Effectiveness of participatory ergonomic interventions: a systematic review
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CRD summary
This review of the effectiveness of workplace-based participatory ergonomic interventions in improving health outcomes concluded that there was limited evidence that participatory ergonomic interventions reduced musculoskeletal symptoms, injury rates and sickness absence. The conclusions should not be considered reliable due to considerable limitations with the primary data and reporting of the analysis.

Authors' objectives
To synthesise the evidence on the effectiveness of workplace-based participatory ergonomic interventions in improving health outcomes.

Searching
MEDLINE, EMBASE, CINAHL, OHSE CCinfo (Canadian Centre for Occupational Health and Safety Database), Safety Science and Risk and Ergonomic Abstracts databases were searched. Only peer reviewed English-language journal articles were considered. Conference proceedings were not searched. An example search strategy was reported. In addition, references of selected articles were searched manually.

Study selection
Eligible studies were those that evaluated the impact of a participatory ergonomic intervention on at least one of the following health outcomes: pain/discomfort; musculoskeletal symptoms; injury rates; accident rates; absenteeism; sick leave or work function/limitation. The population of interest was any working population. Study design was not specified. The included studies comprised a variety of study designs (randomised trials, pre-post comparisons and time series) across diverse population groups. The studies were conducted in different countries (Australia, Finland, USA and Norway) and focused on different risk factors and differing levels of health outcome measurements across a variety of workplaces.

Two reviewers screened studies for relevance. Disagreements were resolved by consensus or by referral to a third reviewer.

Assessment of study quality
Validity assessment was carried out using a specially developed 16-item instrument based on previous quality assessment scales. A total of 11 items were designated as critically important for judging internal validity. Based on these 11 criteria, studies were divided into four categories: very high (met 100% of criteria); high (75 to 99% of criteria); medium (45 to 74% of criteria); and low quality (0 to 44% of criteria). Any study rated as low quality was excluded from the review.

The authors stated that each study was quality-assessed independently by rotating pairs of reviewers who then met to discuss any disagreements. Where agreement could not be reached a third reviewer was consulted.

Data extraction
Data on health outcomes (injury rates, accidents, first aid rates), musculoskeletal pain or symptoms, absenteeism, sick leave, work function and other outcomes were extracted by pairs of reviewers using a standardised form. Odds ratios, rate ratios, effect sizes, means and proportions were calculated where possible for each primary study.

Methods of synthesis
A narrative synthesis was carried out presenting various descriptive summaries of the participatory ergonomic intervention processes, changes in risk factors and impact on health outcomes as a result of the participatory ergonomic interventions. Studies were grouped by health outcome measure: symptoms of musculoskeletal pain or discomfort;
injury records; lost-time claims, sick leave and lost workdays as a result of musculoskeletal disorders. Effect sizes were not synthesised due to the small number of studies that reported sufficient details to calculate this outcome.

**Results of the review**
A total of 10 studies were included in this review (no overall n was reported, but the range was from 18 to approximately 7,421): seven pre-post non-randomised studies (three without control groups); one non-randomised time series; and two randomised studies. The two randomised controlled trials (RCTs) rated as very high and high in terms of quality; the remaining eight studies were scored as medium quality.

Musculoskeletal Symptoms (five study arms): Four studies reported a reduction in musculoskeletal symptoms following participatory ergonomic intervention. The two RCTs reported conflicting results, with one finding a small but significant benefit and the other finding no benefit. The RCT that reported benefit did not find any significant differences in pain at 10-month follow-up.

Injury Records or Claims (six study arms): All six studies reported reductions in this outcome after participatory ergonomic intervention. The scale of the reduction in injury rates varied across studies.

Sick leave/lost workdays (two study arms): Both studies reported a reduction in absenteeism or sick leave following participatory ergonomic interventions.

**Authors' conclusions**
There was limited evidence that participatory ergonomic interventions had a positive effect on musculoskeletal symptoms, injury rates and sickness absence.

**CRD commentary**
This review addressed a broad question, but the inclusion criteria did not adequately support this and the lack of clarity in terms of population and study design contributed to a very heterogeneous group of included studies. Appropriate databases were searched, but language and publication bias may have affected this review. The review methodology was adequately reported. Steps were taken to reduce reviewer error and bias. Although a quality assessment was carried out as part of the screening process, the quality of the studies included in the final stages remained unclear and the narrative synthesis did not distinguish between study types. Most studies did not report any follow-up data, therefore, it was unclear if any benefits would be long term. The synthesis itself grouped studies only by outcomes and did not consider the wide range of study populations, which may have been inappropriate. The authors acknowledged that the analysis was limited by the inability to calculate effect sizes. The conclusions of this review should not be considered reliable.

**Implications of the review for practice and research**
**Implications for practice:** The authors stated that participatory ergonomic interventions should continue to be implemented in workplaces.

**Implications for research:** The authors stated that future research should incorporate concurrent comparison groups whenever possible and that randomisation of interventions should be considered.

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