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REVIEW

# Systematic review update of organisational-level mental health promotion interventions: evidence from healthcare, construction, and telework-based mobile work settings

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## Abstract

**Objective** This systematic review evaluates the effectiveness of organisational-level mental health promotion interventions in healthcare, construction, and Telework and ICT-based Mobile (TICTM) work, focusing on burnout, depression, anxiety, stress, and overall mental well-being.

**Methods** Following PRISMA 2020 guidelines and registered with PROSPERO (CRD42024541652), we searched PubMed Medline, Scopus, Web of Science, and EBSCOHost Medline. Studies were included if they assessed organisational-level interventions targeting mental health outcomes, used quantitative methods with control groups, and applied validated measurement tools. Eligible publications were those appearing between 10 July 2021 and 30 June 2024 for healthcare and 17 May 2022 and 30 June 2024 for construction, reflecting the cut-off dates of our previous reviews, and between 1 January 2014 and 30 June 2024 for TICTM. Included studies were appraised for quality using the Quality Assessment Tool for Quantitative Studies (QATQS), and findings were synthesised using a narrative synthesis approach.

**Results** Six controlled trials (four randomised, two non-randomised) met the inclusion criteria. The four healthcare-sector studies each reported significant improvements in at least one primary mental health outcome-burnout, depression, or stress. The construction-sector study found a short-term reduction in stress at 12 months, but this was not sustained at 24 months. The single TICTM study reported improvements in positive affect, a component of psychological well-being.

**Conclusion** This update confirmed our previous findings, showing that evidence on organisational-level interventions remains strongest in healthcare, where most studies reported improvements in at least one mental health outcome, while studies in construction and TICTM settings remain scarce. Only one study each was found for the construction sector and the TICTM setting, confirming the lack of organisational-level interventions for better mental health in sectors and settings other than healthcare. Due to this limited evidence base, no general trends can be identified. Nevertheless, the few studies suggest that organisational-level mental health promotion interventions have the potential to improve mental health outcomes in diverse settings when appropriately adapted to sector-specific conditions.

**Keywords** Burnout prevention · Construction sector · Mental health promotion · Organisational interventions · Telework and ICT-based mobile work (TICTM) · Workplace well-being

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## Introduction

Workplace mental health profoundly affects individual well-being, productivity and economic outcomes, with conditions such as burnout, depression, anxiety and stress driving sickness absence and long-term disability (Burton 2010; Joyce et al. 2016). Integrated, organisational-level mental health interventions, addressing both structural and individual factors, demonstrate a promising approach in improving employee mental health across diverse sectors (LaMontagne et al. 2014, 2019).

In this review, we focus on organisational-level mental health promotion interventions, defined as strategies delivered within workplace settings that aim to enhance employees' well-being or prevent the onset of mental health problems by modifying aspects of the psychosocial work environment (e.g., workload, leadership, organisational culture). For consistency, this terminology is used throughout the manuscript.

Under the EU Horizon-funded Mental Health Promotion and Intervention in Occupational Settings project (MENTUPP), our consortium conducted two similar sector-specific systematic reviews, one in healthcare workers (Aust et al. 2024) and one in construction workers (Greiner et al. 2022), to map existing organisational-level mental health interventions. These two reviews found that interventions involving concrete changes to work tasks and environments show the clearest mental health benefits, but they also revealed persistent gaps in long-term outcomes and in trials conducted in smaller organisations and other under-studied settings. This systematic review builds on prior work from the MENTUPP project and has been updated under the EU-funded PROSPERH initiative to reflect the latest evidence on sector-specific interventions.

While the MENTUPP reviews in healthcare (Aust et al. 2024) and construction (Greiner et al. 2022) provided a valuable synthesis of organisational-level mental health promotion interventions, we aimed to investigate the results from newer studies to capture the impact of recent developments. The COVID-19 pandemic accelerated organisational restructuring, digitalisation of workplaces, and adoption of telework, creating new psychosocial risks and intervention needs in healthcare, construction, and TICTM setting. Therefore, an updated synthesis was needed to integrate knowledge from studies that were conducted in this new context. Building on that foundation, the current update aims to synthesise the most recent evidence on organisational-level mental health promotion interventions across healthcare, construction, and TICTM sectors.

## Methods

The protocol for this systematic review was registered with the International Prospective Register of Systematic Reviews (PROSPERO 2024 CRD42024541652, available at: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42024541652 (Giovanis et al. 2024). The systematic review was conducted in accordance with PRISMA 2020 guidelines (Page et al. 2021).

### Search strategy

The search was conducted on the 20th of May 2024 and updated on June 30, 2024, using four bibliographic databases: PubMed Medline, Scopus, EBSCOhost Medline, and Web of Science. The search included studies published in English, and the search strategies are illustrated in Appendix A. Previously (Aust et al. 2024), we conducted a systematic review of the healthcare sector, with the literature search covering publications from 1 January 2010 to 9 July 2021. Similarly, for the construction sector, the literature search covered 1 January 2010 to 16 May 2022 (Greiner et al. 2022). Thus, we excluded studies published before these dates. Regarding the TICTM settings, the search included all published literature from the past ten years (1 January 2014). More specifically:

- For the healthcare sector searches, were performed between 10th of July 2021 and 30th of June 2024
- For the construction sector, searches were performed between 17th of May 2022 and 30th of June 2024
- For TCICM, searches were performed between 1st of January 2014 and 30th of June 2024

The reason we searched for intervention studies conducted during the last ten years for TICTM is that we aimed to focus on intervention efforts in the modern working environment and match the time frames of the previous reviews conducted in healthcare and construction. The search strategy was created using an iterative method, employing the Population, Intervention, Comparison, and Outcome (PICO) framework. The search strategy consisted of free text and controlled vocabulary terms to identify personnel in the healthcare sector, including healthcare professionals, physicians, nurses, dentists, and other medical staff. Common terms in the construction sector encompass several professions, such as carpenter, electrician, builder, painter, and mason, among others. In the TICTM settings, we incorporated search terms, such as remote workers and teleworkers (for more details see in Appendix A Supplementary A).

