Deliverable 8

Existing solutions - Meta-analysis on solutions available to mitigate stress and promote resilience for healthcare professionals

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1. KEEPCARING project

Healthcare professionals working in hospitals -and those in training to embark on hospital careers- experience high levels of stress, especially in the surgical pathways. While interventions to improve wellbeing and resilience exist, not much is known about the right (combination of) intervention(s) for this specific setting. KEEPCARING aims to (re-)build wellbeing and resilience of healthcare workforce in EU hospitals by co-creating a multi-faceted non-digital, digital and AI-supported solution package to prevent burnout among (aspirant) healthcare professionals on the individual, team, and organizational level. Our multi-sector and interdisciplinary consortium will (1) study stress and stressors experienced by (aspiring) health care providers in their specific setting, (2) evaluate digital and non-digital solutions to reduce stress at an individual and team level, (3) study job crafting among (aspiring) health professionals as a way to reduce stress, and (4) finally, develop a change management platform that, using explainable AI, helps hospital managers as well as surgical caregivers to choose the solutions that match their context. All solutions as well as the portal will be developed in co-creation with end users, including 2 professional associations in our consortium. In addition, legal and ethical expertise is provided across Partners and in Advisory Board to ensure privacy and ethical guidance in this sensitive context.

KEEPCARING will provide solutions to improve wellbeing among health care professionals and students, thereby reducing burnout and improving the number of health care students entering the workplace. Our organizational solutions will empower individuals and employers to understand and act on stressful situations in their specific setting. Cost-effectiveness analyses will be used for policy recommendations to ensure sustainable uptake among policy makers, funders, and employers.

2. Background information

This meta-analysis has been performed in the context of the KEEPCARING project. We aimed to investigate the effectiveness of available solutions mitigating stress and promoting resilience for healthcare professionals (HCPs) in hospital settings. Our findings and insights based on this research serve as a foundation of the KEEPCARING study protocols.

Below is a brief description of the definitions of stress, burnout and resilience that we use. This is for the sake of clarity and a clear demarcation of the concepts.

Stress

Stress is a natural human response when any physical or psychological stimuli are triggered by perceived challenges or threats (stressors). These stressors disrupt the body's internal balance and activate the physiological "fight-or-flight" response, often resulting in symptoms such as anxiety, irritability, difficulty concentrating, and somatic or emotional symptoms (Chu, Marwaha, Sanvictores, Awosika, & Ayers, 2025; S. Lu, Wei, & Li, 2021). Importantly, stress is not always detrimental. A positive form of stress can serve as a motivator enhancing cognitive function and even promote well-being. When exposure to stressors becomes prolonged and unmanageable though, it can lead to chronic stress, which is a sustained activation of the stress response systems and is associated with increased risks of cardiovascular disease, depression, and anxiety (Chu et al., 2025). In that case, the characteristic adverse physiological and psychological effects can have detrimental consequences. .

Burn-out

Ongoing, un-mitigated stress that is related to one's work or workplace may result in a syndrome that is often referred to as 'burn-out' (Organization, 2019). According to the World Health Organization (WHO) and the International Classification of Diseases (ICD), burnout is classified as an occupational phenomenon, not as a medical condition (Organization, 2019). In the 11th Revision of the International Classification of Diseases (ICD-11), burn-out is defined as a syndrome conceptualized as resulting from chronic

workplace stress that has not been successfully managed (Organisation, 2025). Burn-out is typically characterized by three dimensions: (1) Feelings of energy depletion or exhaustion (2) Increased mental distance from one's job, or feelings of negativism or cynicism related to one's job (3) Reduced professional efficacy.

Resilience

On the other hand there is resilience which refers to the capacity of individuals, teams, or organizations to adapt positively and thrive during of a stressful or adverse event (Cimellaro Gian, Renschler, Reinhorn Andrei, & Arendt, 2016; Connor & Davidson, 2003; Morgan, Libby, Weaver, & Cai, 2019; Rees, Breen, Cusack, & Hegney, 2015). It involves key elements such as personal hardiness, goal orientation, adaptability, endurance, and the ability to recover and recharge (Jackson, Firtko, & Edenborough, 2007; Morgan et al., 2019; Sonnentag & Fritz, 2007).

3. Introduction

The prevalence of occupational stress, among HCPs is a topic of great concern. Occupational stress, burnout and personnel shortage have long been present in the healthcare sector (Adeolu, Yussuf, & Popoola, 2016; Tekeletsadik, Mulat, Necho, & Waja, 2020; Yosef, Woldegerima Berhe, Yilkal Fentie, & Belete Getahun, 2022). Currently, it is estimated that 60% of HCPs experience burnout symptoms. Among them with 30-50% of nurses, and 13-21% of hospital doctors are considering leaving their profession (Maunder et al., 2021; services, 2023; van Roekel, van der Fels, Bakker, & Tummers, 2020). Younger physicians and nurses are more likely to experience burnout, emotional distress and/or stress (Gunja, 2022; Maunder et al., 2021). A recent Canadian study showed that for every 100 Canadian nurses who started working in the field in 2022, 40 nurses below the age of 35 quit. This is an increase of 25% compared to 2013 (Gunja, 2022). Compared to other industries, HCPs report significantly higher rates of absenteeism due to psychological distress and burnout (Brand et al., 2017). Besides that, hospital-based nurses are more than twice as likely to cite burnout as a cause for quitting their jobs compared to nurses not working in a hospital (Shah et al., 2021). Consequently, high levels of burnout can lead to understaffing, which places further stress on the remaining personnel because the

demand for care remains the same, creating a vicious cycle of HCPs leaving the job and even more staff shortages (Hodkinson et al., 2022; Maunder et al., 2021). By 2030, there will be an estimated shortfall of 10 million healthcare workers worldwide (Organisation, 2022). Several factors contribute to higher numbers of distress and burnout, including long workdays, inflexible scheduling, the complexity of tasks, the occurrence of complications and adverse events, the unpredictability of the work, and the constant fear of litigation (Arnold-Forster, 2020; J. W. Kim, Ko, & Shin, 2016; Lederer et al., 2018; Patel, Huggard, & van Toledo, 2017; van Leeuwen, Kuyvenhoven, Taris, & Verhagen, 2022; Yosef et al., 2022). Additionally, health care professionals face administrative pressures and high workloads, and must maintain constant alertness (Arnold-Forster, 2020; J. W. Kim et al., 2016; Lederer et al., 2018; Patel et al., 2017; van Leeuwen et al., 2022; Yosef et al., 2022). Additionally, poor well-being and moderate-to-high levels of burnout are associated with poor patient safety results such as medical errors (Hall, Johnson, Watt, Tsipa, & O'Connor, 2016; Jun, Ojemeni, Kalamani, Tong, & Crecelius, 2021). Burnout among physicians is associated with double the risk of patient safety incidents (Hodkinson et al., 2022). In conclusion, the personal well-being of healthcare professionals, workplaces, and patient care can all be negatively impacted by workplace stress (Li et al., 2018; Yosef et al., 2022).

The findings above are of great value identifying and understanding (occupational) stress in healthcare settings and its negative consequences, but for the wellbeing of HCPs and patients in our healthcare system it is even more crucial to increase the understanding of how to reduce and prevent (occupational) stress and burnout, and how to increase resilience. So far, several systematic reviews have addressed this topic, identifying the effectiveness of different interventions to reduce stress, and/or burnout and to promote resilience (Jung et al., 2021; Kunzler et al., 2022; Moore, Kelly, & Melnyk, 2024; Scheepers, Emke, Epstein, & Lombarts, 2020; Wong, Wu, & Dong, 2024; Xu, Kynoch, Tuckett, & Eley, 2020).

Although existing reviews show promising results, it is unclear to what extent they can be generalized to in-hospital settings. The aforementioned systematic reviews focus on

specific groups of HCPs only, or they include professionals working outside hospital settings, or they are limited to a single intervention.

The purpose of this meta-analysis is to investigate the effectiveness of interventions to mitigate stress and promote resilience for HCPs, specifically in hospital settings. We aim to provide an answer to the following questions (1) what interventions are available to reduce stress and burnout and to promote resilience for healthcare professionals working in hospital settings and (2) how effective are they?

4. Methods

This systematic review and meta-analysis is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement and performed according to the guidelines as reflected in the Cochrane handbook for systematic reviews of interventions. (Higgins JPT, 2024; Moher, Liberati, Tetzlaff, & Altman, 2009) The protocol of this review has been registered in the International Prospective Register of Systematic Reviews (PROSPERO) database (registration No. CRD420251028648)

Eligibility criteria

We limited inclusion to randomized controlled trials (RCTs) to evaluate intervention effectiveness. RCTs were included if published in a peer reviewed scientific journal. Excluded from our search were abstracts without accompanying full texts, trial protocols, conference abstracts and proceedings, reviews, letters, comments, case reports, and case series. Publications in languages other than English were excluded. RCTs that met the following criteria were included: (1) The intervention(s) were aimed at improving resilience or reduce stress and/or burnout symptoms of (2) target groups were HPCs i.e. nurses, physicians, medical students and nursing students working in a hospital (3) and validated scales or standardized self-report questionnaires were used for evaluating the intervention. The validated scales have to directly measure stress, burnout symptoms or resilience. The questionnaires measuring these outcomes include

the following: Perceived Stress Scale (PSS), Nursing Stress Scale (NSS), Visual Analogue Scale (VAS), Occupational Stress Questionnaire (OSI), Job Stressor Scale (JSS), Depression Anxiety Stress Scale (DASS), Visual Analogue Scale (VAS) or Numeric Rating Scale (NRS) for stress symptoms, List of Signs and Symptoms of Stress (LSS), Brief Job Stress Questionnaire (BJS), Shirom-Melamed Burnout Questionnaire (SMBQ), Osipow Occupational Stress Inventory (OOSI), Health and Safety Executive occupational stress questionnaire (HSE), Maslach Burnout Inventory (MBI), Oldenburg Burnout Inventory (OBI), Copenhagen Burnout Inventory (CBI), Visual Analogue Scale (VAS), and Connor Davidson Resilience Scale (CD-RISC), Brief Resilience Scale (BRS). Studies that included healthcare professionals not working in the hospital were excluded. Studies with allied healthcare professionals or administrative personnel were also excluded.

Database search and data collection

The online databases of PubMed, CINAHL (through Ebsco), and Embase (through Ovid), and PsycINFO were searched for articles published from 1 January 2015 to 1 April 2025. Additionally the reference lists of included studies and relevant reviews were manually screened to retrieve any additional eligible studies. A clinical librarian from Amsterdam UMC was consulted for advice on the search strategy. The following key groups of search terms were (1) nurses, physicians, medical students, nursing students (2) stress or burnout (3) resilience (4) hospitals (5) randomized controlled trials, and were used in the search in all conceivable combinations, using available synonyms. Duplicates were removed. See Appendix 1 for the complete search strategy.

Two reviewers independently screened all titles and abstracts for eligibility criteria and performed full text screening in Rayyan. A third reviewer was consulted to resolve disagreements.

Data extraction

For data extraction a standardized form was used to extract relevant information from the eligible RCTs. The following data were extracted: author, publication year, characteristics of the participants (sample size, profession, place of work) , details of the intervention (brief description, frequency, duration and follow-up), outcome measures and pre and

post intervention results of the relevant outcomes. One reviewer first extracted the data into tables using Microsoft Word. The accuracy was checked by another reviewer.

Methodologic quality assessment

The quality of the included randomized controlled trials (RCTs) was assessed independently by two reviewers using the Cochrane Risk of Bias 2.0 tool (Sterne et al., 2019). The tool scores five different domains with one of the following levels: low risk of bias, some concerns or high risk of bias. A not included response will be given if the article did not provide sufficient information. The five domains include: bias arising from randomization process, bias due to deviations from intended interventions, bias due to missing outcome data, bias in the measurement of outcome and bias in the selection of reported results.

