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REVIEW

Efficacy of Individual-Level Interventions to Mitigate the Risk for Burnout Among Health Care Professionals

A Systematic Review and Meta-analysis of Randomized Controlled Trials

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Background: There is limited evidence of the strategies to mitigate burnout among all health care professionals (HCPs).

Purpose: To evaluate the effectiveness of all interventions to mitigate burnout among HCPs.

Data Sources: PubMed and Scopus (up to 14 May 2025).

Study Selection: Independent study selection (2 people) of randomized controlled trials (RCTs) and cluster RCTs of interventions to mitigate burnout (vs. no active intervention) among HCPs.

Data Extraction: Independent extraction with validation by second reviewer. Continuous data for burnout outcomes extracted for emotional exhaustion (EE), depersonalization, personal accomplishment (PA), and single-concept burnout measurement. Separate random-effects models were stratified by role.

Data Synthesis: 93 RCTs and 6 cluster RCTs evaluating individual-level interventions were included (9330 participants). Among physicians, professional coaching was probably effective in reducing some aspects of burnout (EE standardized mean difference [SMD], −0.37 [95% CI, −0.62 to −0.13], low certainty; and depersonalization SMD, −0.30 [CI, −0.42 to −0.19], moderate certainty), but mindfulness-based interventions may not be effective (EE SMD, −0.46 [CI, −1.28 to 0.35], very low certainty; depersonalization SMD, −0.09 [CI, −0.30 to 0.12], moderate certainty). However, mindfulness-based interventions may reduce burnout among nurses and midwives (EE SMD, −0.90 [CI,−1.46 to −0.34], low certainty) and among a mixture of HCP roles (EE SMD, −0.40 [−0.65 to −0.16], low certainty; depersonalization SMD, −0.33 [CI, −0.53 to −0.14], low certainty; and PA SMD, 0.48 [CI, 0.29 to 0.67], moderate certainty). Mindfulness-based and professional coaching interventions were generally more than 4 weeks in duration.

Limitations: Most trials were unblinded with subjective outcomes. There was substantial heterogeneity among interventions and populations despite stratifying by role.

Conclusion: Although mindfulness-based interventions may reduce burnout in nurses and midwives and among a mixture of HCPs, professional coaching probably reduces burnout among physicians, particularly when sustained for more than 4 weeks.

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In recent years, health care professionals (HCPs) worldwide have been exposed to a sustained period of stress due to limited resources, economic difficulties, and the COVID-19 pandemic. Studies have shown excessive mental health burdens among HCPs (1), and burnout seems to be a constant threat (2, 3). Although there is no single definition of burnout and its validity has been contested (4, 5), it is often described as a work-related syndrome primarily consisting of high levels of emotional exhaustion (EE) (6). Burnout is also said to consist of depersonalization (negative and cynical attitudes about one's clients/patients/colleagues) and a sense of low personal accomplishment (PA), which can occur separately from EE (6).

In the United States, the reported prevalence of burnout among HCPs has increased from 45% in 2019 to 60% in late 2021 (7). This may have an adverse impact on staff retention (8), absenteeism (9), and quality of patient care (10). Indeed, recent strikes by staff in the U.K.'s National Health Service were thought to be driven by EE in addition to other issues such as reduced quality of patient care and support for staff and lack of appropriate recognition (11). Interventions to reduce burnout can be at the individual or organizational level, although most studies have focused on individual-level interventions. Furthermore, previous systematic reviews and meta-analyses of individual strategies to mitigate burnout focus only on specific roles (for example, nurses or physicians only [12–15]) or

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specific interventions (16), or often do not comprehensively stratify by intervention type (14, 15). Understanding the effectiveness of different interventions to reduce burnout among the breadth of HCPs may help policymakers consider the effectiveness of individual options to reduce burnout, for reduced staff attrition and improved patient care.

The aim of this systematic review and meta-analysis is to identify and summarize published randomized controlled trials (RCTs) evaluating all interventions to reduce burnout among all HCPs and evaluate their efficacy within specific roles.

METHODS

This systematic review and meta-analysis was prospectively registered in PROSPERO (ID: CRD42024552385). Analysis and reporting followed PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) principles.

Data Sources and Searches

The full search strategy is provided in the **Supplement** (available at Annals.org). Briefly, PubMed and Scopus were searched for all RCTs and cluster RCTs, published all years, on 14 May 2025. Studies were included if published in English language, using commonly used terms in the title or abstract to describe RCTs and cluster RCTs among HCPs, evaluating interventions to mitigate burnout (vs. no active intervention or routine provisions), and reporting continuous outcomes related to burnout. Filters for study design were not applied to avoid omitting relevant articles.

Study Selection

Studies were included if they had an RCT or cluster RCT design and had the following characteristics: 1) conducted for HCPs directly involved in patient care who were aged 18 years or older, 2) evaluated modifiable intervention strategies evaluated against no active intervention, and 3) included a continuous outcome related to burnout, measured using validated assessment tools. Studies involving both HCPs and non-HCPs—or solely involving informal caregivers, social workers, care home staff, domiciliary care workers, or administrative staff—were excluded. Studies evaluating interventions against an active control group were also excluded.

Articles retrieved from the search were exported from the databases and entered into a spreadsheet. Duplicate articles were removed. Articles were screened independently by 2 authors (G.C. and A.E.) against the inclusion–exclusion criteria based on the title and the abstract and were excluded if they did not meet all criteria. The full text of the remaining articles was reviewed in detail against inclusion–exclusion criteria.

Data Extraction and Quality Assessment

Data collection was performed solely by the first author manually extracting: 1) study identification: first author, reference, and year; 2) study and population characteristics: country, sample size, sample occupation, and age; 3) intervention characteristics: intervention type, duration, and control; 4) outcome measure; and 5) point estimate (posttest mean values) and uncertainty of intervention efficacy measurement (CIs, SEs, SDs). The data extracted were spot-checked by a second author (A.E.). The risk of bias for RCTs and cluster RCTs was assessed using the Cochrane risk-of-bias tool for randomized trials (RoB2) macro and the Cochrane RoB2 CRT macro, respectively. Risk of bias was evaluated independently by 2 authors (G.C. and A.E.). The quality (certainty) of evidence for subgroups (stratified by intervention type and target role) of 3 or more studies was assessed for EE, depersonalization, and PA independently by 3 authors (G.C., A.E., and J.G.) using the GRADE (Grading of Recommendations Assessment, Development and Evaluation) approach.

Data Synthesis and Analysis

The analysis was performed using Stata v.17.0. Postintervention mean scores and SDs for both active intervention and control groups were extracted, and—if mean scores were unavailable—the change in mean scores from preintervention to postintervention was extracted (17). If neither was available, then the reported effect size was converted to the Cohen *d*, which was then used in meta-analyses of standardized mean difference (SMD) only (18, 19). Just 1 study ([20] reporting partial η^2) required this procedure. The earliest postintervention assessment was used in the meta-analysis. Missing SDs were reconstructed based on SEs and/or 95% CIs.