The outcomes we focused on were depression, anxiety, burnout, perceived job stress, and mental well-being. These

were consolidated using Boolean operators in collaboration with the subject librarian. The search method was reviewed according to the PRESS criteria (McGowan et al. 2016) by a subject librarian from the collaborating author's institution (EG), who was independent and separate from the original reviewer. During the full-text review stage, we performed both backward and forward citation chaining of all publications to identify any further studies that may have fulfilled the search criteria but were not previously detected in the search results.

## Inclusion and exclusion criteria

The inclusion criteria were the same as in our previous reviews. Studies were eligible if they focused exclusively on organisational-level interventions, used validated measurement tools, and included quantitative designs with control groups and pre/post assessments. Eligible designs included randomised controlled trials (RCTs), cluster RCTs (cRCTs), and non-randomised controlled trials. Studies using uncontrolled before-and-after or quasi-experimental designs without a control group were excluded. Moreover, studies lacking a clear intervention description were omitted unless additional information was available from earlier publications (e.g., protocols). The complete inclusion and exclusion criteria are presented in Table 1. The primary outcomes were identical to those defined in the previous reviews: depression, anxiety, burnout, perceived job stress, and overall mental well-being. Some newly included studies reported additional indicators related to well-being, such as positive affect and fatigue, which were extracted and narratively synthesised under the broader concept of psychological well-being, consistent with our review's scope.

## Study identification

Two researchers conducted the search in the respective databases (EG and OO). Results were exported into Covidence, a software application designed to streamline the process of selecting studies for systematic reviews. Duplicates were deleted using the Covidence duplicate detection function, also checked manually and confirmed by two reviewers (EG and OO). Two reviewers (EG and OO) conducted a blinded examination of the titles and abstracts of 50% of the randomly selected records to determine their eligibility for inclusion and the remaining 50% were screened by two additional reviewers (JCS and BA). The agreement among the reviewers reached a high level of 96.1%. Any disputes that arose were successfully handled through discussion, with the contribution of a fifth reviewer (CL). Then, two reviewers (EG and OO) conducted the full-text review and two other reviewers (JCS and BA) checked and approved the final extracted studies. Any disputes were handled through discussion, with the contribution of a fifth reviewer (CL).

## Data extraction

The data extraction process for the articles, following a thorough assessment of the full text, involved the following steps: (1) author's name and the year of publication; (2) country where the study took place; (3) type of study design; (4) number of participants and their characteristics, such as their employment type; (5) number of treated and control participants and their characteristics, both at baseline and at follow-up (after the intervention); (6) detailed information about the intervention; (7) total number of sessions and their duration; (8) type of control condition (e.g., waitlist, usual care, or active comparator); (9) follow-up length; (10) primary outcomes; (11) instruments used to measure these outcomes; (12) mean and standard deviation and other statistics of the relevant outcomes analysed for all study groups at each assessment period; (13) number and size of organisation(s).

## Quality appraisal

The quality of each study was evaluated using the Quality Assessment Tool for Quantitative Studies (QATQS) scale (National Collaborating Centre for Methods and Tools, 2008). This scale analyses six areas: (1) selection bias, (2) study design, (3) confounders, (4) blinding, (5) data collection methods, and (6) withdrawals and dropouts. The results were evaluated and scored using a scale ranging from 1 to 3, with 1 indicating a strong methodology, 2 indicating a methodologically moderate study, and 3 indicating a weak methodology. Each study was then assigned an overall rating as "strong" if it had no weak components, "moderate" if it had one weak component, and "weak" if it had two or more weak components.

The quality of all studies was blindly assessed using the QATQS by two independent reviewers (OO and EG). The quality appraisal is presented in Appendix B. Inter-rater agreement was high, exceeding 90% across domains before consensus discussion. Discrepancies were resolved through discussion until full agreement was achieved. Studies rated as strong were considered to provide robust evidence, while moderate and weak ratings were interpreted with caution, particularly when assessing the consistency of effects across sectors.

**Table 1** Inclusion and exclusion criteria

| Criteria | Description | Inclusion | Exclusion |
|---|---|---|---|
| Population | Healthcare sector, construction industry and TICTM settings | 1. Employed or sub-contract workers<br>2. Full-time or part-time workers<br>3. Workers in companies of all sizes<br>4. Workers in the healthcare sector involved in the direct delivery of healthcare activities and/or their management. Occupations include, but are not limited to, nurses, physicians, doctors, dentists, physiotherapists, eldercare workers and care assistants<br>5. Workers and managers in the construction industry according to the NACE classification: construction of buildings, civil engineering and specialised construction activities<br>6. Workers in Telework and ICT-Based Mobile (TICTM) sector according to the NACE classification. Occupations include, but are not limited to, managers, technicians and associated professionals, such as computer programming, consultancy and related services (e.g., statisticians, economists, financial consultants, data analysts), telecommunications, and information service activities, call center employees) | 1. Mainly non-working populations (unemployed, retired, long-term sick leave)<br>2. Populations not working in healthcare, TICTM and construction sectors<br>3. Apprentices or workers in training<br>4. Patients and clinical populations with mental health disorders |
| Intervention | Organisational level mental health promotion intervention | Organisational-level mental health promotion intervention aimed at improving workers' mental wellbeing or preventing workers from the onset of mental health symptoms or disorders at the level of the organisation by changing aspects of the psychosocial work environment (e.g., organisational policies, stress management, leadership style, workplace culture, working conditions) or interventions can involve building mental health knowledge and awareness conducted in the context of employees work or programmes to train managers to initiate workplace changes for the promotion of mental health Health knowledge and awareness building in the organisation or programmes to train managers to initiate workplace changes for the promotion of mental health | 1. Health promotion not primarily targeted at mental health but at physical health (e.g., pain, MSDs)<br>2. Mental health interventions not formally implemented in the workplace (e.g., signposting work-related<br>3. Individual-level interventions solely aimed at changing employees' individual coping skills or behaviour (e.g., mindfulness, stress resilience) and not embedded into the organisation<br>4. Interventions that solely target mental health disorders or treatment and referral<br>5. Interventions that solely target return-to-work after absenteeism due to mental health difficulties<br>6. Evaluations focussing exclusively on the economic effects of mental health interventions (e.g., Cost–Benefit analyses) |
| Comparison | Control group pre- and post-intervention | All experimental study designs with a comparison group, including RCTs, cRCTs, controlled before-and after-designs and controlled quasi-experimental designs | 1. Uncontrolled pre- and post-interventions<br>2. Observational study designs and study designs with a single measurement<br>3. Studies using solely qualitative methods |
| Outcomes | Burnout, depression and anxiety symptoms, perceived job stress, and mental wellbeing | Burnout, depression and anxiety symptoms, perceived job stress, and mental wellbeing measured by validated scales | Clinical mental health outcomes, such as severe depression and anxiety, diagnosed mental health disorder as suicide and suicidal ideation |