Statistical analysis

Review Manager 5.4 was used to conduct the meta-analysis. Since the outcomes of stress and resilience were measured using different scales standardized mean difference with a 95% confidence interval was used. Only study results of eligible post-intervention outcomes published in mean and standard deviation were included in the meta-analysis. The random effects model was used as differences in the intervention characteristics and clinical environment were expected. To explore if the intervention effects varied between types of interventions a subgroup analysis was performed. Statistical heterogeneity among studies was evaluated using the I^2 statistic where values exceeding 75 % were considered as substantial heterogeneity. (Higgins JPT, 2024) A p-value < 0.05 was considered statistically significant.

5. Results

A total of 16.609 articles were obtained through the literature search till April 1, 2025. After removing 5825 duplicates, a total of 10.856 were screened by title and abstract for eligibility. 198 of the studies were considered eligible and were their full-text was screened. 72 studies were eventually included in this review. Figure 1 shows the flow chat of the selection process.

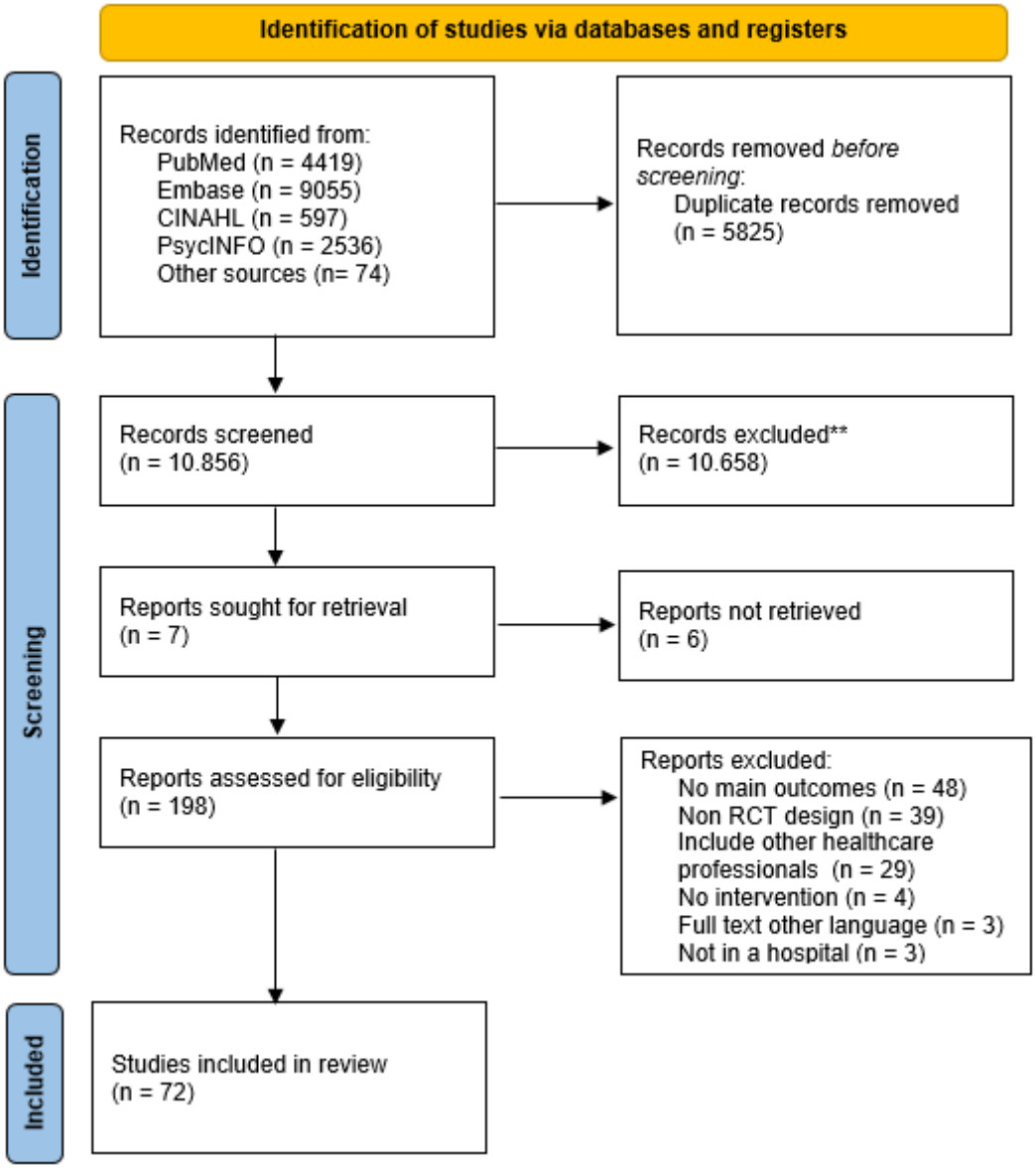

Figure 1 PRISMA flowsheet.

Study characteristics

The studies included in this review were randomized controlled trials (RCTs). In the majority of studies, the comparator was no intervention or usual/routine care. However, several studies (Abbasalizadeh, Farsi, Sajadi, Atashi, & Fournier, 2024; Concilio et al., 2021; Dincer & Inangil, 2021; Emadikhalaf, Ghods, Sotodeh-Asl, Mirmohamadkhani, & Vaismoradi, 2023; Farsi, Rajai, Teymouri, & Gholami, 2021; Fendel, Aeschbach, Schmidt, & Göritz, 2021; Ghazavi, Mardany, & Pahlavanzadeh, 2016; Grabbe, Higgins, Baird, Craven, & San Fratello, 2020; Ireland et al., 2017; F. Lu et al., 2023; Y. Mao, Zhang, Wang, Hu, & Fan,

2024; Munhoz et al., 2024; Shin, Lee, Lee, Kang, & Seol, 2020; Wang et al., 2024; Watanabe et al., 2019; Yıldırım & Çiriş Yıldız, 2022) used alternative control interventions. These control conditions included auriculotherapy on placebo points, educational sessions on burnout, stress or resilience, a nutrition class, additional breaks, relaxing in a calm setting, or placebo treatments with sesame oil, distilled water or sweet almond oil, and exposure to inspirational quotes or medical fact texts (Baek & Cha, 2025; Emadikhalaf et al., 2023; Faramarzi, Dehghani, & Hojat, 2024; Kline et al., 2020; Pehlivan & Güner, 2020; Prado, Kurebayashi, & Silva, 2018) conducted three armed RCTs, all the other studies were two armed.

Table 1 and Table 2 present a summary of the studies i.e. participants, and intervention characteristics, along with the measurement instruments used and outcomes assessed.

Category of intervention

Although the majority of the interventions were not identical, their content can be grouped into eight separate domains: (1) Mindfulness-Based Interventions (MBI's), (2) Yoga, breathing, meditation and relaxation (non-MBI), (3) Psychological support, (4) Sensory stimulation, (5) communication training, (6) physical exercise training, (7) Balint group intervention, and (8) other.

Yoga, Breathing, Meditation and Relaxation

Interventions involving yoga, breathing exercises, meditation and relaxation techniques were the most commonly used among the included studies, with 17 out of 72 studies incorporating one or more of these approaches. The majority within this group focused on yoga-based interventions (Alexander, Rollins, Walker, Wong, & Pennings, 2015; Fang & Li, 2015; Faramarzi et al., 2024; Mandal et al., 2021; Miyoshi, 2019; Sis Çelik & Yarali, 2023; Yılmaz & Çevik Kaya, 2024). Meditation interventions were the second most common (Asadollah, Nikfarid, Nourian, & Hashemi, 2024; Bonamer et al., 2024; Hsieh, Huang, Ma, & Wang, 2022; Loiselle et al., 2023; Sharma et al., 2024), In addition, two studies used progressive muscle relaxation (Ganjeali, Farsi, Sajadi, & Zarea, 2022; Ozgundondu & Gok Metin, 2019), and 3 studies combined mediation and yoga (Bhardwaj et al., 2023; Hwang & Jo, 2019), one study focused solely on breathing exercises (Calder Calisi, 2017).

Psychological support

Seventeen studies involved interventions providing psychological support. Of these four focus on resilience building (Abbasalizadeh, Farsi, Sajadi, & Atashi, 2024; Abbasalizadeh, Farsi, Sajadi, Atashi, et al., 2024; Grabbe et al., 2020; Pehlivan & Güner, 2020) , two employed solution focused therapy (Bernburg, Groneberg, & Mache, 2020; Kong et al., 2024), six offered general psychological training or support (Bernburg, Baresi, Groneberg, & Mache, 2016; Concilio et al., 2021; Gao et al., 2024; Hersch et al., 2016; L. Mao, Huang, & Chen, 2021; Wang et al., 2024), three targeted emotional regulation skills training (Ferreres-Galán et al., 2022; Ghazavi et al., 2016; Gunasingam, Burns, Edwards, Dinh, & Walton, 2015) and three utilized cognitive behavioral therapy (Bernburg et al., 2020; Dahlgren, Tucker, Epstein, Gustavsson, & Söderström, 2022; Sampson, Melnyk, & Hoying, 2020).

Mindfulness-Based Interventions

A total of 14 studies included mindfulness-based interventions, such as Mindfulness-Based Stress Reduction (MBSR), Mindfulness-Based Cognitive Therapy (MBCT), and Acceptance and Commitment Therapy (ACT).

Sensory stimulation

Several studies examined sensory based interventions, which target stress reduction and emotional regulation through the stimulation of the senses i.e. touch , smell, and vision. Aromatherapy using rose, lavender, or patchouli oil was investigated in three studies (Emadikhalaf et al., 2023; Farsi et al., 2021; Shin et al., 2020), while light-based therapy with blue light was used in one study (Guerrier, Margetis, Agostini, Machroub, & Di Maria, 2021). Auriculotherapy was assessed in two studies (Munhoz et al., 2024; Prado et al., 2018), general Swedish massage in one study (Nazari, Mirzamohamadi, & Yousefi, 2015), and tapping on acupressure points in one study (Dincer & Inangil, 2021).

Balint group interventions

Six studies evaluated the effects of Balint group interventions (Cao, 2022; H. Huang et al., 2020; L. Huang et al., 2019; Y. Mao et al., 2024; Shan et al., 2023; Yousefzadeh, Dehkordi, Vahedi, Astaneh, & Bateni, 2024), which involve structured group discussions aimed at reflecting on the emotional aspects of patient care and strengthening professional resilience.

Physical exercise

Three of the studies used some forms of physical exercise interventions including elastic band exercise, and aerobic exercise (Faramarzi et al., 2024; K. Y. Kim & Kim, 2022; Mohebbi, Dehkordi, Sharif, & Banitalebi, 2019)

Communication training

Three studies investigated the effects of communication training (Antonsen et al., 2025; Spiva et al., 2020; Wei, Ji, Li, & Zhang, 2017)

Other

For four studies, we could not assign a single overarching theme. These included a time management workshop (Karbakhsh Ravari, Farokhzadian, Nematollahi, Miri, & Foroughameri, 2020), therapy dogs and coloring intervention (Kline et al., 2020), mandala coloring (Fong, Hui, Ho, Chan, & Lee, 2022). Additionally, (Baek & Cha, 2025) incorporated multiple domains, making it difficult to classify under one specific theme.

Effects of interventions

For this deliverable, the outcomes of interest were stress and resilience. For each construct a meta-analysis was conducted. Variations in outcomes were further explored with subgroup analyses. Studies with large Standardized Mean Difference (SMD) were excluded if heterogeneity was high after sub-grouping attempt to reduce heterogeneity. Results are presented in SMD with 95% confidence interval.

Resilience (figure 2)

Resilience was examined in 9 studies, of which 8 were included in the meta-analysis. The included studies involved 314 participants in the intervention groups and 307 in the control groups. The meta-analysis showed no significant difference between intervention and control groups (SMD = 0.46, 95% CI [−0.16, 1.07]). Due to the small number of included studies and limited data per domain, no subgroup analyses were performed. Given the substantial heterogeneity (I^2 = 92%), a random-effects model was applied.