Separate meta-analyses (within each HCP role stratified by intervention type) were performed on each component of burnout (EE, depersonalization, and PA) and for single-concept burnout measures (6) such as the Professional Quality of Life (ProQOL) burnout subscale. Any contrasts between published analysis and preplanned protocol are per the *Annals* deputy editor's request: the preplanned protocol did not specify conducting separate meta-analysis *within* separate HCP roles. Higher scores on EE, depersonalization, and single-concept burnout measures indicate a higher degree of burnout, whereas higher scores on PA domains indicate a lower degree of burnout. The SMDs and their 95% CIs for each study were calculated, and overall SMDs and 95% CIs were obtained for each subgroup from fitting random-effects models using restricted maximum likelihood due to anticipated heterogeneity. Heterogeneity was formally assessed by the I^2 statistic (21). Studies were grouped by intervention type according to the core focus of the intervention. Due to the potential limitations of calculating SMDs across different scales (22), as supplementary analysis we estimated the unstandardized mean differences (MDs) using random-effects models for the most commonly used scales in these studies: the Maslach

Table. Summary Table for the Efficacy of Each Intervention Type (vs. No Active Intervention) on Burnout

Intervention Type	Burnout Domain	Trials, *n* (Participants)	SMD (95% CI)	GRADE Strength of Evidence
Physicians*				
Mindfulness-based	EE	7 ($n = 375$)	−0.46 (−1.28 to 0.35)	⊕◯◯◯ Very low†‡§
	DP	7 ($n = 375$)	−0.09 (−0.30 to 0.12)	⊕⊕⊕◯ Moderate†
	PA	5 ($n = 195$)	0.43 (−0.48 to 1.34)‖	⊕◯◯◯ Very low†‡§¶
Job-role training	EE	3 ($n = 265$)	−0.11 (−0.35 to 0.13)	⊕◯◯◯ Very low†§¶
Resilience, well-being, stress management	EE	3 ($n = 205$)	−0.76 (−1.48 to −0.03)‖	⊕◯◯◯ Very low†‡§
Debriefing/support/ Balint groups	EE	3 ($n = 183$)	−0.18 (−0.88 to 0.53)	⊕◯◯◯ Very low†‡§
	DP	3 ($n = 183$)	−0.31 (−0.94 to 0.32)	⊕◯◯◯ Very low†‡§
	PA	3 ($n = 183$)	0.01 (−0.51 to 0.53)	⊕◯◯◯ Very low†‡§¶
Professional coaching	EE	7 ($n = 1145$)	−0.37 (−0.62 to −0.13)	⊕⊕◯◯ Low†‡
	DP	7 ($n = 1155$)	−0.30 (−0.42 to −0.19)	⊕⊕⊕◯ Moderate†
	PA	4 ($n = 681$)	0.22 (−0.02 to 0.46)	⊕◯◯◯ Very low†‡¶
Nurses and midwives**				
Mindfulness-based	EE	8 ($n = 511$)	−0.90 (−1.46 to −0.34)‖	⊕⊕◯◯ Low†‡
	DP	8 ($n = 511$)	−0.34 (−0.73 to 0.05)	⊕◯◯◯ Very low †‡§
	PA	7 ($n = 443$)	1.31 (0.32 to 2.31)‖	⊕◯◯◯ Very low†‡§
Job-role training	EE	6 ($n = 411$)	−0.33 (−0.81 to 0.15)	⊕◯◯◯ Very low†‡§
	DP	6 ($n = 411$)	−0.39 (−0.90 to 0.11)	⊕◯◯◯ Very low †‡§
	PA	5 ($n = 329$)	0.20 (−0.04 to 0.43)	⊕⊕⊕◯ Moderate†
Debriefing/support/ Balint groups	EE	3 ($n = 284$)	−0.65 (−1.73 to 0.43)	⊕◯◯◯ Very low †‡§
	DP	3 ($n = 284$)	−1.10 (2.88 to 0.67)‖	⊕◯◯◯ Very low †‡§
	PA	3 ($n = 284$)	0.83 (−0.36 to 2.02)‖	⊕◯◯◯ Very low†‡§¶
Multifaceted including mindfulness	EE	3 ($n = 276$)	−1.05 (−1.90 to −0.20)‖	⊕◯◯◯ Very low†‡§¶
Mixed roles or a mixture of HCPs††				
Mindfulness-based	EE	8 ($n = 511$)	−0.40 (−0.65 to −0.16)	⊕⊕◯◯ Low†‡
	DP	7 ($n = 610$)	−0.33 (−0.53 to −0.14)	⊕⊕◯◯ Low†‡
	PA	6 ($n = 532$)	0.48 (0.29 to 0.67)	⊕⊕⊕◯ Moderate†
Multifaceted interventions	EE	4 ($n = 534$)	−0.45 (−0.68 to −0.23)	⊕⊕◯◯ Low†‡
Alternative interventions	EE	3 ($n = 344$)	−0.37 (−0.79 to 0.06)	⊕◯◯◯ Very low†‡
	DP	3 ($n = 341$)	−0.29 (−0.78 to 0.21)	⊕◯◯◯ Very low†‡§

DP = depersonalization; EE = emotional exhaustion; GRADE = Grading of Recommendations Assessment, Development and Evaluation; HCP = health care professional; PA = personal accomplishment; SMD = standardized mean difference.

* "**Physicians**" section: Studies not reported for EE: 1 trial evaluated multifaceted interventions and 1 trial evaluated psychological therapy. Studies not reported for DP: 2 trials evaluated job-role training; 1 trial evaluated resilience, well-being, and stress management; and 1 trial evaluated psychological therapies. Studies not reported for PA: 2 trials evaluated job-role training and 1 trial evaluated resilience, well-being, and stress management.

† Reduced quality of evidence due to high risk of bias associated with unblinded interventions.

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‡ Reduced quality of evidence due to inconsistency (substantial heterogeneity) in pooled estimate.
§ Reduced quality of evidence due to imprecision in pooled estimate.
‖ Heterogeneity >85%.
¶ Reduced quality of evidence due to indirectness in intended target role.
** "**Nurses and midwives**" section: Studies not reported for EE: 1 trial evaluated art-based mindfulness; 2 trials evaluated resilience, well-being, and stress-management; 2 trials evaluated psychological therapy; 1 trial evaluated pharmacologic–dietary supplementation; 1 trial evaluated motivation–gratitude; 2 trials evaluated alternative therapies; and 1 trial evaluated physical activity. Studies not reported for DP: 1 trial evaluated multifaceted interventions; 1 trial evaluated art-based mindfulness; 2 trials evaluated resilience, well-being, and stress-management; 2 trials evaluated psychological therapies; 1 trial evaluated pharmacologic–dietary supplementation; 1 trial evaluated motivation–gratitude; 2 trials evaluated alternative therapies; and 1 trial evaluated physical activity. Studies not reported for PA: 2 trials evaluated multifaceted interventions; 1 trial evaluated art-based mindfulness; 1 trial evaluated resilience, well-being, and stress-management; 1 trial evaluated psychological therapies; 1 trial evaluated motivation–gratitude; 2 trials evaluated alternative therapies; and 1 trial evaluated physical activity.
†† "**Mixed roles or a mixture of HCPs**" section: Studies not reported for EE: 2 trials evaluated art-based mindfulness; 2 trials evaluated job-role training; 2 trials evaluated resilience, well-being, and stress management; and 1 trial evaluated pharmacologic–dietary supplementation. Studies not reported for DP: 2 trials evaluated multifaceted interventions, 1 trial evaluated art-based mindfulness, and 2 trials evaluated job-role training. Studies not reported for PA: 2 trials evaluated multifaceted interventions, 1 trial evaluated art-based mindfulness, 2 trials evaluated job-role training, and 1 trial evaluated alternative therapies.