## Results

### Included studies and study characteristics

The systematic review of organisational-level mental health promotion interventions delivered in workplace settings followed a comprehensive study selection process as outlined in Fig. 1. Initially, 11,236 studies were identified from various databases: Scopus (3337), PubMed Medline (2939), Web of Science (1922), and EBSCOHost Medline (3008). 17 additional records were identified through the citation chaining of records included in the full-text review. After removing 3567 duplicates identified by Covidence and 8 duplicates identified by the reviewers, 7648 studies were screened in the title and abstract stage. Out of these, 7,367 studies were excluded based on relevance and eligibility criteria. Consequently, 281 studies were sought for full-text

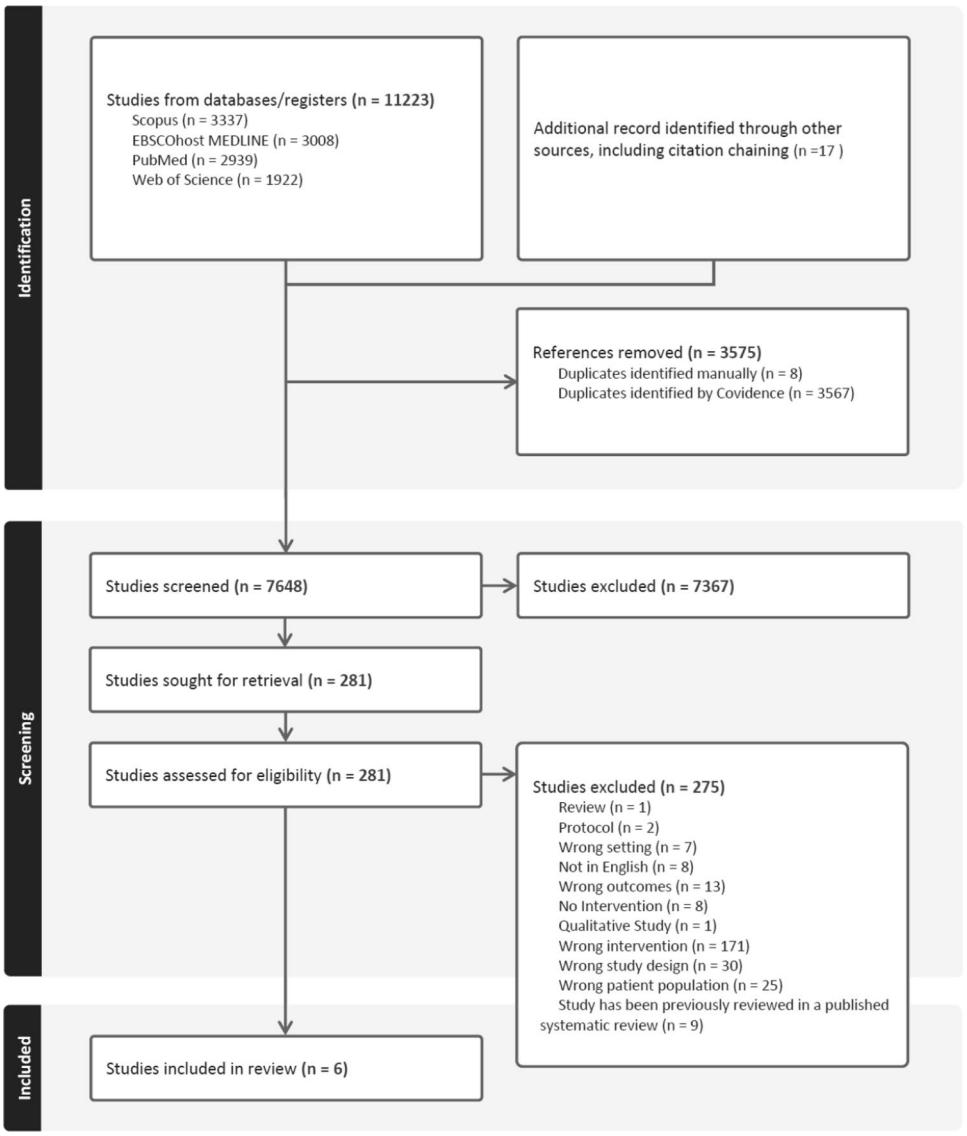


**Fig. 1** PRISMA flow diagram

retrieval and assessed for eligibility. During the eligibility assessment, 275 studies were excluded for various reasons, including Review (1), Protocols (2), Wrong setting (7), Not in English (8), Wrong outcomes (13), No intervention (8), Qualitative study (1), Wrong intervention (171), Wrong study design (30), Wrong population (25), Studies that had already been reviewed in one of our two previous systematic reviews (Greiner et al. 2022; Aust et al. 2024) were therefore excluded to avoid duplication (9). Ultimately, after applying all exclusion criteria, 6 studies met the inclusion criteria and were included in the systematic review. We identified four RCT's (Falk et al. 2022; Shan et al. 2024; Kiser et al. 2024; Wang et al. 2024) and two non-randomised controlled trials (Cedstrand et al. 2022; Micek et al. 2022).