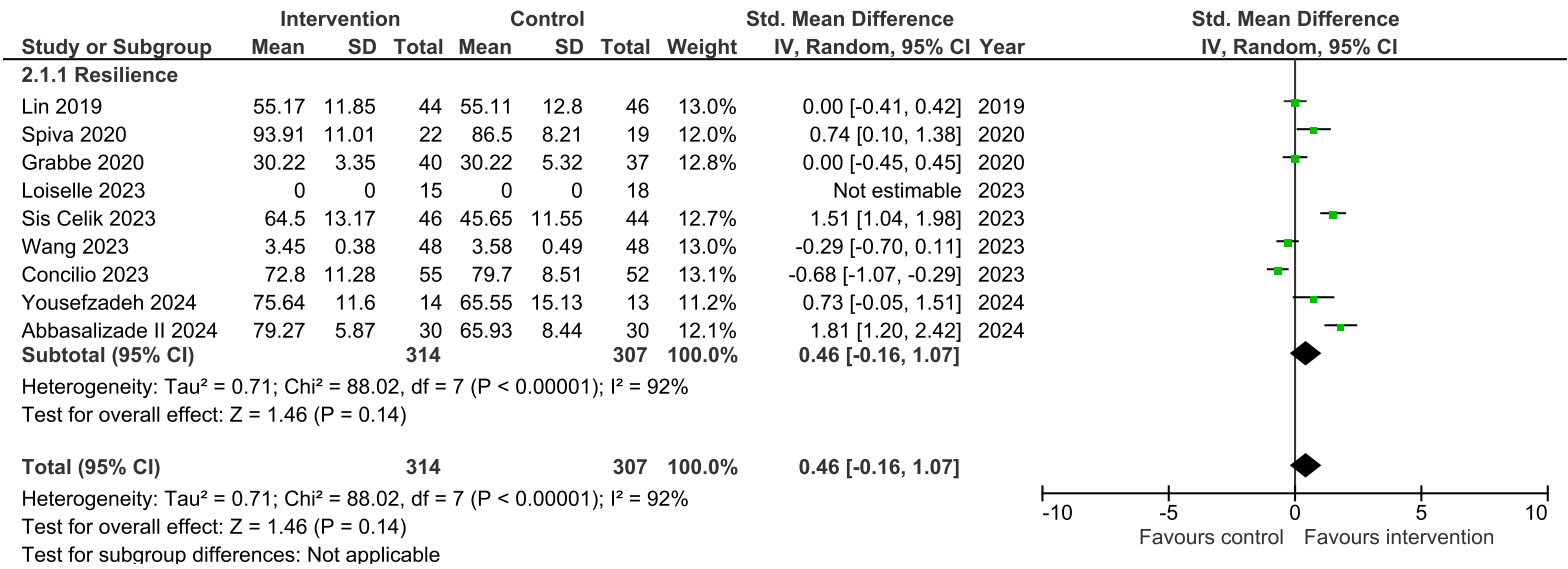

Figure 2 forest plot of interventions on resilience

Stress (figure 3)

Stress was the most frequently evaluated outcome in the studies included in this review. A total of 51 studies investigated stress, with 35 studies focusing on overall stress in and 16 on specific occupational stress. 37 studies were included in the analysis. Two studies with large SMD were excluded (Cao, 2022; Y. Mao et al., 2024). The meta-analysis of the 35 included studies, comprising 1,358 participants in the intervention groups and 1,364 in the control groups, showed a significant effect of interventions compared to control conditions in reducing stress for all domains except the domain 'other'. Standardized Mean Difference (SMD) = −0.89, 95% CI [−1.16, −0.61], $p < 0.00001$. Given the substantial

heterogeneity between studies (I^2 = 91%, p < 0.00001), a random-effects model was applied.

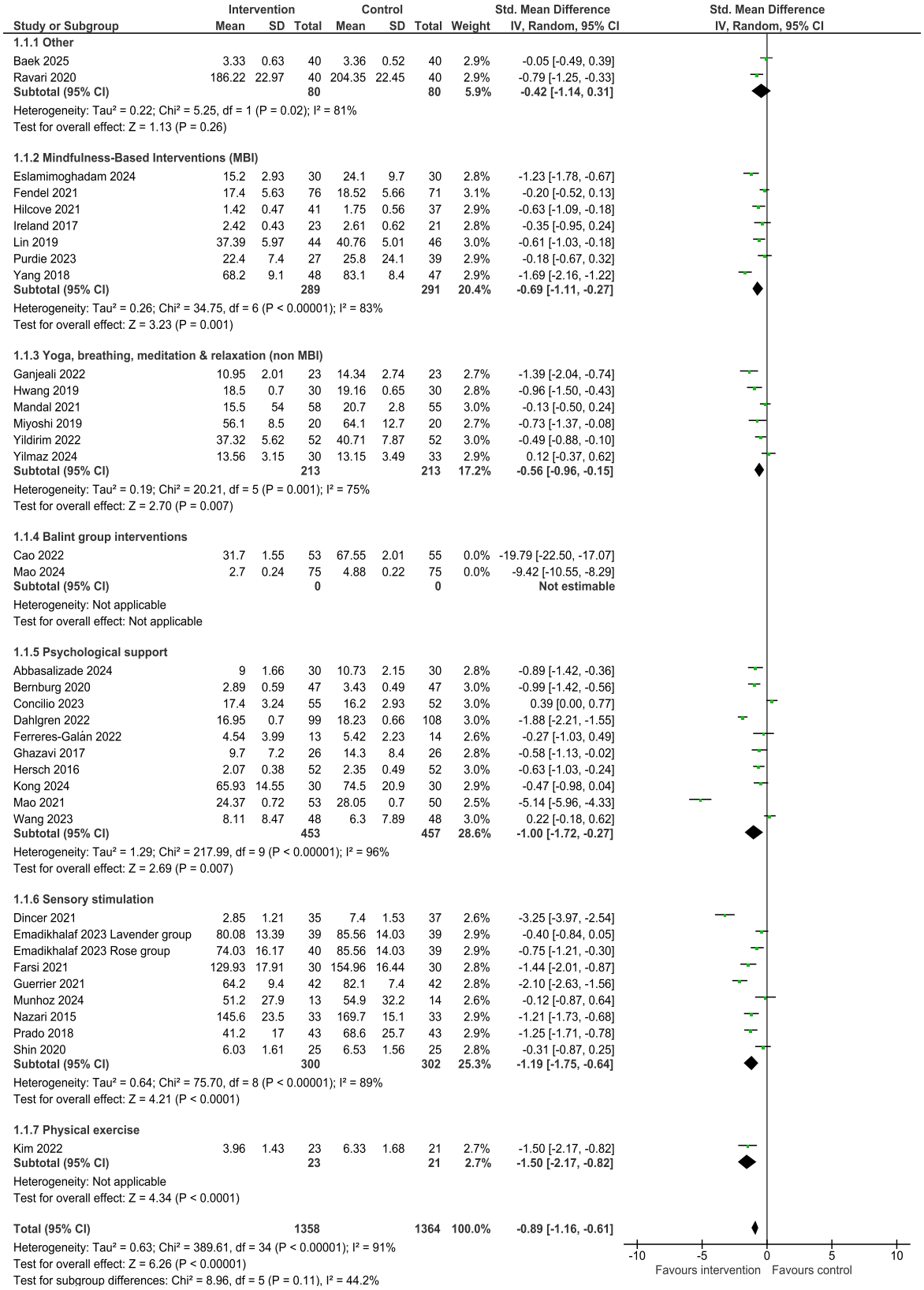

Figure 3 forest plot of interventions on stress

6. Conclusion and future directions

Conform the aim of deliverable D8 we concentrated this meta-analyses primarily on stress and resilience outcomes. To date there have been limited RCTs targeting stress and resilience specifically in the surgical domain. Moreover, none of the studies in our review used Virtual Reality (VR) interventions, which is a shortcoming considering the increasing relevance and potential of immersive technologies in supporting mental well-being (Meshkat et al., 2024; Seabrook et al., 2020).
Within the KEEPCARING project we aim to address this shortcoming by exploring a VR-based intervention for HCPs. This intervention falls under the broader category of relaxation and mindfulness-based interventions, and is designed to offer immediate and accessible support for healthcare professionals in their work environment. This is an important advantage compared to most interventions identified in this review, consisting of multi-week programs requiring commitment for several weeks. VR interventions consist of short and flexible sessions that can easily be integrated into the daily routines of HCPs. Our meta-analysis shows a promising effect of MBI and relaxation supporting the rationale for further innovation in this area.

This meta-analysis highlights the available solutions to mitigate stress and promote resilience for healthcare professionals. It proves a sound rationale for our research interventions and our choices in protocol. We intend to further explore the topic in the near future by expanding our analyses, and to include additional outcome measures e.g. burnout. Furthermore, we will conduct a full risk of bias assessment for all included studies and incorporate these findings into the current document. Once this systematic review and meta-analysis is further developed in accordance with the previous statements, providing a comprehensive discussion and critical appraisal it will be submitted in a peer-reviewed journal (gold, at a minimum green open access).

In summary, this work provides insight into the current state of research addressing interventions targeting stress and resilience among HCPs working in the hospital. Despite promising intervention, RCTs on this topic, appear to be scarce in the surgical domain,

which is in contrast with the urgent needs of HCPs in the surgical pathways, being at higher risk for stress-related burn-out, and subsequent drop-out. This once again underlines the relevance of the KEEPCARING project.

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7. Tables

Table 1 – Intervention

Authors, (year), country	Population (n, gender %, mean age)	Intervention characteristics	Measures	Mean (SD) before	Mean (SD) after	Main outcomes
Baek, (2025), South Korea	Nurses working in a hospital N=120 (IG 40, CG1 40, CG2 40), 89.2% female, 31.83±4.61 years	IG: Nurse healing space AI algorithm chosen program CG1: self chosen program CG2: guidance materials	CBI Job stress	CRB IG 62.6±18.3 CG1 52.3±19.8 CG2 49.7±22.0 PB IG 67.5±17.6 CG1 55.8±19.5 CG2 52.3±16.4 WRB IG 60.4±17.7 CG1 55.6±15.5 CG2 53.3±15.4 Job stress IG 3.73±0.56 CG1 3.56±0.57 CG2 3.62±0.41	CRB IG 42±15.1 CG1 44.8±17.2 CG2 47.3±19.3 PB IG 44.7± 14.6 CG1 48.2±17.0 CG2 51.0±18.7 WRB IG 46.9±14.8 CG1 48.8±17.1 CG2 50.3±15.8 Job stress IG 3.33±0.63 CG1 3.14±0.50 CG2 3.36±0.52	All three groups showed significant improvements, the IG was the most effective in reducing CRB and PB
Antonson, (2025), Denmark	Doctors working in the oncology department N = 89 (IG 44, CG 45), 65% female, 46 years	IG: supportive communication training CG: no intervention	CBI	WRB IG 31.3±16.5 CG 38.1±13.7 CRB IG 22.0±16.8 CG 27.7±15.6	WRB IG 30.7±17.3 CG 34.8±14.1 CRB IG 23.6±18.8 CG 28.2±15.9	No significant differences found between groups. WRB p = 0.34 CRB p = 0.67
Talebiazar (2025) Iran	Nurses working in the ED, N = 60 (IG 30, CG 30), 52% female, IG 30.73 ± 5.98 years CG 29.03 ± 4.13 years	IG: MBSR training CG: no intervention	MBI NSS	EE IG 37.05±1.31 CG 36.95±1.92 D IG 15.26±1.81 CG16.15±1.01 PA IG 24.33±0.21 CG 24.26±0.32	EE IG 25.08±1.13 CG 36.95±1.92 D IG 8.16±0.93 CG 16.15±1.01 PA IG 18.06±0.54 CG	the IG displayed statistically significant differences in all occupational stress subscales (P < 0.05) and burnout subscales (P <0.01) compared to CG
Talebiazar, (2024), Iran	Nurses working In geriatric wards, N = 60 (IG 30, CG 30), 51.7% female, IG 30.73 ±	MBSR	MBI OCQ	EE IG 37.05 ± 1.31 CG 36.95 ± 1.92	EE IG 25.08 ± 1.13 CG 37.01 ± 1.01	Significant reduction in occupational stress and burnout in the intervention group

