁴ Interventions that do not greatly disrupt daily productivity are more easily implemented for longer time periods and make longer term follow-up assessments more achievable.³⁰⁻³² Despite this, most studies (n=20) in this review did not collect postintervention follow-up data and only one⁵⁷ study conducted a long-term follow-up (12 months post the gratitude intervention), in which reported improvements were sustained. It is therefore difficult to suggest which interventions show long-term benefits and therefore may be more effective. With the acknowledgement that healthcare workers face especially difficult psychosocial hazards in the workplace, this review suggests that healthcare employees are likely to benefit from a stronger focus on well-being promotion in the workplace. However, with such a large volume of studies attempting to relieve symptoms of burnout by encouraging new health behaviours in employees themselves, rather than affecting change

at an institutional level, further interventional research is demanded. Particularly in the form of RCTs with adequate long-term follow-up data collection.

CONCLUSION

The results of this review suggest that healthcare workers benefited from workplace well-being interventions, with a wide array of positive outcomes (improvements in well-being, work engagement, quality of life and mindfulness as well as reductions in burnout, perceived stress, anxiety and depressive symptoms) reported. Relaxation techniques targeted at the secondary interventional level (designed to manage stress in the individual worker) were the predominant well-being strategy of choice. The literature suggests this is due to the feasibility of implementing such a study. Reported positive outcomes included: improvement in EE, resilience, mindfulness, well-being, quality of life, and work engagement and/or reduction in burnout, perceived stress, anxiety and depressive symptoms. However, many of these reported positive outcomes, were somewhat diluted by the limitations of the various study designs that is, no control group, usage of a waitlist style control group and/or lack of postintervention follow-up surveys. Despite this, healthcare institutions can implement interventions pertaining to mindfulness-based education, promoting positive mindsets or organisational changes that are shown to illicit positive results in the well-being of their staff. Employers must also address the bigger picture for healthcare worker well-being. A short-term inconvenience, can cultivate an environment conducive to improved well-being and reduced burnout, thereby fostering long-term productivity and retention of staff.

Limitations and future research

Due to the large variation in study designs and data collection methods implemented, quantitative meta-analysis or comprehensive comparison of all study findings was not possible. Theoretical and practical implementations of the results are therefore complicated by the marked heterogeneity in intervention types, intervention timeframes, participant groups and conduction of postintervention follow-ups. This review was also limited by the lack of organisational studies that met the inclusion criteria. For example, several studies that implemented interventions involving the use of medical scribes or the electronic health record were excluded from this review as they did not focus on well-being as a primary outcome or did not use validated measures of well-being. Twenty-six of the thirty-three intervention studies reviewed opted to implement employee relaxation techniques to manage symptoms of occupational stress in the individual. With most studies adopting this one-dimensional view to employee well-being, it is difficult to accurately comment on the overall impact of well-being strategies for healthcare workers. Future research is needed to implement more primary or proactive organisational well-being interventions for healthcare workers, using robust study designs including appropriate control groups as well as further data collection beyond the conclusion of the intervention timeframe.

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