The six included studies covered three sectors: four in healthcare, one in construction, and one in the TICTM setting. Most were conducted in high-income countries (United States and Sweden), with two studies from China, representing middle-income contexts. Notably, three studies (Falk et al. 2022; Kiser et al. 2024; Wang et al. 2024) explicitly referenced the COVID-19 pandemic, either by situating the intervention during remote or crisis conditions or by addressing its psychosocial consequences. Across studies, sample sizes ranged from fewer than 50 to over 300 participants, with follow-up durations varying from 4 weeks to 24 months.

Regarding the healthcare sector, the study by Kiser et al. (2024), implemented an RCT of peer-coaching for U.S. physicians, with 67 participants randomised to the intervention arm, of whom 52 received the coaching intervention, and 71 participants allocated to the control group. The second study is by Micek et al. (2022), a non- randomised trial of a remote-scribe support programme in US primary care with 37 scribe users and 68 as the control. The third study

by Shan et al. (2024) is an RCT of Balint group sessions among Chinese hospital nurses with 33 participants in the intervention and 40 in the control group. The fourth study added is by Wang et al. (2024), who implemented an RCT of Psychological First Aid training for Chinese frontline staff (n = 43 in the intervention/46 in the control group).

In the construction sector, we identified one study by Cedstrand et al. (2022) who conducted a non- randomised trial of a co-designed stress-reduction intervention among Swedish construction workers. The number of participants in the intervention group was 203, and in the control group, 124. In TICTM setting, we also identified one study: Falk et al. (2022) who conducted an RCT comparing sit–stand desks, online well-being modules, their combination, and control in US university staff. Although the Falk et al. (2022) study primarily measured affective outcomes (positive and negative affect) rather than clinical mental health indicators, it was included because it assessed psychological well-being in a TICTM (telework) setting consistent with the scope of organisational-level mental health promotion. The sample of the intervention arms was desk only (n = 24), programme only (n = 21), and desk + programme (n = 21) versus one control arm with (n = 23). Table 2 provides an overview of each study's country, design, sample sizes, intervention, and follow-up timing. Detailed demographics (group sizes, gender, age) appear in Supplement C1, and full intervention protocols (session counts, components, timing) are reported in Supplement C2.

## Study quality

The methodological quality of the six included studies was appraised using the Quality Assessment Tool for Quantitative Studies (QATQS) developed by the Effective Public Health Practice Project (EPHPP) (Thomas et al. 2004). This tool assesses six domains, which are selection bias, study design, confounders, blinding, data collection methods, and withdrawals/dropouts, each rated as strong, moderate, or weak according to standardised EPHPP criteria. The six domain ratings are synthesised into a global quality rating for each study (strong, moderate, or weak). Among the six studies, one was rated strong (Wang et al. 2024), three moderate (Falk et al. 2022; Kiser et al. 2024; Shan et al. 2024), and two weak (Cedstrand et al. 2022; Micek et al. 2022).

Overall, the quality of evidence ranged from weak to moderate, reflecting common methodological challenges in organisational-level intervention research. Study design emerged as a key differentiator, where randomised controlled trials (RCTs), such as those by Wang et al. (2024) and Kiser et al. (2024), scored higher for methodological rigour and transparent reporting, while the two non-randomised trials (Cedstrand et al. 2022; Micek et al. 2022) were downgraded

**Table 2** Study and sample characteristics

| Study | Country | Type of study/design | Sample size (N intervention/ N control) | Intervention |
|---|---|---|---|---|
| Health care | | | | |
| Kiser (2024) | USA | RCT | 67,52/71* | *Individualised peer coaching*: Six sessions over 3 months delivered by trained physician peer coaches to improve professional fulfilment and reduce burnout |
| Micek (2022) | USA | Non-randomized controlled trial | 37/68 | *Remote scribe support programme*: Trained scribes remotely documented clinical encounters in real time via audio connection to reduce Electronic Health Record (EHR) burden and improve physician well-being |
| Shan (2024) | China | RCT | 33/ 40 | *Balint group sessions*: Two lectures plus ten 1-h small-group reflective discussions designed to improve nurse–patient relationships and reduce burnout |
| Wang (2024) | China | RCT | 43/46 | *Culturally adapted psychological first aid (PFA) training*: "READ-Y" programme with self-care component, combining trauma recovery principles and culturally tailored techniques, delivered over 3 months |
| TICTM | | | | |
| Falk (2022) | USA | RCT | 24/21/21/23** | *Sedentary behaviour reduction programme*: Provision of height-adjustable desks, online weekly behavioural modules (goal setting, self-monitoring), or both combined, to reduce sitting time and improve well-being in remote workers (12 weeks) |
| Construction | | | | |
| Cedstrand et al. (2022) | Sweden | Non-randomized controlled trial | 203/124 | *Co-created occupational health intervention*: Duties clarification and structured roundmaking workshops co-designed with managers and workers to improve role clarity, planning, and reduce stress; implemented over 24 months |

*Randomised to intervention n = 67, receiving coaching intervention n = 52, control group = 71

**Three intervention arms (Desk only n = 24; Program only n = 21; Desk + Program n = 21) vs one control arm (n = 23)

for selection bias and lack of random allocation, increasing the likelihood of confounding. Blinding represented the weakest domain across studies. As participants and facilitators could not be blinded to group allocation, an inherent limitation in behavioural and organisational research, all studies scored moderate or weak on this criterion.

In contrast, data collection methods were consistently rated strong, as all studies employed validated and reliable psychometric instruments. Handling of withdrawals and drop-outs was inconsistent. Falk et al. (2022) and Wang et al. (2024) provided complete reporting and low attrition (strong), whereas others lacked sufficient detail (moderate). In summary, although methodological quality varied, the overall evidence base can be considered moderate, with the highest rigour observed in RCTs employing validated tools and transparent reporting procedures.