	5.98 years, CG: 29.03 ± 4.13 years			DP IG 15.26 ± 1.81 CG 16.15 ± 1.01 PA IG 24.33 ± 0.21 CG 24.26 ± 0.32	DP IG 8.16 ± 0.93 CG 15.13 ± 1.25 PA IG 18.06 ± 0.54 CG 24.30 ± 0.71	compared to the control group ($p < 0.001$ for all subscales)
Eslamimoghadam, (2024), Iran	Nursing students, N=72 (IG 36, CG 36), 50% female, IG 21.49 ± 2.01nyears, CG: 22.99 ± 2.13 years	IG: MBSR CG: no intervention	DASS-21	Stress IG 29.20 ± 5.28 CG 26.22 ± 10.20 Anxiety IG 28.32 ± 5.75 CG 26.94 ± 7.44 Depression IG 28.00 ± 5.60 CG 26.94 ± 4.81	Stress IG 15.20 ± 2.93 CG 24.10 ± 9.70 Anxiety IG 13.20 ± 3.08 CG 24.76 ± 4.84 Depression IG 14.38 ± 3.56 CG 24.54 ± 5.32	Significant reduction in stress, anxiety, and depression in the IG $p<0.001$ compared to the CG
Mao, (2024), China	Psychiatric nurses, N= 150 (IG 75, CG 75), 76.7% female, IG 25.17 ± 1.26 years CG 25.16 ± 1.21 years	IG: Balint group activities CG: mental health knowledge lectures	JSS	Job stress IG 5.32 ± 1.1 CG 5.34 ± 1.08	Job stress IG 2.70 ± 0.24 CG 4.88 ± 0.22	Significant difference between the experimental and control groups after intervention ($P < 0.05$)
Gao, (2024), China	Nurses and physicians working new in the ICU due to COVID-19. N=101 (IG 47, CG 54), 63% female, 30.0 years	IG: Multimodal Psychological Support (MPS) program CG: Routine wellness care	DASS-21	NR	NR	No statistically significant differences were found between IG and CG ($p>0.05$)
Yousefzadeh (2024), Iran	Psychiatric nurses in a hospital N=26 (IG 13, CG 13), 48% female, 35.91±7.55 years	IG: Balint group training CG: no intervention	CD-RISC	Resilience IG 72.71 ± 10.17 CG 64.08 ± 14.37	Resilience IG 76.64 ± 11.60 CG 65.55 ± 15.13	Significant difference found between the IG and CG ($P=0.13$)
Shan (2024), China	Head nurses in a general hospital, N=80 (IG 40, CG 40), 100% female, IG 47.3 ± 6.7, CoG: 46.4	IG: Balint group program CG: No intervention	MBI	EE IG 32.42 ± 11.71 CG 31.85 ± 11.33 DP IG 8.88 ± 7.14 CG 8.87 ± 6.74 PA IG 26.91 ± 10.26 CG 27.30 ± 9.74	EE IG 28.30 ± 7.73 CG 27.65 ± 3.64 DP IG 6.18 ± 3.74 CG 7.97 ± 2.45 PA IG 31.15 ± 4.60 CG 21.70 ± 4.72	Significant difference ($p=0.003$) found for PA between IG and CG. For EE (0.740) and DP ($p=0.387$) no statistically significant differences were found

Sharma (2024), India	Nurses in a tertiary hospital, N=100 (IG 50, CG 50), 86.3% female, IG: 37.10 ± 5.31, CG: 36.39 ± 6.65 years	IG: AVPHFN (Anulom Vilom Pranayama + Heartfulness Meditation) CG: no intervention	PSS-10	Median + IQR IG: 19 (IQR 10.5) CG: 20.5 (IQR 9.0)	Median + IQR IG: 13 (IQR 12.5) CG: 19.5 (IQR 12.5)	A significant difference within and between IG and CG was found.
Faramarzi (2024), Iran	Female nurses, N=71 IG1 21, IG2 23, CG 27	IG 1 : integral Yoga IG 2: Aerobics CG: no intervention	MBI	EE IG1 38.12 ± 9.46 IG2 38.69 ± 7.91 CG 38.35 ± 10.15 DP IG 1 24.33 ± 4.71 IG2 24.54 ± 1.09 CG 24.11 ± 3.79 PA IG 1 33.07 ± 6.71 IG 2 34.38 ± 5.82 CG 32.42 ± 6.29	EE IG1 23.13 ± 4.13 IG2 36.00 ± 5.65 CG 38.44 ± 10.96 DP IG 1 23.36 ± 3.03 IG2 23.63 ± 4.09 CG 24.17 ± 5.19 PA IG 1 35.59 ± 2.20 IG 2 35.47 ± 3.39 CG 32.66 ± 6.86	No statistically significant differences were observed between the three interventions.
Asadollah (2024), Iran	NICU nurses, N=66 (IG 33, CG 33), 100% female, IG: 34.03 ± 7.65, CG: 32.79 ± 7.61 years	IG: Loving kindness meditation CG: educational audio about mental health during COVID-10	MBI	EE IG 14.79 ± 8.85 CG 20.60 ± 9.22 DP IG 5.51 ± 4.10 CG 7.06 ± 5.04 PA IG 31.21 ± 6.78 CG 19.33 ± 4.65 Total IG 38.72 ± 15.88 CG 46.33 ± 16.73	EE IG 12.84 ± 6.99 CG 21.33 ± 10.4 DP IG 3.93 ± 2.78 CG 7.15 ± 6.14 PA IG 19.33 ± 4.65 CG 27.21 ± 7.53 Total IG 32.03 ± 12.98 CG 48.48 ± 19.70	A significant difference within and between groups in favor of the intervention group was found on all MBI outcomes
Abbasalizadeh (2024), Iran	ICU nurses, N=60 (IG 30, CG 30), 71.7% female, 29.58±4.68 years	IG: resilience training CG: self-study via smartphone	CD-RISC	Resilience IG 67.30 ± 10.12 CG 79.27 ± 5.87	Resilience IG 68.80 ± 9.09 CG 65.93 ± 8.44	A statistically significant difference within groups was found for the IG ($p < 0.001$) compared to the CG ($p = 0.548$)
Abbasalizadeh (2024), Iran	ICU nurses, N=60 (IG 30, CG 30), 71.7% female, 29.58±4.68 years	IG: resilience training CG: self-study via smartphone	DASS-21	Stress IG 10.77 ± 3.33 CG 10.10 ± 2.19 Anxiety IG 9.43 ± 3.35 CG 9.10 ± 1.63	Stress IG 9.00 ± 1.66 CG: 10.73 ± 2.15 Anxiety IG 7.93 ± 0.98 CG 10.23 ± 1.65	A statistically significant difference was found within group for the IG and a statistically significant between groups was found for both scores.

Yilmaz (2024), Turkey	ICU nurses on surgical ICU's, N=63 (IG 30, CG 33), NR, NR	IG: laughter Yoga CG: no intervention	PSS-10	Stress IG 13.70 ± 3.33 CG 14.57 ± 4.57	Stress IG 13.56 ± 3.15 CG 13.15 ± 3.49	No statistically significant difference was found within and between groups.
Kong (2024), China	Nurses in a tertiary general hospital, N=60 (IG=30, CG=30), 96.7% female, IG: 37.53 ± 5.62 years CG: 36.20 ± 7.16 years	IG: Solution-Focused Brief Therapy (SFBT) CG: no intervention	CNSS MBI	CNSS IG 85.83 ± 15.38 CG 85.53 ± 15.18 EE IG 34.23 ± 9.46 CG 35.33 ± 10.93 DP IG 12.17 ± 5.86 CG 13.90 ± 7.41 PA IG 29.83 ± 9.83 CG 28.27 ± 7.37	CNSS IG 65.93 ± 14.55 CG 74.50 ± 20.90 EE IG 17.33 ± 12.69 CG 22.37 ± 14.66 DP IG 6.00 ± 5.95 CG 7.77 ± 8.19 PA IG 35.70 ± 10.15 CG 31.10 ± 10.10	Statistically significant difference were found for the IG ($p<0.001$)
Munhoz (2024), Brazil	Nurses working in SC, PACU, GSU and SMPD in a hospital	IG: Auriculotherapy on 'real' points CG: auriculotherapy on sham (placebo) points	LSS	Stress IG 77.5 ± 16.6 CG 82.6 ± 32.0	Stress IG 51.2 ± 27.9 CG 54.9 ± 32.2	Within both groups a statistical significant difference was found ($p<0.05$) between groups no statistical significant differences were found.
Purdie (2023), USA	Pediatric Residents, N =66 (IG 27, CG 39), NR, 81.5% female	IG: Mindful Awareness Practices (MAPs) CG: no intervention	PSS MBI-9	PSS IG 25.9±7.3 CG 25.8 ±6.0 EE IG 10.7±4.8 CG 10.6 ±4.0 DP IG 6.0±4.8 CG 5.9 ±4.0 PA IG 13.8±3.9 CG 13.9 ±3.1	PSS IG 22.4 ±7.4 CG 24.1 ±6.1 EE IG 9.7 ±4.9 CG 10.2 ±4.1 DP IG 5.6 ±4.7 CG 6.0 ±4.1 PA IG 14.1 ±3.9 CG 13.9 ±3.3	A statistically significant difference was found for the PSS between groups, other measures were not statistically significant.

Wang (2023), China	Nurses and doctors working in a tertiary hospital. N =96 (IG 48 CG 48), NR, 90% female	IG: Psychological first aid training CG: psychoeducation	DASS BRS	Depression IG 8.17 ± 7.68 CG 8.30 ± 8.61 Anxiety IG 6.61 ± 7.79 CG 6.00 ± 7.19 Stress IG 11.67 ± 10.57 CG 10.90 ± 9.36 Resilience IG 3.22 ± 0.61 CG 3.43 ± 0.58	Depression IG 6.06 ± 6.18 CG 5.90 ± 7.30 Anxiety IG 3.89 ± 5.01 CG 4.25 ± 5.55 Stress IG 8.11 ± 8.47 CG 6.30 ± 7.89 Resilience IG 3.45 ± 0.38 CG 3.58 ± 0.49	A statistically significant difference between groups was found for depression. For the other outcomes no significant differences were found
Concilio (2023), USA	Newly Licensed Graduate Nurses, N=107 (IG 55, CG 52), 90.7% female, 27.18 ± 5.02 years	IG: supportive text messages CG: weekly medical facts via text messages	PSS CD-RISC	Stress IG 20.3±6.4 CG 15.1±4.72 Resilience IG 72.7±10.83 CG73.7±8.31	Stress IG 17.4±3.24 CG 16.2±2.93 Resilience IG 72.8±11.28 CG 79.7±8.51	Stress and resilience did not change for either the control or experimental group.
Lu (2023), China	ICU nurses, N=94 (IG 47, CG 47), 92.2% female, IG: 28.33 ± 3.32, CG: 27.27 ± 3.76 years	IG: MBSR CG: Information via WeChat	MBI	EE IG 24.14 ± 11.97 CG 22.28 ± 7.12 DP IG 11.00 ± 6.57 CG 10.70 ± 7.54 PA IG 26.27± 8.96 CG 27.33±7.99	EE IG 16.10 ± 4.91 CG 22.73 ± 6.95 DP IG 9.18±7.91 CG 9.87±8.03 PA IG 30.89±9.88 CG 29.98±9.27	Significant reduction in EE post-intervention, sustained at two and six months. For the other measures no significant difference found.