Burnout Inventory (MBI) subscales (MBI-EE, MBI-depersonalization, MBI-PA) and the ProQOL burnout subscale to evaluate for effect size.

As supplementary analysis, random-effect meta-regression was used to estimate the association between burnout subscales and potential explanatory variables: mindfulness-based versus non–mindfulness-based interventions, pandemic versus nonpandemic study period, targeted role (physicians vs. nurses or midwives, a mixture of various HCPs, and other: anesthetists, physiotherapists, psychologists, ambulance crew members), intervention duration (<4 weeks vs. 4 to 12 weeks, and >12 weeks), and delivery (instructor led vs. self-delivered, combined, or other). Meta-regressions for MDs for most commonly used scales (MBI-EE, MBI-depersonalization, MBI-PA, and ProQOL burnout subscale) were also developed using the same variables described in this paragraph in addition to baseline burnout score in the intervention group.

Role of the Funding Source

This work was supported by Barts Charity project grants (G-002045 and G-002649). The funders had no role in the study design, collection, analysis, or interpretation of the data, or in the writing of the report.

RESULTS

Study Selection

After excluding duplicates, 1617 unique studies were identified (**Appendix Figure** for flow chart). Based on abstract and/or full-text review, 1518 did not meet all selection criteria, leaving 99 studies (93 RCTs and 6 cluster RCTs) for inclusion in the meta-analyses, including a total of 9330 participants.

Study Characteristics

Supplement Table 1 (available at Annals.org) summarizes the characteristics of included studies. All interventions were conducted at the individual level.

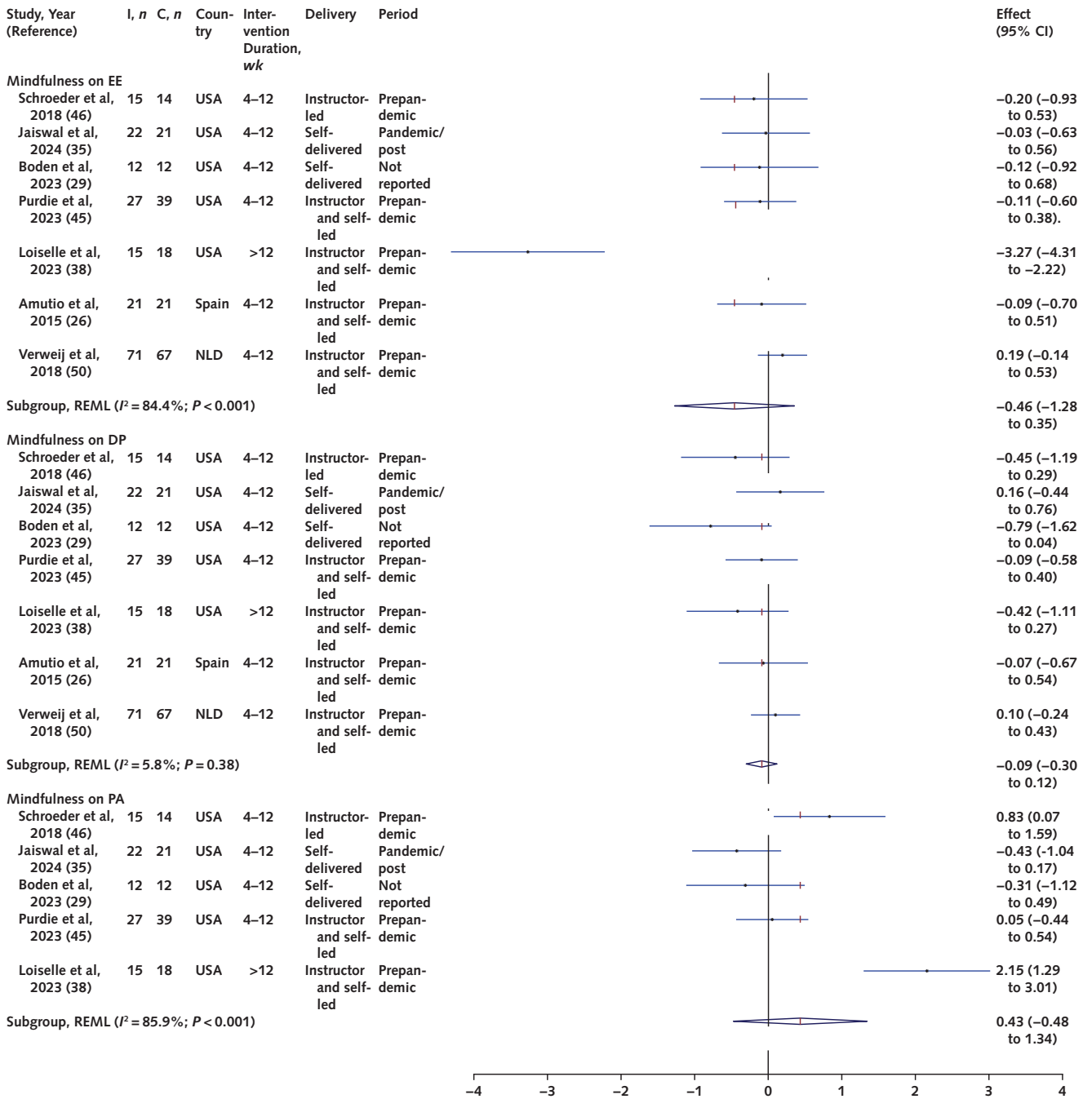
Of the 99 studies, 47 studies of 3815 participants evaluated mindfulness-based interventions or included a mindfulness component as part of their intervention. Of these 47 studies, 29 implemented guided mindfulness-specific programs or yoga–meditation programs (23–51), 15 incorporated mindfulness practice into multifaceted programs (52–66), and 3 used art-based mindfulness (67–69).

Of the remaining 52 intervention studies that did not report mindfulness as a component, 10 (1665 participants) involved resilience or stress-management training (65, 70–79), 12 (777 participants) involved skills training specific to performing one's job role effectively (job-role training) (80–91), 6 (456 participants) involved debriefing support and Balint group sessions (92–97), 7 (1155 participants) involved professional coaching (goal setting, work–life balance, and developing a sense of purpose in one's profession) (98–104), 5 (383 participants) involved psychological therapies such as cognitive behavioral and imagery competing (105–109), 2 (195 participants) implemented pharmacologic–dietary interventions (20, 110), 3 (331 participants) implemented motivational or gratitude messaging (111–113), and 7 (553 participants) implemented alternative therapies such as listening to music, oil inhalation, creative arts therapy, chromotherapy, and Chinese traditional medicines (114–120). One of the mindfulness–yoga-specific studies also evaluated aerobic exercise as part of a 3-arm trial (31).

Nurses were the only participants in 42 studies (**Supplement Table 1** for references); 27 studies included exclusively physicians/physician trainees/surgeons; 25 studies included a mixture of HCP roles; and 1 study was exclusive to each of trainee anesthetists (111), physiotherapists (85), psychologists (56), community health workers (77), and ambulance crew members (78).