### Study outcomes

Tables 3, 4 summarises each trial's primary-outcome effect estimates (MD, OR, or *d* with 95% CIs and *p*-values) and follow-up timing. Across all sectors, outcomes included burnout, depression, anxiety, perceived stress, and overall well-being. In the healthcare sector, all four studies assessed at least one primary outcome. Kiser et al. (2024); n = 67/71; 6 months) demonstrated significant reductions in overall burnout (−0.79; $p = 0.001$) and in the burnout subscale interpersonal disengagement (−0.94; $p = 0.001$), a component of the Stanford Professional Fulfilment Index (PFI) that captures emotional detachment from work and colleagues. As secondary outcomes, the study also reported improvements in professional fulfilment (Δ = +0.59; $p = 0.046$) and work engagement (Δ = +0.33; $p = 0.04$). Micek et al. (2022; n = 37/68; 12 months) reported that remote-scribe support reduced burnout (OR = 0.15; $p = 0.02$) and lowered perceived EHR-related stress by 1.46 ($p = 0.01$). As secondary outcomes, the intervention improved ratings of supportive work environment (+1.55; $p = 0.02$) and Joyful Workplace scores (+2.83; $p = 0.01$). Shan et al. (2024; n = 33/40; 3 months) found no significant effects on the primary burnout dimensions of emotional exhaustion and depersonalisation but did observe an increase in the secondary outcome personal accomplishment (+9.7; $p = 0.003$). Wang et al. (2024; n = 43/46; 3 months) reported significant reductions in the primary outcomes: depression (F = 2.87; $p = 0.046$), and burnout (F = 3.73; $p = 0.018$) compared with psychoeducation, with no significant changes in anxiety or secondary traumatic stress.

In the TICTM setting, Falk et al. (2022; n ≈ 19–24/23; 4 weeks) did not assess any of the primary mental health outcomes but measured psychological well-being via affective indicators. The combined sit–stand desk and behavioural-prompt intervention improved positive affect (d = 1.11) and reduced fatigue (d = −0.65), while the desk-only and module-only arms showed smaller changes. However, the authors noted that the pilot design was not suitable for formal significance testing, and *p*-values were not reported. Consequently, this study was rated of moderate quality due to unreported statistical testing and potential bias (see Supplementary B, Table B2). In the construction sector, Cedstrand et al. (2022; n = 203/124; 12 & 24 months) found that a co-created organisational intervention limited the 12-month increase in stress (+1.4 vs +6.1; $p = 0.015$), but effects were not sustained at 24 months.

Across the six trials, considerable heterogeneity was observed in study design, outcome measures, and follow-up length, which precluded meta-analysis. Healthcare interventions, typically randomised and institution-based, showed consistent short-term reductions in burnout, stress, or depression, while the construction and TICTM trials demonstrated more limited or short-lived effects. Follow-up periods ranged from four weeks (Falk et al. 2022) to 24 months (Cedstrand et al. 2022), highlighting sectoral differences in implementation scope and sustainability. Detailed tabulated data and extended synthesis of these sectoral trends are provided in Supplementary Material C3.

## Discussion

This review updates and extends two MENTUPP systematic reviews that examined organisational-level interventions to promote mental health and well-being in the healthcare (Aust et al. 2024) and construction sectors (Greiner et al. 2022). In contrast to those earlier reviews, the present update incorporates studies published up to June 2024 and broadens the scope to include TICTM settings. The synthesis of six new controlled trials reinforces, refines, and contextualises previous conclusions, while also revealing enduring research gaps and sector-specific implementation challenges.

### Healthcare sector

Four newly identified studies were conducted in healthcare (Kiser et al. 2024; Micek et al. 2022; Shan et al. 2024; Wang et al. 2024). Consistent with the earlier MENTUPP healthcare review, burnout again emerged as the most studied and most consistently improved primary outcome. All studies identified improvements in at least one dimension of burnout, stress, or depression in the short term. This reinforces the evidence that approaches to the organisational level within healthcare- such as approaches that promote supportive supervision, peer reflection, and processes that continue workflow- influence and improve employee well-being.

**Table 3** Results of the effectiveness of health promotion interventions

| Study/Sector | Outcome/Measurement | Measure of effect (95%) | Intervention duration/Follow-up |
|---|---|---|---|
| Kiser et al. (2024)/Healthcare | Emotional exhaustion burnout And Depersonalization burnout/ Modified Maslach Burnout Inventory (mMBI)/ | *Absolute difference, intervention vs control (95% CI), points*<br>Emotional exhaustion: −0.09 (−0.60 to 0.42)<br>*P*-value = 0.73<br>Depersonalization: −0.4 (−0.9 to 0.2)<br>*P*-value = 0.18 | 3 months/Immediate |
| | Burnout/Work exhaustion and interpersonal disengagement subscales of the Stanford Professional Fulfillment Index (PFI) | Work exhaustion: −0.52 (−1.19 to 0.15)<br>*P*-value = 0.13<br>Interpersonal disengagement: −0.94 (−1.48 to −0.41) *P*-value = 0.001 | |
| | Overall Burnout score/Stanford Professional Fulfillment Index (PFI) calculated by combining the scores from two subscales: Work Exhaustion (WE) and Interpersonal Disengagement (ID) | Overall burnout: −0.79 (−1.27 to −0.32)<br>*P*-value = 0.001 | |
| Micek et al. (2022)/Healthcare | Burnout/Mini-Z: Burnout (Single-item, dichotomized)/ Likert variable | Unadjusted OR (95% CI) OR = 0.15 (0.03, 0.71) *p*-value = 0.02, *p*-value(Benjamini-Hochberg) = 0.048<br>Adjusted OR (95% CI) OR = 0.15 (0.03, 0.70) *p*-value = 0.02, *p*-value(Benjamini-Hochberg) = 0.02 | 1 year/1 year |
| | Mini-Z: Joyful Workplace/Likert variable-sum of scores Higher scores indicate a more joyful workplace | Unadjusted- Δ (95% CI) 2.83 (0.60, 5.06) *p*-value = 0.01, *p*-value(Benjamini-Hochberg) = 0.048<br>Adjusted- Δ (95% CI) β = 3.05 (0.96, 5.13) *p*-value = 0.005, *p*-value(Benjamini-Hochberg) = 0.02 | |
| | Mini-Z: Supportive Work Environment Subscale/Likert variable-sum of scores. Higher scores indicate a more supportive workplace | Unadjusted- Δ (95% CI) 1.43 (0.16, 2.70) *p*-value = 0.03, *p*-value(Benjamini-Hochberg) = 0.048<br>Adjusted- Δ (95% CI) β = 1.55 (0.30, 2.80) *p*-value = 0.02, *p*-value(Benjamini-Hochberg) = 0.02 | |
| | Work Pace and Stress/Mini-Z: Work Pace and EHR Stress/ Likert variable-sum of scores. Higher scores indicate less stress related to work pace and EHR | Unadjusted- Δ (95% CI) 1.33 (0.12, 2.54) *p*-value = 0.03, *p*-value(Benjamini-Hochberg) = 0.048<br>Adjusted- Δ (95% CI) β = 1.46 (0.29, 2.62) *p*-value = 0.01, *p*-value(Benjamini-Hochberg) = 0.02 | |
| | Professional Fulfillment/Professional Fulfillment Index (PFI)/6 items, each answered on a 5-point Likert scale Higher scores indicate greater professional fulfillment | Unadjusted- Δ (95% CI) 0.45 (−1.11, 2.02) *p*-value = 0.56, *p*-value(Benjamini-Hochberg) = 0.68<br>Adjusted- Δ (95% CI) β = 0.94 (- 0.61, 2.48) *p*-value = 0.23, *p*-value(Benjamini-Hochberg) = 0.28 | |
| | Burnout/PFI/10 items that measure work exhaustion and interpersonal disengagement, also rated on a 5-point Likert scale. Total score is the sum, higher scores imply higher burnout levels | Unadjusted- Δ (95% CI) −0.46 (−3.46, 2.55) *p*-value = 0.76, *p*-value(Benjamini-Hochberg) = 0.76<br>Adjusted- Δ (95% CI) β = −0.28 (−3.25, 2.69) *p*-value = 0.85, *p*-value(Benjamini-Hochberg) = 0.85 | |