Loiselle (2023), USA	Academic physicians, N=33 (IG 15, CG 18),, IG 42.1 ± 8.1, CG: 47.6 ± 11.8	IG: Transcendental Meditation CG: No intervention	MBI PSS BRS	EE IG 31.33 ± 6.98 CG 31.35±7.26 DP IG 14.33 ± 3.98 CG 14.72 ± 3.34 PA IG 25.35 ± 3.16 CG 25.20 ± 3.38 MBI total IG 68.31±10.97 CG 68.86±11.07 PSS IG 18.66 ± 5.93 CG 18.8 ± 6.33 BRS IG 20.78 ± 3.35 CG 18.8±4.19	EE IG −4.35 ± 1.02 CG −1.19 ± 0.92 DP IG −1.64 ± 0.48 CG −1.45 ± 0.43 PA IG 2.22 ± 0.65 CG 0.82 ± 0.59 MBI total IG −8.20 ± 1.52 CG −3.47 ± 1.37 PSS IG −4.45 ± 1.53 CG −5.15 ± 1.38 BRS IG 1.27 ± 0.88 CG 2.56 ± 0.80	Significant improvements were found for the IG group compared with controls at 4 months in total burnout (p = .020) including the Maslach Burnout Inventory dimensions of emotional exhaustion (p = .042) and personal accomplishment (p = .018). For the other measures no significant differences were found.
Emadikhalaf (2023), Iran	Nurses in hospitals, N=118 (IG1 39, IG2 40, CG 39, 64.4% female, 35.75 ± 5.18 years	IG1: aromatherapy with rose essential oil IG2: aromatherapy with lavender essential oil CG: sesame seed oil	NSS	NSS IG1 84.80 ± 19.47 IG2 88.97 ± 14.95 CG 87.56 ± 17.66	NSS IG1 74.03 ± 16.17 IG2 80.08 ± 13.39 CG 85.56 ± 14.03	Aromatherapy using rose scent had a positive effect on the nurses' job stress at the end of the fourth week compared to the placebo (p = 0.002)
Celik (2023), Turkey	Nurses working in a hospital N=90 (IG45, CG 45), 86.6% female, IG 29.15 ± 7.06, CG: 28.50 ± 5.80 years	IG: Laughter Yoga CG: No intervention	CD-RISC	Resilience IG 46.80 ± 12.97 CG 45.65 ± 11.55	Resilience IG 64.50 ± 13.17 CG 45.88 ± 11.33	significantly improvement were found in the resilience levels of the IG (P<.05)
Bhardwaj (2023), India	Resident doctors, medical students and nurses in a tertiary hospital, N=98 (IG49, CG 49), 36.7% female, 28.26 ± 3.55 years	IG: mHealth aided Yoga-based Breath and Meditation (Sudarshan Kriya) CG: no intervention	MBI	EE IG 23.90 ± 9.98 CG 25.49 ± 12.94 DP IG 8.96 ± 4.34 CG 9.33 ± 5.51 PA IG 37.14 ± 5.68 CG 37.98 ± 5.73	EE IG 17.65 ± 9.29 CG 26.27 ± 10.20 DP IG 6.02 ± 4.05 CG 10.18 ± 5.12 PA IG 41.16 ± 5.08 CG 36.78 ± 4.98	All measures showed a significant difference between the two groups (p<0.001)

Bonamer (2023), USA	Nurses in hospitals, N=104 (IG 53, CG 51), 94% female, 43 ±11.3 years	IG: Transcendental Meditation CG: no intervention	MBI	EE IG 3.3±1.2 CG 2.9±1.4 DP IG 1.8±1.3 CG1.4±1.1 PA IG 1.8±1.0 CG 1.7±0.8	EE IG 2.5±1.3 CG 2.9±1.4 DP IG 1.2±1.0 CG 1.4±1.2 PA IG 1.6±1.3 CG 1.6±1.1	No significant differences were found between the measures.
Cao (2022), China	Nurses working in isolation wards, ICU and new fever clinic for COVID-19 patients. N=108 (IG 53, CG 55), 92.5% female, NR B	IG: Balint group combined with MBSR CG: No intervention	CPSS MBI	PSS IG 67.28 ± 4.43 CG 67.36 ± 1.99 MBI total IG 72.62 ± 3.95 CG 71.36 ± 3.69	PSS IG 31.70 ± 1.55 CG 67.55 ± 2.01 MBI total IG 35.53 ± 3.34 CG 70.64 ± 3.05	A statistical significant difference for the IG group was found for all measurements ($p < 0.001$)
Hsieh (2022), Taiwan	Nurses working in a hospital, N =79 (IG40, CG 39), NR, IG: 42.30 ± 8.49; CG: 32.51 ± 8.24 years	IG: gong meditation CG: no intervention	PSS OBI	NR	PSS β = −4.20 mean 29.46 SD 0.59 personal burnout β = −6.53 mean 51.42 SD 1.26 over-commitment to work β = -3.69 mean 49.49 SD 1.49 work-related burnout β = -3.98 mean 19.96 SD 1.69 client-related burnout β = - 3.98 mean 19.9 SD 6 1.69	A significant difference for measures were found

Ferreres-Galan (2022), Spain	Nurses working in a hospital N=27 (IG 13, CG 14), 100% female, 45.67 ± 7.71 years	IG: Unified Protocol Prevention Program CG: no intervention	DASS-21 MBI	Stress IG 6.62 ± 4.52 CG 7.36 ± 3.59 Anxiety IG 4.00 ± 3.56 CG 3.50 ± 1.7 Depression IG 5.85 ± 5.8 CG 5.00 ± 4.76 EE IG 11.00 ± 9.21 CG 16.00 ± 11.64 DP IG 5.85 ± 4.24 CG 4.79 ±5.18 PA IG 40.92 ± 4.92 CG 38.79 ± 5.92	Stress IG 4.54 ± 3.99 CG 5.42 ± 2.23 Anxiety IG 2.15 ± 1.95 CG 2.92 ± 2.15 Depression IG 3.69 ± 5.02 CG 2.67 ± 1.92 EE IG 9.69 ± 6.97 CG 17.17 ± 10.17 DP IG 5.69 ± 3.84 CG 5.33±3.87 PA IG 35.15 ± 6.57 CG 40.42 ± 5.07	Statistically significant between-group differences showed lower EE and PA in favor of the IG after the intervention
Dahlgren (2022), Sweden	Newly graduated nurses working in hospitals, N=207 (IG 99, CG 108), 88% female, IG: 27.5 ± 5.3, CG: 27.0 ± 5.1 years	IG: proactive recovery CG: Routine psychological counseling	SMBQ PSS	Burnout IG 3.74 ± 0.12 CG 3.71 ± 0.11 Stress IG 18.34 ± 0.75 CG 17.77 ± 0.66	Burnout IG 3.54 ± 0.12 CG 3.89 ± 0.11 Stress IG 16.95 ± 0.70 CG 17.63 ± 0.70	No statistical significant difference were found for stress. Symptoms of burn-out showed significant group by time interactions p=0.02
Fong (2022), China	Nurses working in a university teaching hospital, N=77 (IG 27, CG 32), 92% female, NR	IG: brief mindful coloring CG: no intervention	PSS MBI	Mean (95% CI) PSS IG 18.4 (16.5–20.3) CG 18.2 (16.5–20.0) EE IG 21.3 (17.8–24.7) CG 23.4 (19.5–27.3) DP IG 6.4 (4.8–7.9) CG 7.7 (5.7–9.6) PA IG 30.1 (27.4–32.9) CG 30.3 (27.6–33.0)	Change Mean (95% CI) PSS IG −3.3 (−4.7 to −1.8) CG −0.3 (−1.6 to 1.1) EE IG −1.6 (−4.2 to 1.1) CG −0.5 (−2.5 to 1.5) DP IG 0.9 (−0.5 to 2.2) CG −0.2 (−1.3 to 0.9) PA IG 0.5 (−2.0 to 3.0) CG −1.6 (−3.3 to 0.2)	A significant difference for stress was found (p=0.003).

Ganjeali (2022), Iran	Nurses working in a hospital, N=46 (IG 23, CG 23), 39.1% female, 31.52 ± 6.36	IG: Demonstration-based Progressive Muscle Relaxation CG: no intervention	DASS-21	Stress IG 13.91 ± 2.41 CG 14.34 ± 2.74 Anxiety IG 13.34 ± 3.41 CG 12.78 ± 2.21	Stress IG 10.95 ± 2.01 CG 14.17 ± 2.34 Anxiety IG 9.47 ± 2.37 CG 12.91 ± 1.85	The levels of stress and anxiety in the IG signifcantly reduced after the intervention (p<0.001)
Kim (2022), South Korea	ICU nurses in a university hospital, N-44 (IG 23, CG 21), 86% female, IG 24.35 ± 1.64, CG: 25.33 ± 2.99 years	IG: Elastic band resistance exercise program CG: no intervention	NRS Stress	Stress IG 6.30 ± 1.46 CG 6.14 ± 2.54	Stress IG 3.96 ± 1.43 CG 6.33 ± 1.68	The level of stress significantly decreased after the intervention compared to the CG (P<0.01).
Yildirim (2022), Turkey	Nurses working in COVID-19 department, N=104 (IG52, CG52), 81% vrouw, IG: 27.55 ± 5.24, CG: 29.11 ± 6.57 years	IG: Mindfulness-based breathing and music therapy CG: relaxed in calm setting	Work Related Strain Scale	Stress IG 42.03 ± 9.85 CG 41.55 ± 7.46	Stress IG 37.32 ± 5.62 CG 40.71 ± 7.87	between groups significantly decreased after intervention (p=0.030) and within intervention (p= 0.025)
Dincer (2021), Turkey	Nurses working in a COVID-19 department, N=72 (IG 35, CG 37), 89% female, IG: 33.54 ± 9.83 CG: 33.37 ± 9.58 years	IG: emotional freedom techniques CG: rest quietly	SUD Burnout scale	Stress IG 7.82 ± 1.33 CG 7.48 ± 1.36 Burnout IG 3.62 ± 0.76 CG 3.56 ± 0.72	Stress IG 2.85 ± 1.21 CG 7.40 ± 1.53 Burnout IG .48 ± 1.06 CG 3.43 ± 0.76	For the IG a statistical significant difference was found for all measures (p<0.001)
Farsi (2021), Iran	Nurses working in a Trauma Center, N=60 (IG 30, CG 30), IG 43% female and CG 70% female, IG: 29.40 ± 6.71; CG: 28.73 ± 4.01 years	IG: Aromatherapy with Rosa Damascena Essential Oil CG: placebo	NSS	Stress IG 140.40 ± 32.66 CG 154.50 ± 25.09	Stress IG 129.93 ± 17.91 CG 154.96 ± 16.44	A statistical significant difference was found between groups (<0.0001)and within group (p=0.012) in the IG.
Hilcove (2021), USA	Nurses, nurses' assistants, physicians, nurse practitioners working in a community based hospital, N=78 (IG 41, CG 37), 95% female, 42.41 ± 12.12 years	IG: Mindfullness-based yoga CG: no intervention	PSS MBI-EE	Stress IG 1.85 ± 0.61 CG 1.83 ± 0.56 EE IG 2.43 ± 1.30 CG 2.68 ± 1.14	Stress IG 1.42 ± 0.47 CG 1.75 ± 0.56 EE IG 1.68 ± 1.03 CG 2.51 ± 1.31	A statiscal significant difference between groups was found for stress (p=0.004) and burnout (p=0.003)