The shortest interventions were a single 4.5-hour multifaceted workshop (52) and alternative oil-inhalation therapy (118) and short-format resilience (75) programs that were both 2 days in duration; other interventions ranged from 2 weeks (116) to 10 months (111). Most studies reported immediate follow-up conducted at the end of the intervention, whereas 8 studies reported a

Figure 1. Forest plot (standardized mean difference) by intervention type for the effect of interventions on EE vs. no active intervention among physicians.



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lag period between the end of the intervention and the postintervention assessment (63, 64, 74, 76, 77, 82, 84, 92).

Seventy-one studies used MBI subscales (**Supplement Table 1**), 14 used the ProQOL burnout subscale, 3 used the Shirom-Melamed Burnout Questionnaire or Shirom-Melamed Burnout Scale (55, 56, 61), 5 used the Copenhagen Burnout Inventory (59, 66, 69, 91, 111), 1 used the Oldenburg Burnout Inventory (70), 1 used the Scale of Work Engagement and Burnout burnout subscale (107), 3 used the Professional Fulfillment Index burnout subscale ([41, 63, 103] 1 of which also used MBI subscales), and 1 used the Compassion Fatigue burnout subscale (112).

Three RCTs (31, 75, 106) were 3-arm trials evaluating 2 separate interventions versus no active intervention.

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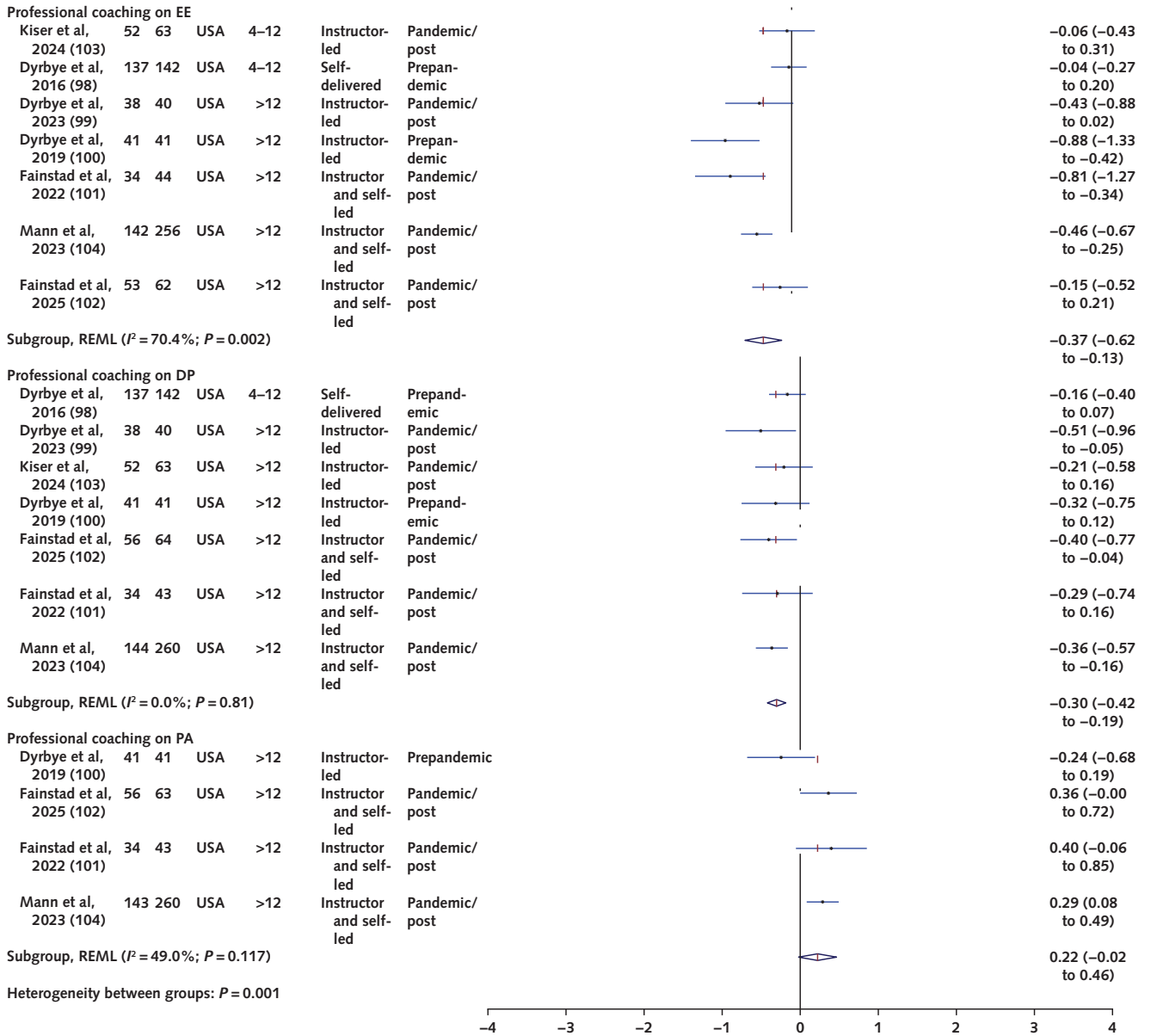