**Table 4** Results of the effectiveness of mental health promotion interventions

| Study/Sector | Outcome/Measurement | Measure of effect (95%) | Intervention Duration/Follow-up Measurement Points |
|---|---|---|---|
| Shan et al. (2024)/Healthcare | Burnout/Maslach Burnout Inventory-Emotional Exhaustion (MBI-EE)/feelings of being emotionally overextended and exhausted | 0.49 (−1.53, 2.51) Cohen's d = 0.002 F-statistic = 0.110, *p*-value = 0.740 | 3 months/Immediate |
| | Impersonal and detached response towards patients/Maslach Burnout Inventory- Depersonalization (MBI-DP) | −1.87 (−3.22, 0.51) Cohen's d = 0.011 F-statistic = 0.757, *p*-value = 0.387 | |
| | Competence and successful achievement in one's work with people/Maslach Burnout Inventory- Personal Achievement (MBI-PA) | 9.70 (8.28, 11.12) Cohen's d = 0.119 F-statistic = 9.598, *p*-value = 0.003 | |
| | Self-Efficacy/General Self-Efficacy Scale (GSES) | −0.05 (−0.15, 0.04) Cohen's d = 0.010 F-statistic = 0.709, *p*-value = 0.403 | |
| Wang et al. (2024)/Healthcare | Depression, Anxiety and Stress/21-Item Depression, Anxiety, and Stress Scale (DASS-21) | *Depression*: F-stat = 2.874, *p*-value = 0.046 *Anxiety*: F-stat = 1.453, *p*-value = 0.235 *Stress*: F-stat = 1.995, *p*-value = 0.123 | 3 months/2 weeks, 2 and 3 months |
| | Burnout and Secondary traumatic stress (STS)/Professional Quality of Life (ProQOL) | *Burnout*: F-stat = 3.729, *p*-value = 0.018 *STS*: F-stat = 2.282, *p*-value = 0.080 | |
| Falk et al. (2022)/TICTM | Mood- Positive and Negative Affect Schedule (PANAS)/ Positive Affect reflects the extent to which a person feels enthusiastic, active, and alert<br>Negative Affect reflects a general dimension of subjective distress and unpleasurable engagement | *Cohen's d*<br>*Positive Effect*<br>Desk Only: 0.135 Program Only: *0.566* Desk + Program*: 1.106 Negative Effect*<br>Desk Only: 0.434 Program Only: −0.124 Desk + Program: −0.266 | 12 weeks/Immediate |
| | Stress/Perceived Stress Scale (PSS) | *Cohen's d*<br>Desk Only: 0.156 Program Only: −0.177 Desk + Program: −0.147 | |
| | Fatigue Duration- Measures how long the respondent has felt fatigued/Fatigue Symptom Inventory (FSI) | *Cohen's d*<br>Desk Only: 0.134 Program Only: 0.182 Desk + Program: *−0.533* | |
| | Fatigue Interference-Assesses the extent to which fatigue interferes with daily activities/Fatigue Symptom Inventory (FSI) | *Cohen's d*<br>Desk Only: −0.076 Program Only: −0.484 Desk + Program: *− 0.688* | |
| | Fatigue Severity-Measures the intensity of the fatigue experienced by the respondent/Fatigue Symptom Inventory (FSI) | *Cohen's d*<br>Desk Only: 0.228 Program Only: *0.577* Desk + Program: −0.191 | |
| Cedstrand et al. (2022)/Construction | Stress/Copenhagen Psychosocial Questionnaire (COPSOQ) | *12 Months*: β = −7.04, CI = −12.7–(− 1.37) *p*-value = 0.015<br>*24 Months*: β = −4.17, CI = −0.290–8.6 *p*-value = 0.067 | 24 months/12 months after baseline and immediately after the intervention (24 months) |

Notably, each of the new studies contributes evidence for specific types of interventions we identified previously. Micek et al. (2022) provide further evidence for job and task modification, finding that remote-scribe support can both alleviate workload-related stress and increase perception of support. Kiser et al. (2024) and Shan et al. (2024) support evidence for relational and team dynamic interventions by illustrating that peer-coaching and Balint groups can reduce elements of burnout associated with interpersonal strain, even though emotional exhaustion and depersonalisation were not consistently improved. Wang et al. (2024) emphasised expanding the scope of approaches by utilising training and capacity building interventions (Psychological First Aid) that decreased depression and stress at short-term follow-up.