Guerrier (2021), France	Scrub and circulating nurses working in the OR, N=84 (IG 42, CG 42), 82% female, median 34 years	IG (A): light based intervention CG (B): no intervention Cross-over design	NSS	Stress IG AB 84.3 ± 8.3 BA 80.9 ± 8.3 CG AB 83.5 ± 8.1 BA 70.8 ± 9.0	Stress IG AB 64.2 ± 9.4 BA 61.2 ± 9.1 CG AB 82.1 ± 7.4 BA 72.5 ± 12.9	Statistical significant difference ($p < 0.001$) within groups and between groups.
Mandal (2021), India	Nurses working in tertiary care hospital, N=113 (IG 58, CG 55), IG: 86.2% female CG: 57.7% female, IG: 35 ± 7.9 CG: 32.5 ± 6.8 years	IG: structured yoga program CG: no intervention	PSS	Stress IG 20.7 ± 5.9 CG 19.8 ± 4.7	Stress IG 15.5 ± 5.4 CG 20.7 ± 2.8	A statistical significant difference between groups ($p=0.0003$) was found.
Fendel (2021), Germany	Resident physicians in a university hospital, N=147 (IG 76, CG 71)) 65,3% female, 31.02 (3.43) years	IG: Tailored MBP CG: Coursebook	CBI PSS	Burnout total IG 41.72 ±13.88 CG 41.98± 16.95 PB IG 50.22± 16.17 CG 53.23± 17.69 WRB IG 44.88± 15.07 CG 44.32± 19.16 CRB IG 29.55± 18.13 CG 27.99± 21.57 PSS IG 19.58± 5.95 CG 19.87 ±5.73	Burnout total IG 39.79 ±13.14 CG 40.22 ±15.77 PB IG 46.56± 14.07 CG 50.62 ±17.97 WRB IG 37.08 ±15.22 CG 41.79± 18.30 CRB IG 28.75 ±18.05 CG 27.99 ±19.75 PSS IG 16.57 ±6.39 CG 18.52 ±5.66	A statistical significant difference was found for PSS ($p=0.046$)
Mao (2021), China	Nurses in a tertiary hospital, N=103 (IG 53, CG 50), NR, 30.94 ± 5.79 years	IG: Emotional Intelligence Training CG: no intervention	PSS	Stress IG 30.26 ± 0.80 CG 28.69 ± 0.79	Stress IG 24.37 ± 0.72 CG 28.04 ± 0.70	A significant difference was found for the PSS ($p<0.001$)
Pehlivan (2020), Turkey	Oncology–haematology nurses in private hospitals, N=125 (IG 1 34, IG 2 49, CG 42), IG 1 89% female, IG 2 94% female, control 86% female, IG 1 25.0 ± 5.1; IG 2: 27.8 ± 5.3, Control: 27.2 ± 5.3 years	IG 1: Compassion Fatigue short-term IG 2: Compassion Fatigue Resiliency Program long-term CG: No intervention	PSS RSA	Stress IG 1 32.29 3.27 IG 2 31.55, SD 3.28 CG 31.7 3.5 Resilience IG 1 135.18 17.45 IG 2 131.62 19.08 Resilience 134.7 (16)	NR	No statistical differences were found between groups

Xie (2020), China	ICU nurses in a tertiary hospital, N=106 (IG 53, CG 53), 100% female, 27.7 ± 7.7 years	IG: Mindfullness based intervention CG: educational intervention related to burnout	MBI	EE IG 31.3 ± 8.8 CG 32.9 ± 8.9 DP IG 12.6 ± 5.3 CG 13.4 ± 6.1 PA IG 23.9 ± 6.6 CG 23.8 ± 7.2	EE IG 24.9 ± 6.5 CG 31.7 ± 3.8 DP IG 8.5 ± 3.6 CG 12.4 ± 3.2 PA IG 28.5 ± 6.8 CG 26.8 ± 6.1	A significant difference within groups for all outcome measures were found ($p < 0.001$). Between groups a significant difference was found for EE and DP ($P < 0.001$)
Bernburg (2020), Germany	Junior nurses (< 2 year experience) working in a hospital, N = 94 (IG47, CG 47), 74.5% female, IG: 23.1 ± 2.5 CG: 23.6 ± 2.4 years	IG: psychosocial competence training combined with cognitive behavioral therapy CG: no intervention	PSQ MBI-EE	Stress IG 3.37 ± 0.45 CG3.45 ± 0.42 EE IG 4.12 ± 0.51 CG 4.19 ± 0.49	Stress IG 2.89± 0.59 CG 3.43± 0.49 EE IG 3.25± 0.55 CG 4.21± 0.51	A statiscal significant difference was found both measures, stress ($p < 0.001$) and EE ($p = 0.01$)
Kline (2020), USA	Doctors and nurses working in the emergency department, N=122, 52% female	IG 1: therapy dogs IG 2: mandala drawing CG: no intervention	VAS stress mPSS-10	VAS Stress IG1 18.2 ±17.8 IG2 18.2 ±17.8 CG 18.2 ±17.8	VAS stress IG1 13.6 IG 2 24.5 CG NR	A statistical difference was found between IG 1 vs IG 2 ($p = 0.018$)
Spiva (2020), USA	Charge nurses working in a hospital, N=41 (IG 22, CG 19), 98% female, 43.22 years	IG: charge nurse leadership training program CG: no intervention	CD-RISC	Resilience IG 86.68±9.73 CG 84.31±7.40	Resilience IG 93.91±11.01 CG 86.50±8.21	Statistical significant improvement in resilience in the IG ($p < 0.05$)
Ghawadra (2020) Malaysia	Ward nurses in a teaching hospital, N=224 (IG 118 CG 106), 95% female, NR	IG: Mindfulness-Based Training CG: No intervention	DASS-21	NR	NR	A significant effect over time on stress, anxiety, depression ($p < .05$)
Ravari (2020), Iran	Nurses working in the emergency department, N=80 (IG 40, CG 40), 84% female, NR	IG: Time Management Workshop CG: No intervention	OOSI	Stress IG 182.52 ± 34.39 CG 204.42 ± 22.42	Stress IG186.22 ± 22.97 CG 204.35 ± 22.45	No statistical significant difference were found.
Sampson (2020), USA	Newly registered nurses working in and academic center, N=89 (IG 39, CG 34), NR, NR	IG: MINDBODYSTRONG cognitive behavioral skill-building program CG: no intervention	PSS	Stress (no SD reported) IG 20.13 CG 20.05	Stress (no SD reported) IG 10.72 CG 13.18	A significant difference was found ($p = 0.022$) following the intervention

Grabbe (2020), USA	Nurses working in a tertiary hospital, N=77 (IG 40, CG 37), 95% female, IG 44.6 years, CG 45.9 years	IG: Community Resiliency Model® (CRM) CG: nutrition class	CD-RISC CBI	Resilience: IG 29.65 ± 5.43 CG 28.82±5.91 Burnout IG 48.10 ± 20.14 CG 43.58±20.31	Resilience: IG 28.82 ± 5.91 CG 30.22±5.32 Burnout IG 43.58±20.31 CG 42.18 ±21.31	A significant difference for resilience was found (p=0.004)
Huang (2020), China	Resident physicians, N=36 (IG 18 CG 18), 69% female, IG 23.89 ± 0.90 CG 23.44 ± 0.92 year	IG: Balint groups CG: no intervention	MBI-HSS	EE IG 16.89 ± 4.825 CG 15.83 ± 5.533 DP IG 7.00 ± 3.361 CG 6.89 ± 2.847 PA IG 28.50 ± 7.139 CG 28.06 ± 7.174	EE IG 15.00 ± 5.111 CG 22.17 ± 9.482 DP IG 6.17 ± 3.130 CG 9.72 ± 3.801 PA IG 30.33 ± 6.843 CG 26.22 ± 6.839	A significant difference was found for EE (p=0.013) and DP (p=0.020)
Huang (2020), china	ICU nurses working in hospitals, N=152 (IG 76, CG 76), 73% female, NR	IG: balint group training CG: no intervention	MBI	Total IG 69.96 ± 6.6 CG 70.07 ± 6.78 EE IG 23.16 ± 3.12 CG 23.20 ± 2.79 DP IG 21.67 ± 2.51 CG 21.66 ± 2.95 PA IG 25.13 ± 4.01 CG 25.21 ± 3.50	Total IG 58.33 ± 7.38 CG 70.50 ± 7.01 EE IG 18.84 ± 3.18 CG 23.68 ± 2.45 DP IG 13.19 ± 3.39 CG 21.37 ± 2.23 PA IG 26.30 ± 3.27 CG 25.45 ± 3.37	Significance differences were found for MBI total, EE and DP (p<0.01)
Shin (2020), South Korea	Emergency nurses working in a university hospital, N=50 (IG25, CG 25), 100% female, 26.5 ± 3.2 years	IG: patchouli oil inhalation CG: sweet almond oil inhalation	VAS stress	Stress IG 7.23±1.02 CG NR	Stress IG 6.02±1.61 CG 6.53 ± 1.56	A significant difference was found for the intervention group p=0.001
Hwang (2019), South Korea	Nurses working in college hospitals, N=60 (IG 30, CG 30), 94.6% female, NR	IG: Mobile app-based stress management program CG: no intervention	PSS	Stress IG 20.00 ± 4.18 CG 18.50 ± 0.70	Stress IG 18.63 ± 3.72 CG 19.16 ± 0.65	Within group a significant reduction in the IG was found (p= 0.035) Between groups a significant for group x time difference was found (p=0.037)

Mohebbi (2019)	Nurses working in a hospital, N=60 (IG 30, CG 30), 100% female, 33 ± 2.7 years	IG: Aerobic Exercise Program CG: no intervention	HSE	Stress IG 86.3±5.7 CG 86.2±6.4	Stress IG 119.7±16.2 CG 86.2±6.7	A significant difference was found after the intervention (p<0.001)
Lin (2019) China	Nurses working in general hospitals, N=90 (IG 44 CG 46), 93.4% female, IG 32.86 ± 7.49 CG: 30.20 ± 6.09	IG: Modified MBSR CG: no intervention	PSS CD-RISC	Stress IG 40.91 ± 6.44 CG 39.91 ± 4.90 Resilience IG 54.43 ± 11.46 CG 55.17 ± 11.85	Stress IG 37.39 ± 5.97 CG 40. 76 ± 5.01 Resilience IG 57.98 ± 11.58 CG 55.11 ± 12.80	A significant difference was found for stress (p<0.001) and resilience (p=0.033)
Miyoshi (2019), Japan	Nurses working night shifts at a university hospital, N=20 (crossover), 100% female, 28.7 ± 4.9 years	IG: restorative yoga CG: no intervention	BJSQ	Stress IG 65.7 ± 10.8 CG NR	Stress: IG: 56.1 ± 8.5 CG 64.1 ± 12.7	Between groups (p=0.01) and within yoga group significant (p=0.01) differences
Ozgundondu (2019), Turkey	ICU nurses working in Internal Medicine, Anaesthesia, and Coronary ICUs, N-56 (IG 28, CG 28), 100% female, IG 24.61 ± 2.61, CG 27.75 ± 4.75	IG; Progressive Muscle Relaxation combined with music CG: attention-matched education	PSS	Median + IQR Stress IG: 31.00 (25.50–36.00) CG: 27.00 (25.00–29.75)	Median + IQR Stress IG: Median 29.00 (26.25–33.75) CG: 29.00 (27.00–31.75)	A significant difference was found in favor of the IG (p=0.030)
Watanabe (2019), Japan	Junior nurses working in hospitals, N=80 (IG 40, CG 40), 100% female, 30.1 ± 8.4 years	IG: brief MBSR CG: psychoeducation leaflet	MBI	Estimated marginal means and 95% CIs EE IG 21.7 (19.0, 24.4) CG 21.1 (18.5, 23.8) DP IG 7.1 (5.6, 8.5) CG 6.9 (5.4, 8.3) PA IG 22.2 (20.3, 24.3) CG 21.5 (19.5, 23.6)	Estimated marginal means and 95% CIs EE IG 21.8 (19.0, 24.6) CG 22.8 (20.1, 25.5) DP IG 6.9 (5.4, 8.4) CG 9.0 (7.6, 10.5) PA IG 21.1 (18.9, 23.2) CG 22.6 (20.5, 24.6)	No significant difference was found between groups (p>0.05)
Prado (2018), Brazil	Nurses working in a hospital, N=133 (IG 43, CG2 47, CG2 43), 94.7% female, 35 ± 8.4 years	IG: Auriculotherapy (Shenmen and Brainstem points) CG1: placebo auriculotherapy CG2: no intervention	LSS	Stress IG 72.4±17.9 CG1 66.7±17.3 CG2 69.3±17.8	Stress IG 41.2 ±17 CG1 49.1±23.6 CG2 68.6±25.7	A significant difference within group was found for in the IG (p=0.000) and CG1 (p=0.01)