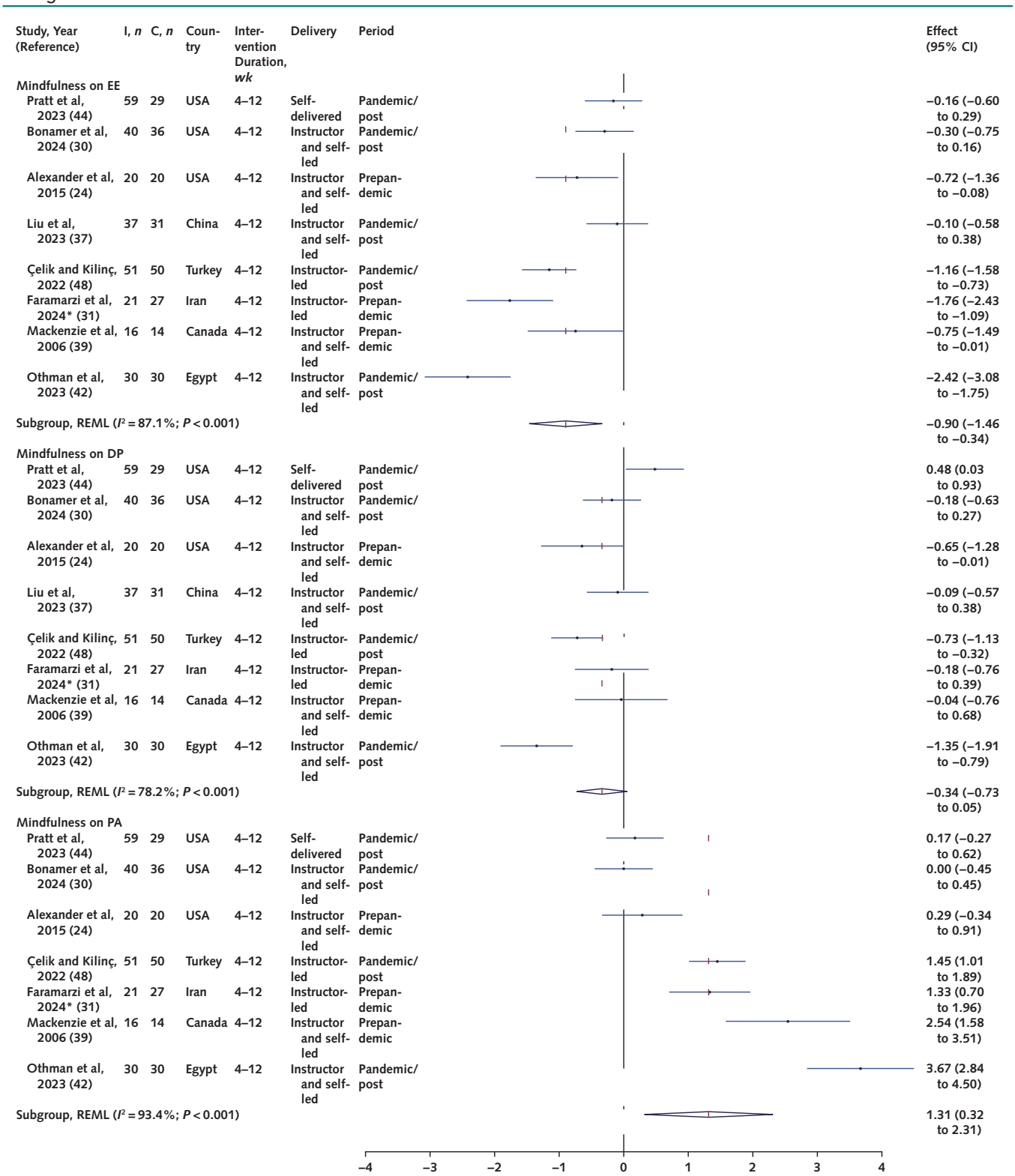
Weights and the between-subgroup heterogeneity test are from the random-effects model. C = control group; DP = depersonalization; EE = emotional exhaustion; I = intervention group; NLD = the Netherlands; PA = personal accomplishment; REML = restricted maximum likelihood; USA = United States.

Risk of Bias in Studies and Grade of Evidence

Supplement Table 2 displays the summary of RoB assessment for the 93 RCT and 6 cluster RCT studies. Of the 93 RCTs, 91 were rated overall high risk of bias. All 6 cluster RCTs were rated overall high risk of bias. The high risk of bias was driven predominantly by the unblinded nature of the interventions in most studies (96%; see Supplement Tables 3 and 4 for each RoB domain).

The Table shows the GRADE strength-of-evidence assessment for different intervention types in specific target roles on each burnout domain. Summary statistics and GRADE assessments are not presented for subgroups with fewer than 3 studies. Most subgroups were rated very low grade of evidence. Forest plots for subgroups (by intervention type) with more than 3 studies within each HCP role are presented in Figures 1 to 3.

Figure 2. Forest plot (standardized mean difference) by intervention type for the effect of interventions on DP vs. no active intervention among nurses and midwives.



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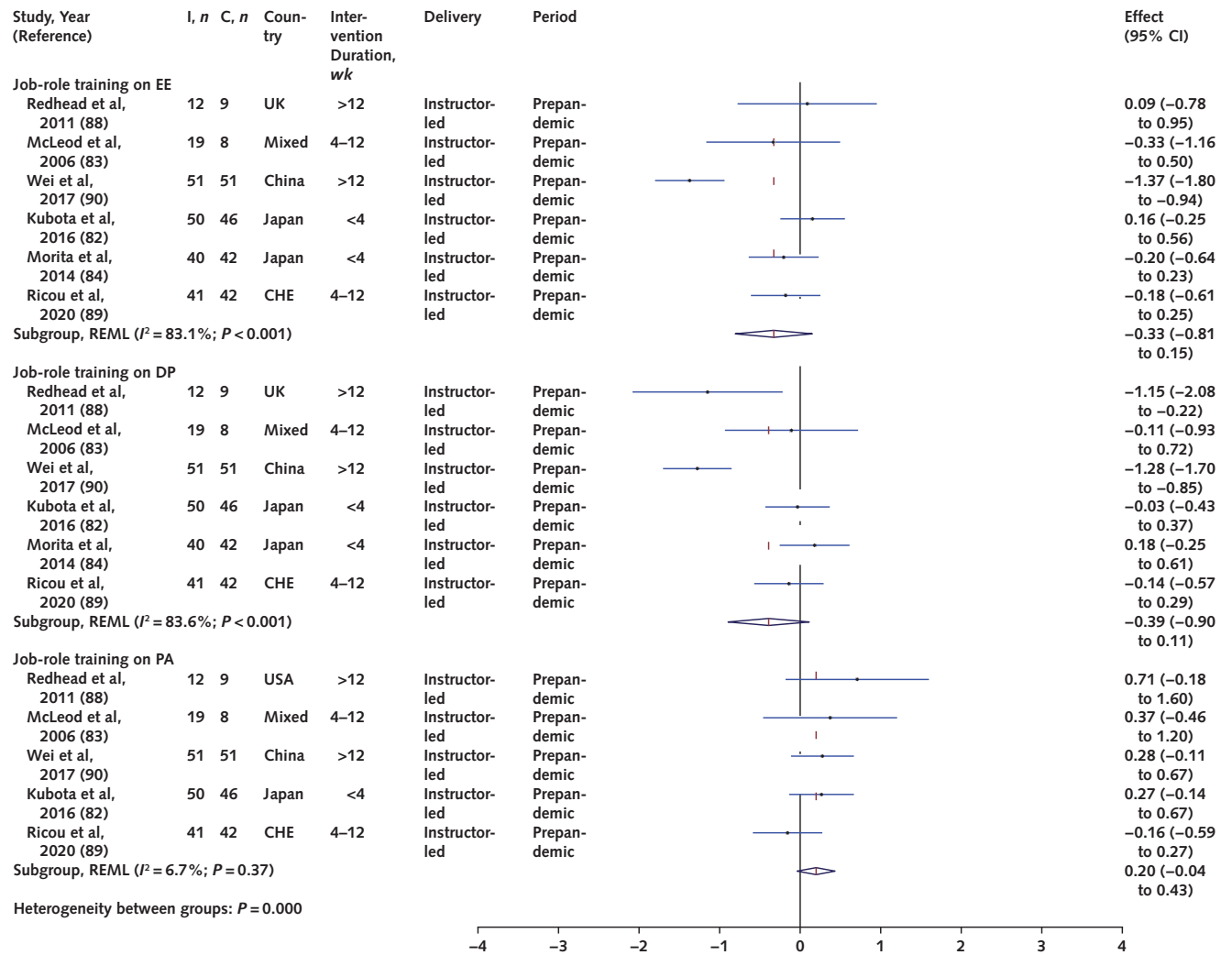


Weights and the between-subgroup heterogeneity test are from the random-effects model. C = control group; CHE = Switzerland; DP = depersonalization; EE = emotional exhaustion; I = intervention group; PA = personal accomplishment; REML = restricted maximum likelihood; USA = United States.
* Faramarzi et al, 2024, is a 3-arm trial. These data represent the first arm of the trial (yoga).