**Table 5** Types of interventions and the level of evidence for each type

| Intervention type | Description | Number of studies | Level of evidence |
|---|---|---|---|
| Job and task modifications | Interventions implementing enhanced work processes resulting from organisational, administrative, technical changes or increased professional competence | *MENTUPP*: 6 studies-*Healthcare* (White and Winstanley 2010; Redhead et al. 2011; Deneckere et al. 2013; Linzer et al. 2015; Gregory et al. 2018; Saffari et al. 2021)<br>1 study-*Construction* (Guimaraes et al. 2013)<br>Current review (*PROSPERH*):<br>1 study-*Healthcare* (Micek et al. 2022) | Strong |
| Flexible work and scheduling changes | Interventions focusing on working time, enabling employees to change assigned work schedules or providing better opportunities to rest between shifts | *MENTUPP*: 2 studies-*Healthcare* (Ali et al. 2011; Garland et al. 2012) | Moderate |
| Changes in the physical work environment | Interventions aiming to improve mental health via physical environment changes (e.g., improved rest areas, calmer environment) | *MENTUPP*: 3 studies-*Healthcare* (Cordoza et al. 2018; Emani et al. 2020; van Woerkom 2021)<br>Current review (*PROSPERH*):<br>1 study-*TICTM* (Falk et al. 2022) | Moderate |
| Participatory and enabling workplace change interventions | Interventions developed jointly with employees and supervisors to improve psychosocial work environment following needs assessment | *MENTUPP*:<br>6 studies-*Healthcare* (Bourbonnais et al. 2011; Uchiyama et al. 2013; West et al. 2014; Stansfeld et al. 2015; Havermans et al. 2018; Kossek et al. 2019)<br>3 studies-*Construction* (Oude Hengel et al. 2012, 2013; Anger, 2018)<br>Current review (*PROSPERH*):<br>1 study-*Healthcare* (Wang et al. 2024)<br>1 study-*Construction* (Cedstrand et al. 2022) | Insufficient (mixed results) |
| Relational and team dynamics interventions | Interventions that aim to improve social relations and team climate through team building or relational support activities | *MENTUPP*:<br>3 studies; 4 articles-*Healthcare* (Leiter 2011, 2012; Olson et al. 2016; Jakobsen et al. 2017)<br>2 studies-*Construction* (Elo et al. 2013; Anger 2018)<br>Current review (*PROSPERH*):<br>2 studies-*Healthcare* (Shan et al. 2023; Kiser et al. 2024) | Insufficient (mixed results) |
| Improvement of employees' mental health through changes in the way (patient) work is done | Interventions modifying patient care processes with indirect benefits for employees' mental health | *MENTUPP*:<br>2 studies-*Healthcare* (Tran et al. 2010; Barcons et al. 2019) | Insufficient (no effects) |

1. Intervention categories and descriptions adapted from Aust et al. (2024)

2. Evidence levels are based on synthesis from Aust et al. (2024) and Greiner et al. (2022), updated with new trials identified in this review (PROSPERH). Consistency, number, and quality of studies were considered in classification

Overall, these findings reinforce the findings by Aust et al. (2024) that the healthcare sector benefits most when multifaceted organisational strategies target both psychosocial and structural conditions. However, those effects are relatively short-lived, thus reinforcing the need for ongoing organisational commitment and follow-up processes to facilitate sustained improvements (Table 5).

## Construction sector

The construction study newly included in the review by Cedstrand et al. (2022) similarly finds that positive effects on stress were short-term and not sustained, replicating findings from the earlier review (Greiner et al. 2022). In particular, both studies discuss structural barriers, such as subcontracting, high workforce turnover, and limited management capacity that inhibit the sustainability and scalability of organisational interventions in construction. The trial by Cedstrand et al. (2022) introduced valuable process data demonstrating sufficient implementation fidelity and good participant engagement, indicating that barriers to efficacy were not related to programme delivery but instead to organisational systems or structures. Therefore, although construction is an intrinsically high-risk sector, evidence suggests that even well-designed implementation interventions will struggle to achieve sustained benefits in psychosocial conditions without broader industry-level changes.

## TICTM sector

Previous MENTUPP scoping in the ICT domain identified very limited eligible organisational-level evidence; similarly, this update found only one TICTM trial (Falk et al. 2022). The scarcity of research confirms that organisational-level

mental health interventions remain rare in remote and hybrid work settings. The study by Falk et al. (2022) focuses on sedentary behaviour, but it demonstrates that environmental and behavioural changes can result in short-term enhancements to positive affect and work satisfaction, though the study does not provide evidence for broader outcomes of mental health. The limited evidence base calls for systematic investigation of organisational approaches tailored to digital and flexible workplaces, including leadership involvement and mechanisms for social support that may offset isolation and blurred work-life boundaries.

### Cross-sector comparison

Cross-sector comparison indicates that healthcare interventions demonstrate stronger evidence of effectiveness than those in the construction or TICTM sectors. This difference likely reflects differences in implementation and sectoral contexts, and follow-up duration. Of the six newly included trials, four were conducted in healthcare: peer-coaching for physicians (Kiser et al. 2024), Balint-group sessions among head nurses (Shan et al. 2024), a psychological first aid training programme for frontline staff (Wang et al. 2024), and a remote-scribe support programme in primary care (Micek et al. 2022), all of which reported short-term benefits in burnout, stress, depression, or professional fulfilment within 3–12 months. These findings suggest that structured organisational frameworks, managerial engagement, and the integration of psychosocial risk prevention into occupational health mechanisms support the stronger and more consistent effects observed in healthcare (LaMontagne et al. 2014; Joyce et al. 2016; Greiner et al. 2022; Aust et al. 2024).