Yang 2018, China	Psychiatric nurses working in a hospital, N =95 (IG 48, CG 47), 67% female, 29.2±6.9 years	IG: MBSR CG: no intervention	NSS	Stress IG 83.9±8.3 CG 84.8±8.1	Stress IG 68.2±9.1 CG 83.1±8.4	A statistical significant difference within and between groups was (P<0.001)
Calisi (2017), USA	Nurses working at cardiac units in a hospital, N=46, IG 24, CG 22, 100% female, NR	IG: Relaxation Response CG: No intervention	NRS work related stress	Stress IG 4.80±1.29 CG 4.55±1.30	Change Stress IG -1.25±1.90 CG -0.38±1.53	No significant differences were found (p=0.10)
Wei (2017), China	Emergency department nurses working in a hospital, N=102 (IG 51, CG 51), 86% female, NR	IG: active intervention with regular management CG: regular management	MBI	EE IG 15.76 ± 4.67 CG 15.13 ± 4.34 DP IG 11.63 ± 4.52 CG 11.21 ± 4.94 PA IG 23.84 ± 4.50 CG 24.35 ± 5.31	EE IG 9.65 ± 3.27 CG 15.39 ± 4.94 DP IG 6.92 ± 1.41 CG 11.49 ± 4.86 PA IG 25.98 ± 5.21 CG 24.54 ± 4.21	A significant difference was found for EE and DP (p<0.05)
Ireland (2017), Australia	Intern doctors completing their emergency department rotation, N=44 (IG23, CG 21), 64% female, 26.88±4.79	IG: Mindfulness Training Program CG: one hour extra break	CBI PSS	Burnout IG 2.55 ± 0.52 CG 2.65 ± 0.75 Stress IG 2.78 ± 0.55 CG 2.55 ± 0.62	Burnout IG 2.35 ± 0.49 CG 2.81 ± 0.87 Stress IG 2.42 ± 0.43 CG 2.61 ± 0.62	A significant difference was found for stress (p=0.003) and burnout (p=0.027)
Ghazavi	Nurses working on the oncology ward in a hospital, N=52 (IG 26, CG 26), 88.5% female, IG 33.9 ± 6.8, CG 34.5 ± 10.1 years	IG: Happiness Educational Program CG: training on interaction with patients	DASS-42	Stress IG 14.23 ± 9.9 CG 14.2 ± 7.5 Anxiety IG 11.77 ± 9.35 CG 11.96 ± 7.4 Depression IG 12.9 ± 10.9 CG 12.8 ± 8.1	Stress IG 9.7 ± 7.2 CG 14.3 ± 8.4 Anxiety IG 8.76 ± 8.1 CG 12.15 ± 8.1 Depression IG 8.3 ± 7.8 CG 12.7 ± 7.7	A significant difference for all measures was found (P=0.04)
Bernburg (2016), Germany	Junior physicians and pediatricians working in a pediatric department in hospitals, N=54 (IG 26, CG 28), 70% female, 27 years	IG: Psychosocial competency training CG: no intervention	PSQ	Stress IG 3.25±0.65 CG 3.12±0.59	Stress IG 3.02±0.62 CG 3.06±0.57	A significant difference was observed for perceived stress (p=0.01)

Hersch (2016), USA	Nurses working in hospitals, N=104 (IG 52, CG 52), 87.5% female, NR	IG: BREATHE: Web-Based Stress Management Program CG: No intervention	NSS	Stress IG 2.243±0.46 CG 2.273±0.43	Stress IG 2.072±0.38 CG 2.350±0.49	a statistical significant difference was found for stress (p=0.003)
Fang (2016), China	Nurses working in a general hospital, N=105 (IG 54, CG 51), 100% female, IG 35.13 ± 10.98, 36.05 ± 9.91 years	IG: Regular Yoga Program CG: No intervention	QMWS	IG Low stress 16.7% High stress 83.3% CG Low stress 15.7% High stress 84.3%	IG Low stress 64.8% High stress 35.2% CG Low stress 23.5% High stress 76.5%	A significant difference was found between groups after the intervention (p=0.001)
Gunasingam (2015), Australia	Junior doctors (1 year postgraduate) working in a hospital, N=31 (IG 13, CG 18), NR	IG: debriefing sessions CG: no intervention	MBI	EE IG 14.7 (9.7 to 19.6) CG 13.4 (10.4 to 16.5) DP IG 12.9 (9.7 to 16.2) CG 12.7 (10.0 to 15.3) PA IG 30.7 (28.8 to 32.6) CG 26.1 (23.0 to 29.1)	EE IG 14.2 (8.4 to 20.0) CG 13.5 (10.8 to 16.3) DP IG 12.8 (7.3 to 18.3) CG 12.9 (9.7 to 16.2) PA IG 30.2 (27.6 to −32.7) CG 27.9 (25.7 to 30.2)	No statistical significant differences were found (p=0.83)
Alexander (2015), USA	Nurses working in a hospital, N=40 (IG 20, CG 20), 97.5% female, 46.38 ± 10.23 years	IG: Yoga-based self-care intervention CG: no intervention	MBI	EE IG 17.60 ± 10.36 CG 20.40 ± 13.19 DP IG 4.05 ± 5.09 CG 4.35 ± 3.83 PA IG 37.15 ± 8.53 CG 36.10 ± 9.93	EE IG 12.95 ± 8.76 CG 20.60 ± 12.09 DP IG 2.50 ± 3.65 CG 5.15 ± 4.51 PA IG 39.60 ± 8.90 CG 37.05 ± 9.98	A significant difference was found for EE (p=0.041) and DP (p=0.035)
Nazari (2015), Iran	Nurses working in the intensive care units (dialysis, ICU, CCU), N=66 (IG 33, CG 33), 57% female, IG 34.1 ± 5.9 years, CG 34.6 ± 6.8 years	IG: General Swedish massage therapy CG: no intervention	OSI	Stress IG 172.2 ± 15.9 CG 167.5 ± 19.5	Stress IG 145.6 ± 23.5 CG 169.7 ± 15.1	Significant reduction in occupational stress (p<0.001)

IG = Intervention group, CG = control group, CBI = Copenhagen Burnout Inventory, CRB = client related burnout, PB = personal burnout, WRB = work related burnout, ED = emergency department, MBSR = Mindfulness Based Stress Reduction, MBI = Maslach Burnout Inventory, NSS = Nursing Stress Scale, EE = Emotional Exhaustion,

DP = depersonalization, PA = Personal accomplishment, OCS = Occupational Stress Questionnaire, JSS = Job stressor scale, CD-RISC = Connor Davidson Reslience Scale, NR = not reported, CNSS = Chinese Nurse Stressor Scale, SC = Surgical Center, PACU = Post-Anesthesia Care Unit, GSU = General Surgical Unit, SMPD = Sterile and Materials Processing Department, LSS = List of Signs and Symptoms of Stress, BRS = Brief resilience Score, CPSS = Chinese Perceived Stress Scale, OBI = Occupational Burnout Inventory, SMBQ = Shirom-Melamed Burn-out Questionnaire , Numeric Rating Scale, SUD = subjective units of distress scale , OR = Operating room, MBP = Mindfulness based program, RSA = The Resilience Scale for Adults, developed by Friborg, PSQ = Perceived stress questionnaire , VAS = Visual Analogue Scale, MPSS = modified Perceived Stress Scale, OOSI = Osipow occupational stress inventory, HSE = Health and Safety Executive (HSE) occupational stress questionnaire, BJSQ = Brief Job Stress Questionnaire, QMWS = Questionnaire on Medical Workers' Stress, ICU = Intensive Care Unit, CCU = Cardiac Care Unit , OSI = Occupational Stress Inventory

Table 2 - Intervention characteristics

Authors (year)	Intervention	Frequency / Modality	Length	Follow -up
Baek (2025)	IG: AI algorithm assigned participant to one of four programs to the intervention group: mindfulness meditation, acceptance commitment therapy, storytelling and reflective writing, or laughter therapy CG 1: self-selected the program CG 2: guidance materials on the four programs through an online blog	IG: comprised of two 2-week programs, each with three 10–15-min sessions per week. IG1: self-chosen two 2-week programs IG2: self-chosen moment All online	4 weeks	-
Antonson (2025)	IG: on site supportive communication training by a psychologist who observed doctor-patient consultations. CG: no intervention	1 hour group session to ensure common language. 1 hour individual session to establish learning goals. 3 days in the outpatient clinic with psychologist with feedback afterwards In person sessions	4 months	-
Talebiazar (2025)	IG: following the MBSR Training by Jon Kabat-Zinn CG: no intervention	weekly training sessions in person	8 weeks	-
Talebiazar (2024)	IG: MBSR training focusing on mindfulness skills including body scans, meditation, yoga, and breathing exercises. Participants received educational materials for home practice. CG: no intervention	Weekly sessions of 2-2,5 hour sessions in person and self-practice at home	8 weeks	-
Eslamimoghadam (2024)	IG MBSR program including daily exercises like mindfulness meditation, body scanning, and deep breathing CG: no intervention	Daily exercises delivered via social networks/apps.	8 weeks	-
Mao (2024)	IG: Balint group activities. The group consisted of 14 nurses and a team leader. Activities included case discussions, simulations, and theoretical training CG: mental health knowledge lectures	IG: Biweekly sessions of 60-90 minutes in person CG: biweekly sessions of 60 minutes in person	20 weeks	-
Gao (2024)	IG: Multimodal Psychological Support (MPS) program included music therapy, sleep hygiene education, psychoeducation, and relaxation training. CG: Routine wellness care provided access to the COVID-19 universal mental health handbook	IG: daily online practice via WeChat with daily reminders CG: accessible via the WeChat platform	28 days	2 mo
Yousefzadeh (2024)	IG: Balint group intervention involving case presentations and group discussions led by trained leaders CG: no intervention	Weekly 60 minute sessions in person	8 weeks	-

Shan (2024)	IG Balint group intervention discussing challenging nurse-patient encounter cases led by one to two group leaders and groups of 6-12 participants CG: no intervention	2 lectures and 10 small group discussion sessions of 60-90 minute sessions in person	3 months	-
Sharma (2024)	IG: AVPHFN (Anulom Vilom Pranayama + Heartfulness Meditation) combined Yogi breathing techtnique with meditation under supervision of a trainer CG: no intervention	3 times per week in person sessions	8 weeks	-
Faramarzi (2024)	IG1: classic yoga including asana, breathing and meditation IG2: aerobic exercises according to guideline CG: no intervention	3 times a week for approximately 70 minutes in person group training	8 weeks	-
Asadollah (2024)	IG: loving kindness meditation with audio files where a person should repeat meaningful spiritual expressions (mantra) to direct positive energe called mantra toward oneself and others CG: no intervention	20 minutes session 3 times a week delivered via WhatsApp	4 weeks	-
Abbasalizadeh (2024)	IG: resilience training via mHealth-app based on microlearning and it comprises of: (a) video lectures by a psychotherapist on resilience, (b) practical demonstration videos illustrating resilience techniques by an expert nurse familiar with resilience techniques © multimedia presentations using voiced PowerPoints based on the micro-learning method, presented as 3-5-minute files CG: self-study via the app	Self-chosen time point accessible via the app.	5 months	-
Yilmaz (2024)	IG: laughter yoga applied before the start of an evening shift in groups of 5 people CG: no intervention	2 times/week between 15:00-16:00	4 weeks	-
Kong (2024)	IG: Solution-Focused Brief Therapy (SFBT) focusing on stress management, emotional regulation, and coping strategies. Activities included group discussions, emotional tests, and cognitive-behavioral interventions. CG: no intervention	Weekly 120 minutes sessions in person group activities	6 weeks	-
Munhoz (2024)	IG: Auriculotherapy on 'real' points with application of semi-permanent needles CG: auriculotherapy on sham (placebo) points	2 sessions/week in person	4 weeks	15 days