Effectiveness of Interventions in Reducing Burnout Among Physicians

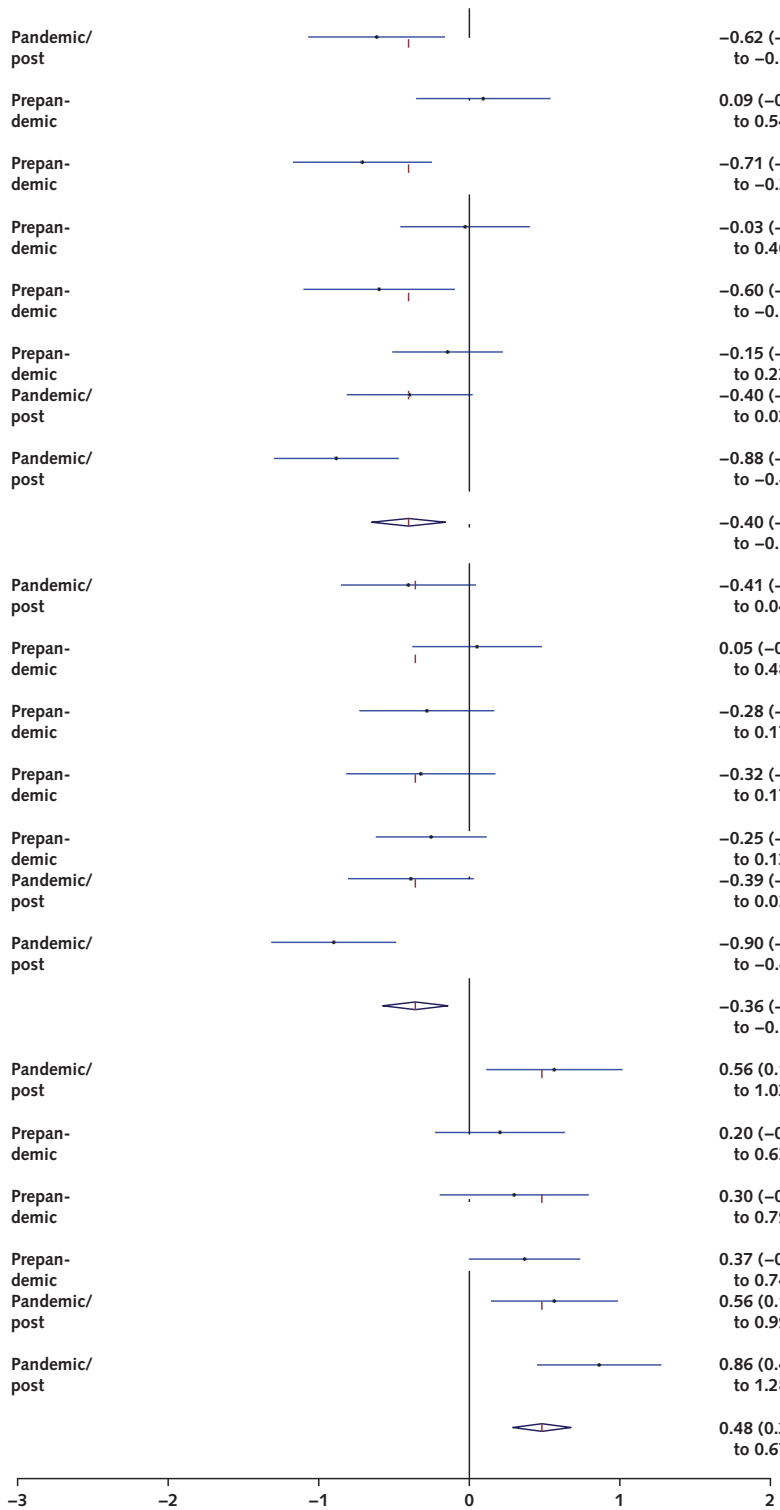
Among physicians, job-role training (n = 3); resilience, well-being, and stress management (n = 3); and debriefing/support/Balint groups (n = 3) provided very low certainty of evidence on burnout outcomes. Seven studies provided low and moderate certainty evidence for the effect of mindfulness-based interventions (n = 7) and professional coaching (n = 7) for some burnout outcomes among physicians (Table). Figure 1 shows the meta-analysis (by intervention type) of SMDs for interventions among physicians (full plots in Supplement Figure 1, available at Annals.org). There was moderate certainty of evidence that mindfulness-based interventions probably do not reduce depersonalization (SMD, −0.09 [95% CI, −0.30 to 0.12]) and very low certainty of any effect on EE and PA with high heterogeneity (I^2 = 84.4% and 85.9%), which was reduced with omitting an outlier (38) (I^2 = 0.0% and 58.2%) (Supplement Figure 2). There was low certainty of evidence that professional coaching may lead to a small reduction in EE (SMD, −0.37 [CI, −0.62 to −0.13]; I^2 = 70.4%), moderate certainty that professional coaching probably leads to a small reduction in depersonalization (SMD, −0.30 [CI, −0.42 to −0.19]; I^2 = 0.0%), and very low certainty that professional coaching may lead to a small increase in PA (SMD, 0.22 [CI, −0.02 to 0.46]; I^2 = 49.0%). Supplementary random-effects meta-analysis of unstandardized MDs showed similar associations (Supplement Figure 3).

Effectiveness of Interventions in Reducing Burnout Among Nurses or Midwives

Three studies provided very low certainty evidence on debriefing/support/Balint groups (n = 3) and multifaceted interventions incorporating mindfulness (n = 3)

Figure 3. Forest plot (standardized mean difference) by intervention type for the effect of different intervention types on PA vs. no active intervention among a mixture of various HCPs.