In contrast, the study by Cedstrand et al. (2022) found no sustained effects on stress or psychosocial outcomes at 24 months, even though implementation efforts were reported and participant engagement appeared satisfactory. The four-week TICTM pilot RCT (Falk et al. 2022) found short-term improvements in positive affect, fatigue, and work performance, affective and performance-related outcomes rather than primary mental health indicators, and it lacked long-term evaluation. These limited effects are consistent with the barriers identified in the MENTUPP qualitative synthesis, where organisational readiness, leadership support, and resource constraints were found to influence the implementation and sustainability of workplace mental health interventions (Paterson et al. 2024). These findings are in line with previous reviews indicating that healthcare work environments benefit from structured organisational frameworks, managerial support, and integration of psychosocial risk prevention into official occupational health mechanisms (LaMontagne et al. 2014; Joyce et al. 2016; Greiner et al. 2022; Aust et al. 2024).

### Overall interpretation

This systematic review update, by situating the six new trials within the broader evidence base established by the MENTUPP reviews, strengthens confidence in the effectiveness of multifaceted organisational strategies, while confirming that their sustainability remains limited. The findings highlight that sector-specific adaptation, ensuring interventions are embedded in supportive organisational systems, is key to achieving lasting improvements in mental health and well-being at work.

## Implications

This update identified six new controlled trials evaluating organisational-level interventions across healthcare, construction, and TICTM settings. Most interventions demonstrated positive effects on at least one psychological or well-being outcomes, such as reduced burnout, improved resilience, or enhanced positive affect, particularly in healthcare contexts (Kiser et al. 2024; Shan et al. 2024; Wang et al. 2024; Micek et al. 2022). However, evidence from the construction (Cedstrand et al. 2022) and TICTM (Falk et al. 2022) sectors was more limited, with no sustained or consistent improvements in mental health indicators. These findings suggest that organisational-level approaches may improve certain aspects of employee well-being under specific conditions, but the current evidence remains too heterogeneous to conclude that they consistently reduce stress, depression, or burnout across all sectors. However, the observed short-term gains often wane without ongoing organisational support. Employers should therefore incorporate structured follow-up mechanisms, such as booster sessions, mentorship, and regular evaluation, to help sustain positive effects over time and reinforce the long-term impact of workplace mental health initiatives.

This pattern is consistent with prior reviews (LaMontagne et al. 2014; Greiner et al. 2022; Aust et al. 2024) and suggests that barriers such as limited organisational support, insufficient leadership engagement, and declining employee adherence may hinder long-term impact. Recent evidence also highlights that successful implementation depends on organisational readiness, management commitment, and supportive workplace culture (Paterson et al. 2024). However, the limited evidence available does not yet explain why organisational-level interventions often fail to achieve or sustain expected effects. Future research should therefore focus on identifying the organisational preconditions

necessary to develop and maintain healthy psychosocial working environments. The forthcoming implementation review protocol by Leduc et al. (2025) represents an important step in addressing this gap by examining how contextual and organisational factors influence intervention uptake and effectiveness.

### Strengths and limitations

The systematic review demonstrates various strengths. It follows PRISMA 2020 guidelines and is registered with PROSPERO, ensuring adherence to high methodological standards. The inclusion of both randomised controlled trials (RCTs) and non-randomised controlled trials allowed assessment of a broader range of organisational-level intervention studies, which often cannot be conducted as randomised controlled trials. Updating our previous reviews allowed us to assess the current situation and assess new developments. Unfortunately, and somewhat surprisingly, the previously identified lack of studies in sectors and settings other than healthcare was confirmed calling for further research activities in these areas. However, various limitations should be acknowledged. Most studies were conducted in high-income countries, which may limit the applicability of the findings to lower- or middle-income settings with different workplace structures and cultural contexts. Moreover, this systematic review does not include a meta-analysis. However, since our interest was to evaluate the effectiveness of all types of organisational interventions, the identified studies were too heterogeneous for such an approach.

The decision not to conduct a meta-analysis was driven by substantial heterogeneity across the included studies. Specifically, interventions varied widely in type (e.g., peer coaching, Balint groups, environmental modifications, remote scribes), duration (ranging from 4 weeks to 24 months), and study design (four randomised and two non-randomised controlled trials). Moreover, outcome measures differed across studies, encompassing burnout, stress, depression, well-being, and positive affect, assessed with diverse instruments. These variations limited the feasibility of statistical pooling and justified the use of a narrative synthesis approach to ensure accurate representation of each intervention's context and results.

Moreover, the inclusion of only six new controlled trials reflects the current scarcity of organisational-level mental health promotion studies published since the MENTUPP reviews. Although this limited number highlights a persistent research gap rather than a narrow search strategy, it nonetheless constrains the generalisability of the findings. The small evidence base means that conclusions regarding sector-wide effectiveness was not possible except for healthcare.

## Conclusion

This update to our previous reviews identified only six new trials. The predominance of organisational-level workplace intervention studies conducted in healthcare was confirmed, as four of the six new studies were conducted in healthcare, while only one study each could be identified for construction and the TICTM setting. Also, the higher rate of improvements for mental health improvements in studies conducted in healthcare was confirmed, while the number of studies in the other sectors and settings is too low to detect any generalisable trends. Nevertheless, the few studies show that multifaceted organisational-level mental health promotion interventions have the potential to improve employee well-being across diverse sectors, provided they are adapted to the specific organisational context and workforce needs.

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**Data availability** This systematic review is based on articles previously

published in scientific journals, and the data are drawn from the studies listed in the tables within the manuscript. The search can be replicated by using the search strings provided in Supplementary Material A. The inclusion and exclusion criteria are presented in Table 1. The references of the identified articles are provided in the article, along with a detailed summary of the quality appraisal Supplementary Material B. A more detailed presentation of the sample, intervention characteristics, and findings is available in Supplementary Material C.

## Declarations

**Conflict of interest** The authors declare no conflict of interest.

**Ethical approval and consent to participate** Not applicable.



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