Purdie (2023)	IG: Mindful Awareness Practices (MAPs) and is a curriculum in mindfulness meditation. Mindfulness exercises include mindful breathing, mindful sitting, mindful eating, mindful listening, appreciation meditation, friendly or loving-kindness meditation, mindful walking, and mindful movement CG: no intervention	comprised of one in-person 60–min session and 6-week access to a digitally delivered MAPs curriculum	6 weeks	-
Wang (2023)	IG: "Preparing Me" culturally adapted psycholological first aid (PFA) training with the use of simulations and cases facilitated by peer trainers CG: psychoeducation in the form of a standard training about empathy and communication skills	1 day in person training followed with 4 online follow up sessions	5 times	3 mo
Concilio (2023)	IG: Supportive text messages to build resilience using three categories: emotional, esteem, and networking support CG: medical facts via text messages	Weekly text messages for both groups	5 weeks	-
Lu (2023),	IG: MBSR with mindfulness meditation, yoga, loving-kindness meditation, daily homework, audio/video resources, and WeChat group CG: information via WeChat with health promotion strategies and inspirational quotes	2 sessions per week with 8 sessions in total and 1 retreat in person.	4 weeks	6 mo
Loiselle (2023)	IG: Transcendental Meditation CG: no intervention	information on the mechanics of the TM practice followed by a brief personal interview with the instructor, personal one-on-one instruction in TM, and three group sessions which included discussions of subjective experiences and correctness of practice. Physicians were instructed to meditate 20 minutes twice a day and attend four group follow-up sessions.	4 months	-
Emadikhalaf (2023)	IG1: aromatherapy with rose essential oil attached to shirt IG2: aromatherapy with lavender essential oil attached to shirt CG: sesame seed oil	2 hours per day	4 weeks	-
Celik (2023)	IG: laughter yoga these sections include deep breathing exercises (5 minutes), warm-up exercises (10 minutes), childlike games (10 minutes), and laughter exercises (15 minutes)	2 times a week via zoom	4 weeks	-

	CG: no intervention			
Bhardwaj (2023)	IG: mHealth aided Yoga-based Breath and Meditation (Sudarshan Kriya) CG: no intervention	4-day instructor-led intro 2 hours per session + daily 30-min home practice via an online program + weekly guided sessions online via zoom	12 weeks	-
Bonamer (2023)	IG: Transcendental Meditation CG: no intervention	Initial instructions 4 consecutive days of 60-90 minute with 4 group follow-up sessions of 45 to 60 minute. Participants were instructed to complete TM practice of 20 minutes twice per day	3 months	1 mo
Cao (2022)	IG: combining Balint group discussions and MBSR sessions CG: no intervention	Online group training 2 times per week of ≥1.5h/session	8 weeks	-
Hsieh (2022)	IG: gong meditation led by a certified gong therapist CG: no intervention	Seven sessions of gong mediation each lasting 50-60 minutes for 2 consecutive days.	2 days	-
Ferreres-Galan (2022)	IG: Unified Protocol Prevention Program focused on emotional regulation skills using modules and additional elements such as assertiveness, pleasant activities CG: no intervention	Weekly in person group session lasting 2 hours	5 weeks	6 mo
Dahlgren (2022)	IG: proactive recovery sessions focused on supporting sleep, unwinding from stress and handling fatigue using cognitive behavioral therapy and motivational interviewing techniques elements CG: Routine psychological counseling	Three 2,5 hour group sessions	4 weeks	6 mo
Fong (2022)	IG: brief mind coloring included viewing a 3-minutes instructional video and coloring mandalas. CG: no intervention	At least 5 working or 100 minute in total during 10-day period in person	10 days	-
Ganjeali (2022)	IG: Demonstration-based Progressive Muscle Relaxation CG: no intervention	Two 60-min in person group sessions followed by daily 20-min self-practice, using demonstration and audio support	2 weeks	-
Kim (2022)	IG: Elastic band resistance exercise program standardized with 5 leg exercises and 5 cycles per session CG: no intervention	3 weekly self-guided sessions via video or booklet	8 weeks	-
Yildirim (2022),	IG: Mindfulness-based breathing and music therapy guided by a certified therapist	Single 30 minute online via Zoom	One session	-

	CG: relaxed in calm setting			
Dincer (2021)	IG: Emotional freedom techniques involving tapping acupressure points while repeating self-acceptance phrases one CG: rest quietly	Single 20-minute online group session online via Zoom	One session	-
Farsi (2021)	IG: Aromatherapy with Rosa Damascena Essential Oil with 2 drops of 40% rose essential oil on a cotton CG: placebo with distilled water on a cotton	Single session 10 minutes session of inhalation before the shift. 90 min after inhalation the with NSS measurement was completed	One session	-
Hilcove (2021)	IG: Mindfullness-based yoga focused on Hatha and Raja Yoga with breathing, stretching, meditation CG: no intervention	Weekly in class sessions of 60 minutes + 3-5 times per week home practice	6 weeks	-
Guerrier (2021)	IG: Light-based intervention exposure to blue-enriched LED light using a portable head-mounted device in the morning CG: no intervention	Daily 45-minute exposure	4 weeks	-
Mandal (2021)	IG: structured yoga program including asana, pranayama, and relaxation CG: no intervention	2 times per week 50 minute sessions in person	12 weeks	-
Fendel (2021)	IG: Tailored MBP included mindfulness, inquiry, integration into medical practice, home practice, and coursebook with detailed information and a description on practical exercises about mindfulness and it's relationship with stress and quality of care as well as texts about the importance of self-care, acceptance and meaning in medicine CG: Received the same coursebook on the same weekly basis except that the coursebook did not contain a description of practical exercises	IG: 8 week MBP with weekly 135 minute sessions and a 6 hour retreat. Additionally, 4 month maintenance with 3 booster sessions. CG: weekly basis	6 months	6 mo
Mao (2021)	IG: Emotional Intelligence Training with a two phase program. Phase I system training with lectures and phase II weekly sessions of case discussions CG: no intervention	Phase I is 2 times per week 4 weeks. Phase II is 1 times per week for 11 months. Both phases are in person.	12 months	-
Pehlivan (2020)	IG 1: Compassion Fatigue Resiliency program short-term IG 2: Compassion Fatigue Resiliency Program long-term The purpose of the program is to provide nurses with knowledge and skills that will increase resilience levels by helping them recognize compassion fatigue, cope with its consequences and work effectively	IG 1: short term 5 hour two day in person training IG 2: long term 2 hour per week for 5 weeks in person training	5 weeks	1 year

	CG: No intervention			
Xie (2020)	IG: Mindfulness based intervention including MBSR, MBCT, ACT, loving kindness and compassion meditation CG: educational intervention related to burnout	Weekly 2.5 hour sessions with additional home practice	8 weeks	3 mo
Bernburg (2020)	IG: Mental health self-care training consists of psychosocial competence training combined with cognitive behavioral therapy and solution focused counseling training and solution focused brief therapy led by psychotherapists CG: no intervention	Weekly in person sessions	12 weeks	24 weeks
Kline (2020)	IG 1: participants interacted for 5 minutes with therapy dogs IG 2: participants were mandala colouring for 5 minutes CG: no intervention	5 minute single session	One session	-
Spiva (2020)	IG: charge nurse leadership training program it included two courses. Supervisory Skills for Positive Outcomes: focused on communication, conflict resolution, time management, and delegation. Critical Thinking for Charge Nurses: Emphasized decision-making, problem-solving, and leadership CG: no intervention	8.5 hour course including 7 continuing education hours provided by employee trainers in person sessions		-
Ghawadra (2020)	IG: Mindfulness-Based Training (MINDFULGym) CG: no intervention	2-hr face-to-face workshop + 4 weeks guided self-practice via website and WhatsApp support	4 weeks	-
Ravari (2020)	IG: Time Management Workshop with lectures, Q&A, slides, clips, exercises, movies, and CDs covering time management techniques and skills CG: No intervention	One day 8 hour workshop	One session	-
Sampson (2020)	IG: MINDBODYSTRONG cognitive behavioral skill-building program ocusing on CBT, mindfulness, health behaviors, self-efficacy, with peer support CG: no intervention	8 weekly 30-35 minute in person sessions	8 weeks	6 months
Grabbe (2020)	IG: Community Resiliency Model® (CRM) CG: nutrition class	Single 3-hour class teaching sensory awareness techniques for emotional regulation	One session	1 year
Huang (2020)	IG: Balint groups focusing on physician–patient interaction, empathy, and stress reduction CG: no intervention	2 lectures and 10 baling in person group sessions	6 months	-

Huang (2020)	IG: Balint group including case presentations and group discussions CG: no intervention	Weekly 1.5 hour in person sessions	8 weeks	-
Shin (2020)	IG: patchouli oil inhalation. 0.5 mL aliquot of 5% patchouli oil dissolved in sweet almond oil dropped on a gauze and placed on the philtrem for thee deep breaths and allowed subsequently allowed to inhale the essential oil for 20 min through natural breathing CG: sweet almond oil inhalation only	first inhalation of patchouli oil at about 10 pm (the end of an afternoon shift) and the second inhalation at about 10 pm on the next day (24-h interval)	2 days	-
Hwang (2019)	IG: Mobile app-based stress management program with an app including meditation, music, yoga, and health information CG: no intervention	At least two times per week via a mobile	4 weeks	-
Mohebbi (2019)	IG: Aerobic Exercise Program including warm-up, 35 min aerobic exercise, and cool-down CG: no intervention	Three 1 hour sessions per week	8 weeks	8 wks
Lin (2019)	IG: Modified MBSR CG: no intervention	weekly 2-hour group sessions + 20 minutes daily home practice delivered in person and supported via WeChat	8 weeks	3 mo
Miyoshi (2019)	IG: restorative yoga including 5 restorative yoga poses CG: no intervention	1-hour guided session + 4 weeks home practice at least 3 times weeks	4 weeks	-
Ozgundondu (2019)	IG; Progressive Muscle Relaxation combined with music CG: attention-matched education on the effects of stress on the body.	IG: weekly 20 minute in person group sessions CG: single 20 minute in person session	8 weeks	4 weeks
Watanabe (2019)	IG: brief MBSR including body scan, breathing meditation, and CBT-based stress management delivered by senior nurses CG: psychoeducation leaflet included information about checking for signs of stress, relaxation, sleep hygiene, and suggestions for stress management such as exercise, laughter, and meeting intimate friends.	IG: weekly individual 30 minute sessions	4 weeks	48 weeks
Prado (2018)	IG: Auriculotherapy on two points with calming properties were used Shenmen and Brainstem points. CG1: placebo auriculotherapy on sham points on the external ear and face area CG2: no intervention	12 auriculotherapy sessions were offered to the IG and CG1	6 weeks	15 days

Yang (2018)	IG: MBSR included breathing, meditation, body scan CG: no intervention	Weekly guided sessions, home practice, and a final reflection sessions	8 weeks	-
Calisi (2017)	IG: Relaxation Response with diaphragmatic breathing and mental focus technique with journaling CG: No intervention	45 minute in person session followed by twice daily 10-20 minutes practicing	8 weeks	-
Wei (2017)	IG: active intervention with training on communication, conflict resolution, efficacy, emotion control, and work skills with regular management CG: regular management consists of discussions and support meetings	Twice per week 30 minute sessions	6 months	-
Ireland (2017)	IG: Mindfulness Training Program adapted from MBSR, MBCT, ACT, including breathing, body awareness, and self-care CG: one hour extra break weekly	Weekly 1 hour group session	10 weeks	-
Ghazavi (2017)	IG: Happiness Educational Program using lecture, discussion, and Q&A on topics including social interaction, planning, optimism, self-expression, and life satisfaction CG: training on interaction with patients	Weekly 60 minute in person group sessions	6 weeks	-
Bernburg (2016)	IG: Psychosocial competency training including theoretical input, group discussions, exercises, and home assignments. Topics included stress management, communication, and self-care. CG: no intervention	Weekly in person group sessions of 1,5 hours	12 weeks	12 mo
Hersch (2016)	IG: BREATHE: Web-Based Stress Management Program with 7 core modules and 1 nurse manager module, covering stress education, assess, identify and manage stress, avoid negative coping, and your mental health CG: No intervention	Online self pased module	3 months	-
Fang (2015)	IG: Regular Yoga Program including physical postures, loosening exercises breathing exercises, and meditation CG: no intervention	Two times per week 50-60 minute yoga sessions	6 months	-
Gunasingam (2015)	IG: debriefing sessions covering stressors, coping strategies, and work-life balance CG: no intervention	1 hour in person group sessions every two weeks	2 months	-
Alexander (2015)	IG: Yoga-based self-care intervention led by an experienced yoga instructor (breathing, posture, relaxation, meditation)	Weekly in person supervised group sessions with home practice	8 weeks	-

	CG: no intervention			
Nazari (2015)	IG: General Swedish massage therapy focusing on hands, legs, back, chest, and lower back, performed by trained researchers conducted in a quiet warm room with proper ventilation CG: no intervention	25 minute massage sessions for 2 times a week	4 weeks	2 wks

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