Study, Year (Reference)	I, *n*	C, *n*	Country	Intervention Duration, *wk*	Delivery	Period	Effect (95% CI)
Mindfulness on EE							
Joshi et al, 2022 (36)	40	38	USA	4–12	Instructor and self-led	Pandemic/post	−0.62 (−1.07 to −0.16)
Ameli et al, 2020 (25)	43	35	USA	4–12	Instructor and self-led	Prepandemic	0.09 (−0.35 to 0.54)
Hilcove et al, 2021 (34)	41	36	USA	4–12	Instructor and self-led	Prepandemic	−0.71 (−1.17 to −0.25)
Seidel et al, 2021 (47)	41	42	USA	4–12	Instructor and self-led	Prepandemic	−0.03 (−0.46 to 0.40)
Asuero et al, 2014 (27)	43	25	Spain	4–12	Instructor and self-led	Prepandemic	−0.60 (−1.10 to −0.10)
Xu et al, 2022 (51)	52	63	AUS	4–12	Self-delivered	Prepandemic	−0.15 (−0.51 to 0.22)
Gan et al, 2024 (32)	48	42	China	4–12	Instructor and self-led	Pandemic/post	−0.40 (−0.81 to 0.02)
Bhardwaj et al, 2023 (28)	49	49	India	4–12	Instructor and self-led	Pandemic/post	−0.88 (−1.30 to −0.47)
Subgroup, REML (I^2 = 60.7%; P = 0.013)							−0.40 (−0.65 to −0.16)
Mindfulness on DP							
Joshi et al, 2022 (36)	40	38	USA	4–12	Instructor and self-led	Pandemic/post	−0.41 (−0.85 to 0.04)
Seidel et al, 2021 (47)	41	42	USA	4–12	Instructor and self-led	Prepandemic	0.05 (−0.38 to 0.48)
Ameli et al, 2020 (25)	43	35	USA	4–12	Instructor and self-led	Prepandemic	−0.28 (−0.73 to 0.17)
Asuero et al, 2014 (27)	43	25	Spain	4–12	Instructor and self-led	Prepandemic	−0.32 (−0.82 to 0.17)
Xu et al, 2022 (51)	52	63	AUS	4–12	Self-delivered	Prepandemic	−0.25 (−0.62 to 0.12)
Gan et al, 2024 (32)	48	42	China	4–12	Instructor and self-led	Pandemic/post	−0.39 (−0.81 to 0.03)
Bhardwaj et al, 2023 (28)	49	49	India	4–12	Instructor and self-led	Pandemic/post	−0.90 (−1.32 to −0.49)
Subgroup, REML (I^2 = 43.0%; P = 0.104)							−0.36 (−0.58 to −0.14)
Mindfulness on PA							
Joshi et al, 2022 (36)	40	38	USA	4–12	Instructor and self-led	Pandemic/post	0.56 (0.11 to 1.02)
Seidel et al, 2021 (47)	41	42	USA	4–12	Instructor and self-led	Prepandemic	0.20 (−0.23 to 0.63)
Asuero et al, 2014 (27)	43	25	Spain	4–12	Instructor and self-led	Prepandemic	0.30 (−0.20 to 0.79)
Xu et al, 2022 (51)	52	63	AUS	4–12	Self-delivered	Prepandemic	0.37 (−0.00 to 0.74)
Gan et al, 2024 (32)	48	42	China	4–12	Instructor and self-led	Pandemic/post	0.56 (0.14 to 0.99)
Bhardwaj et al, 2023 (28)	49	49	India	4–12	Instructor and self-led	Pandemic/post	0.86 (0.45 to 1.28)
Subgroup, REML (I^2 = 17.0%; P = 0.30)							0.48 (0.29 to 0.67)



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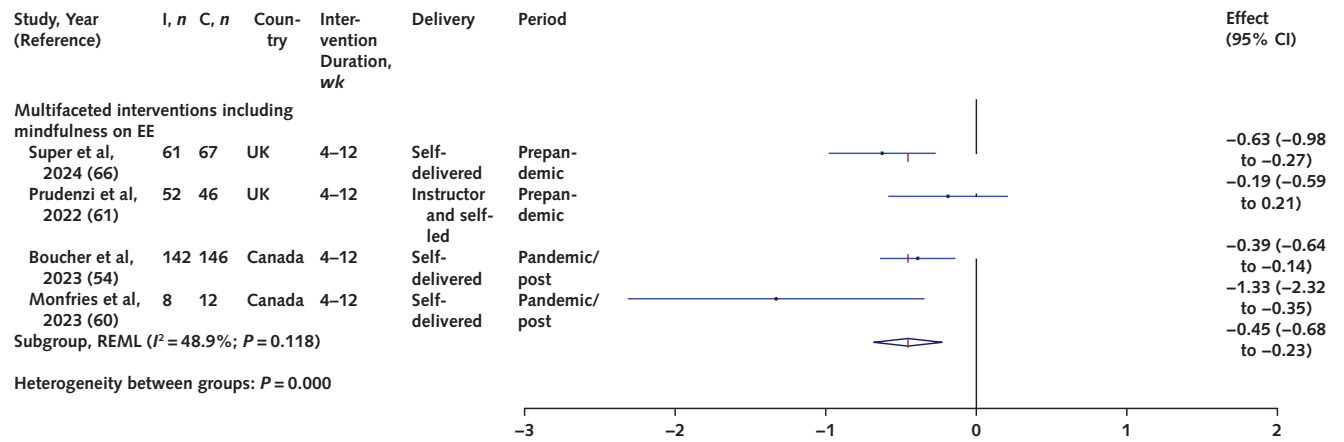

Weights and the between-subgroup heterogeneity test are from the random-effects model. AUS = Australia; C = control group; DP = depersonalization; EE = emotional exhaustion; I = intervention group; PA = personal accomplishment; REML = restricted maximum likelihood; USA = United States.

on burnout outcomes among nurses and midwives. Mindfulness-based interventions (n = 8) and job-role training (n = 6) had sufficient evidence for some burnout outcomes among nurses and midwives (**Table**). **Figure 2** shows the meta-analysis (by intervention type) of SMDs for interventions among nurses or midwives (full plots in **Supplement Figure 4**). There was low certainty that mindfulness-based interventions may result in a large reduction in EE (SMD, −0.90 [CI, −1.46 to −0.34]; I^2 = 87.1%) and moderate certainty of evidence that job-role training may have small incremental improvement in PA (SMD, 0.20 [CI, −0.04 to 0.43]; I^2 = 6.7%) among nurses and midwives but very low certainty for other burnout outcomes. Heterogeneity remained statistically significant after omitting an outlier (42) when estimating the effect of mindfulness-based interventions on EE (I^2 = 78.7%) (**Supplement Figure 5**). Random-effects meta-analysis of unstandardized MDs showed similar associations (**Supplement Figure 6**).

Supplement Figure 7 reports the sensitivity analyses excluding outliers (62) for the effect of multifaceted interventions incorporating mindfulness on single-concept burnout outcomes (SMD, −0.58 [CI, −0.89 to −0.28]; I^2 = 44.8%) among nurses and midwives (see **Supplement Figure 8** for plots including other HCP roles).

Effectiveness of Interventions in Reducing Burnout Among a Mixture of Various HCPs

Among a mixture of HCPs, mindfulness-based interventions (n = 8) and multifaceted interventions incorporating mindfulness (n = 4) provided low-certainty evidence on some burnout outcomes, and 3 studies of alternative interventions provided very-low-certainty evidence (n = 3) (**Table**). **Figure 3** shows the meta-analysis (by intervention type) of SMDs for interventions among a mixture of various HCPs (full plots in **Supplement Figure 9**). There was low certainty that mindfulness-based interventions may result in a small-to-moderate reduction in EE (SMD, −0.40 [CI, −0.65 to −0.16]; I^2 = 60.7%) and a small reduction in depersonalization (SMD, −0.36 [CI, −0.58 to −0.14]; I^2 = 43.0%), and moderate certainty that mindfulness-based interventions probably result in moderate improvement in PA (SMD, 0.48 [CI, 0.29 to 0.67]; I^2 = 17.0%). There was low certainty that multifaceted interventions incorporating mindfulness may result in a moderate reduction in EE (−0.45 [−0.68 to −0.23]; I^2 = 48.9%) (**Table**). Supplementary random-effects meta-analysis of unstandardized MDs showed similar associations (**Supplement Figure 10**).

