

Occupational safety interventions directed at the group or organisational level are more effective in preventing accidents than individual-level measures



The review findings do not mean that safety training is not relevant, but rather that it is ineffective in the absence of other efforts.

What is the aim of this review?

The aim of this Campbell systematic review is to assess the effectiveness of broad classes of safety interventions in preventing accidents at work, and to examine which intervention components are most effective.

Occupational safety interventions directed at the group or organisational level are more effective at improving safety and behaviour and reducing accidents at work than interventions directed solely at the individual level.

Multifaceted measures are particularly effective when they include elimination, substitution or other engineering controls. Safety regulation and enforcement contribute to the prevention of accidents at work, but with lesser effect.

What is this review about?

Accidents at work are responsible for considerable morbidity and mortality, with an estimated 380,000+ fatalities a year worldwide. There are over 3,700 fatalities in the European Union annually, while reported non-fatal accidents at work amount to approximately 3.2 million cases annually.

The evidence base regarding what works in preventing accidents at work is limited, which inhibits informed decision-making by policy makers, occupational health and safety practitioners, business owners, managers and workers in selecting the most effective approaches to reduce accidents at work.

This systematic review fills this gap by focusing on the main types of occupational safety interventions directed at the individual, group or organisational level. This includes attitude, behaviour and physiological modifications, changes in structural conditions, such as legislation and engineering controls (such as barriers, or measures that remove hazardous conditions), and multifaceted approaches combining two or more safety interventions.

What studies are included?

This review includes studies that evaluate the effectiveness of interventions to improve safety and reduce accidents at work. A total of 100 studies, containing 120 safety interventions were of sufficient methodological quality to be included in the analyses.

The studies use experimental, quasi-experimental or observational study designs, with about one-third being of high quality, one-fourth of moderate quality, and the remaining being low-quality studies.

What are the main findings of this review?

Strong evidence supports greater effects being achieved with safety interventions directed towards



How up-to-date is this review?

The review authors searched for studies up to July 2015.

What is the Campbell Collaboration?

Campbell is an international, voluntary, non-profit research network that publishes systematic reviews. We summarise and evaluate the quality of evidence about programmes in the social and behavioural sciences. Our aim is to help people make better choices and better policy decisions.

About this summary

This summary is based on Dyreborg, J., Lipscomb, H. J., Nielsen, K., Törner, M., Rasmussen, K., Frydendall, K. B., Bay, H., Gensby, U., Bengtsen, E., Guldenmund, F., & Kines, P. (2022). Safety interventions for the prevention of accidents at work: A systematic review. *Campbell Systematic Reviews*, 18, e1234. <https://doi.org/10.1002/cl2.1234>.

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the group or organisational level rather than at the individual level. Engineering controls, including elimination and substitution, are more effective at reducing accidents at work than other approaches, particularly when engineered changes are introduced independently of workplace practices and 'decision-to-use' by workers.

Multifaceted approaches combining intervention elements at the organisational level, or across levels, provide moderate to strong effects, particularly when engineering controls are included. The evidence supports safety regulation and enforcement, but with lower effect sizes.

Effects are modest for safety climate interventions, e.g. leadership safety communication. Intensive group discussions are effective approaches (at medium term follow-up). No effects are found for various physical training methods on reducing accidents at work. Behavioural approaches, such as general coaching and feedback or safety training, are less effective. This does not mean that safety training is not relevant, but rather it is ineffective in the absence of other efforts.

How have these interventions worked?

The relative effectiveness of workplace safety interventions is in accordance with the Public Health Hierarchy of Hazard Control, whereby interventions that are more effective in preventing accidents eliminate risks at the source of the hazard through engineering solutions or the separation of workers from hazards.

What do the findings of this review mean?

Occupational safety intervention efforts should foster safer working environments, machines, tools and working conditions rather than solely focusing on how workers can mitigate the risks. The latter approach should be a last resort, exercised only when other more effective measures are not feasible.

Even though effects are modest for legislation and enforcement, their population-based effects can potentially be quite large, as they are often applied to broad groups of workers.

For some types of safety interventions, the level of evidence is insufficient or limited: safety campaigns and training, behavioural-based safety interventions, interventions directed at changes in safety climate and administrative controls, and soft regulation such as audits and certification systems. Here further research should be encouraged.

There is a need for clarification as to how various types of safety intervention are classified. The review authors propose a classification of safety interventions, which they hope can be a starting point in more clearly defining safety interventions in future studies.