Discussion

This meta-analysis evaluated the efficacy of different intervention types aiming to reduce burnout (vs. no active intervention) within different professional roles. First, we found differential efficacy of interventions for different roles: there was cumulative evidence of low certainty that mindfulness–meditation-based interventions may result in a large reduction in EE among nurses and midwives and may result in a small-to-moderate reduction in EE among a mixture of various HCP samples, but not among physicians, whereas there was low certainty that professional coaching may result in a small reduction in EE among physicians. Most of these studies of mindfulness-based and professional coaching interventions were longer than 4 weeks, highlighting the need for adequate allocation of resources for broader implementation. Although there may be interest in peer-support or debriefing groups, most other interventions had very-low-certainty evidence due to high risk of bias, substantial heterogeneity, and imprecision in the pooled estimates.

The core component of burnout is EE. Our finding that mindfulness-based interventions may reduce EE among nurses and midwives and a mixture of HCPs,

but not physicians, extends previous meta-analyses (16) by stratifying by role. Our observations regarding the benefit of professional coaching among physicians are consistent with a previous meta-analysis (121), although certainty was low and the benefit of professional coaching to other roles remains uncertain (98–101, 103, 104). To understand whether these reductions are clinically meaningful, our estimated unstandardized effect of mindfulness–meditation-based interventions on nurses and midwives and a mixture of HCPs found a reduction in MBI-EE scores (scale, 0 to 48) by 9.33 units and by 4.84 units, respectively, albeit with high heterogeneity. For physicians, professional coaching reduced MBI-EE scores by 3.66 units. Previous studies have shown that a 1-unit increase in MBI-EE is associated with an at least 5% increased risk for self-perceived major medical errors among physicians (122) and surgeons (123).

Regarding depersonalization (negative and cynical attitudes about one's clients/patients/colleagues), mindfulness-based programs may reduce depersonalization among a mixture of various HCP samples, and our finding that professional coaching was significantly associated with reduced depersonalization among physicians is consistent with a previous meta-analysis (121). Both mindfulness and professional coaching can help improve self-awareness and awareness of one's work surroundings thus helping to regulate emotional reactivity, leading to reduced EE and reduced cynicism toward one's work (124, 125). The moderate grade of evidence for the impact of professional coaching on depersonalization among physicians will also be reassuring for policymakers.

A sense of achievement and competence in one's work defines PA. Although there was cumulative evidence of moderate-certainty that mindfulness–meditation-based interventions improved PA for a mixture of HCPs, evidence was of very low certainty among nurses and midwives. For nurses and midwives, the cumulative evidence suggests that job-role training may have small incremental, albeit statistically insignificant, improvement in PA. This observation was unsurprising given that job-role training would likely improve HCPs' perceived work ability and professional confidence.

Burnout is less often measured as a single concept, with 1 meta-analysis including single-concept burnout measures by the ProQOL, although it did not stratify by intervention types (126). Likewise, we could not draw substantial conclusions for most roles and interventions due to the few studies measuring this outcome. However, our sensitivity analysis suggested that multifaceted interventions may be associated with a reduction in burnout among nurses and midwives.

This study has strengths and limitations. The key strength is the large number of studies and participants, which allowed us to explore the effectiveness of different types of interventions among different professional roles. Despite this, there are a few limitations.

First, there was statistically significant heterogeneity within most intervention-type subgroups even when stratified by role, and this heterogeneity remained when limiting to consistent burnout measurements. We speculate that heterogeneity may be explained by variations in delivery duration and intensity (longer duration may be associated with a larger effect in meta-regression analysis; **Supplement Tables 5** and **6**), as well as method within each intervention type, and potentially within each target role (for example, those in intensive care units may differ to those in other settings). Drawing on this, as a caveat, most mindfulness-based and professional coaching interventions were between 4 and 12 weeks, so it is difficult to determine the extent that the efficacy of these interventions is driven by their content or by their duration. Furthermore, one may also consider whether baseline burnout levels may influence the magnitude of the effect (increased burnout levels in the intervention group at baseline were associated with a greater magnitude of effect on MBI-EE scores in meta-regression analyses (**Supplement Table 6**). Given the substantial heterogeneity, further research should focus on the most effective design and delivery method of different interventions for specific roles, and whether there might be differences among genders and cultural backgrounds within roles.

Second, almost all studies were high risk of bias, primarily driven by unblinded interventions with subjective outcomes. In all but 2 studies (110, 118), the designs were inherently open label, so that estimates of intervention effects on burnout may be impacted by participants' awareness of the allocated intervention. The direction of any resulting bias is unclear and depends on participants' attitudes toward their allocated intervention. Moreover, it is difficult to determine whether any effect is due to the intervention itself or, if applicable, to breaks from work to attend the intervention. Furthermore, interventions may have the counterproductive effect of increased work burden as the intervention may be an additional task in addition to normal work and other duties.

Finally, despite including cluster RCT designs in our criteria, all studies in this meta-analysis focused on individual-level interventions and do not account for organizational-level strategies and factors that drive burnout (3, 127). Indeed, most support for the value of organizational-level strategies in mitigating burnout is provided by observational studies (128–130), and few studies have evaluated organizational-level interventions in experimental designs.

In conclusion, this comprehensive study of the literature—based on the RCT evidence only—suggests mindfulness-based interventions may be effective to reduce EE for nurses and midwives and a mixture of HCPs, but not for physicians, whereas professional coaching may reduce emotional exhaustion and probably reduces depersonalization among physicians. The interventions in these studies were implemented

for at least 4 weeks. Studies in this review focused on individual-level interventions, and policymakers must not neglect the organizational-level drivers of burnout. These findings will be valuable to policymakers developing support strategies, especially given the health care shortages and high rates of burnout, particularly among primary care physicians and nurses around the world.

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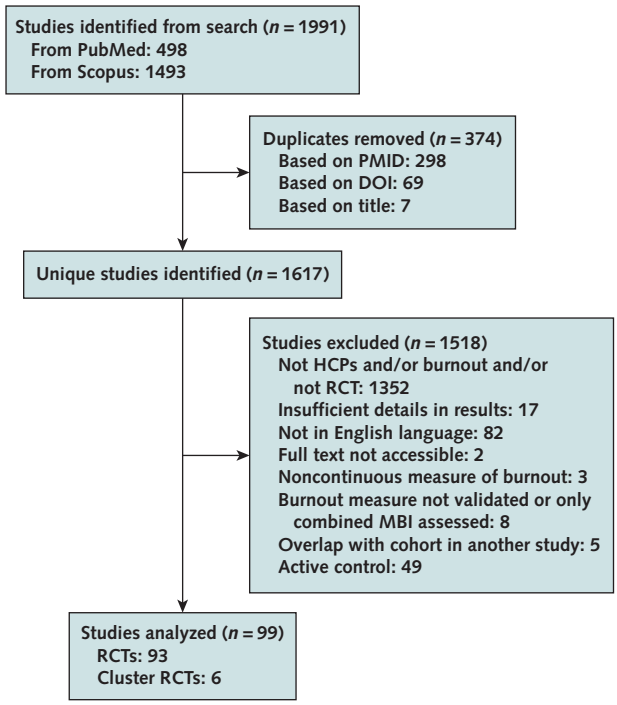
Appendix Figure. Evidence search and selection.



Flow chart of study selection for meta-analysis. DOI = digital object identifier; HCP = health care professional; MBI = Maslach Burnout Inventory; PMID = PubMed identifier; RCT = randomized controlled trial.