

## Appendix 6 – Overview of results

**Table 1: Overview of behavioural interventions to prevent diseases of the musculoskeletal system**

Intervention	Comparison	Number of studies; study design	Population/ Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Combined stretching and endurance training for the neck	No intervention	1 RCT	Office workers	Individual study	Neck pain	▲	High	Chen et al. 2018 [23]
Manual material handling advice	No intervention	7 RCTs	Varying professions	MA	Back pain	◀▶	Moderate	Verbeek et al. 2011 [33]
Exercise therapy	No intervention	9 RCTs, 2 SR	Computer users, office workers, computer screen workers	Narrative	A: Pain in work-related upper limb disorders B: Functional outcomes in work-related upper limb disorders	A: △ B: △	Moderate	Kelly et al. 2018 [27]
Group education	No intervention	2 RCTs	Office workers	MA	Neck pain	◀▶	Moderate	Chen et al. 2018 [23]
Whole-body light resistance exercise	No intervention	1 RCT	Office workers	Individual study	Neck pain	▲	Moderate	Chen et al. 2018 [23]
Myofeedback	No intervention	2 RCTs	Office workers	MA	Neck pain	◀▶	Moderate	Chen et al. 2018 [23]
Neck/shoulder strengthening exercise	1: No intervention 2: Physiotherapy	10 RCTs	A: Office workers in general B: Office workers symptomatic	MA	Neck pain	1A: ◀▶ 1B: ▲ 2B: ◀▶	Moderate	Chen et al. 2018 [23]
Qi Gong	No intervention	1 RCT	Office workers	Individual study	Neck pain	◀▶	Moderate	Chen et al. 2018 [23]
Extensive manual material handling training	One-time video training	3 cohort studies	Varying professions	MA	Back pain	◀▶	Moderate	Verbeek et al. 2011 [33]
General fitness exercise	No intervention	4 RCTs	A: Office workers in general B: Office workers symptomatic	MA	Neck pain	A: ◀▶ B: ▲	Low to Moderate	Chen et al. 2018 [23]

Intervention	Comparison	Number of studies; study design	Population/ Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Muscle Learning Therapy	n. a.	1 RCT	Call center workers, telemarketers, engineers, assembly workers	Narrative	Musculoskeletal disorders	◄►	Limited <sup>1</sup> to Moderate	Crawford et al. 2008 [29]
Training in workstation adjustment and posture	n. a.	2 RCTs	Call center workers, telemarketers, engineers, assembly workers	Individual studies	Musculoskeletal disorders	◄►	Limited <sup>1</sup> to Moderate	Crawford et al. 2008 [29]
Physical education	No intervention	2 RCTs	Office workers	Individual study	Pain severity	◄►	Low	Aas et al. 2011 [22]
Manual material handling advice and devices	Advice only or no intervention	1 RCT	Varying professions	Individual study	Back pain	◄►	Low	Verbeek et al. 2011 [33]
Manual material handling advice	Back belt use	2 cohort studies	Varying professions	MA	Back pain	◄►	Low	Verbeek et al. 2011 [33]
Education for mental health	No intervention	1 RCT	Office workers	MA	Pain prevalence	◄►	Low	Aas et al. 2011 [22]
Cognitive behavioural therapy	No intervention	1 RCT	Office workers	Individual study	Neck pain	◄►	Low	Chen et al. 2018 [23]
Workplace exercise programmes	Counselling or no intervention	5 RCTs	Varying professions (symptomatic and asymptomatic)	MA	Shoulder pain intensity	▲	Low	Lowry et al. 2017 [25]
Workplace exercise programmes	Workplace modifications	1 RCT	Varying professions	Individual study	Shoulder pain intensity	▲	Low	Lowry et al. 2017 [25]
Safe and no strenuous lifting	Usual practice	1 RCT	Office workers	Individual study	Shoulder symptoms	◄►	Low	Hoe et al. 2012 [30]
Manual material handling advice	Professional education	1 cohort study	Varying professions	MA	Back pain	◄►	Very low	Verbeek et al. 2011 [33]

Intervention	Comparison	Number of studies; study design	Population/ Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Ergonomic training	No intervention	2 RCTs	Office workers	MA	Neck/shoulder and wrist/hand symptoms, upper extremity symptoms	◀▶	Very low	Hoe et al. 2012 [30]
Neck/shoulder stretching exercise	No intervention	1 RCT	Office workers	Individual study	Neck pain	◀▶	Very low	Chen et al. 2018 [23]
Cognitive behavioural interventions	n. a.	1 RCT	Nurses	Individual study	Pain	▲	n. a.	Richardson et al. 2018 [26]
Patient handling training	n. a.	2 cohort studies with control group	Nurses	Individual studies	A: Back pain B: Physical discomfort	A: ◀▶ B: ▲	n. a.	Richardson et al. 2018 [26]

**Abbreviations:** MA = meta-analyses; n. a. = not available; RCTs = randomised controlled trials; SR = systematic review

**Explanations for column Result:** Effect direction: up arrow = positive health effects, down arrow = negative health effects, sideways arrows = mixed effects / contradictory results; statistical significance: black arrow:  $p < 0.05$ ; grey arrow:  $p > 0.05$ ; empty arrow: no statistical data reported

<sup>1</sup> Defined as: limited or contradictory evidence, produced by one scientific study or inconsistent findings in multiple scientific studies.

Table 2: Overview of relational interventions to prevent diseases of the musculoskeletal system

Intervention	Comparison	Number and study design	Population/ Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Ergonomic mouse	Conventional mouse	2 RCTs, 1 prospective parallel group design	Office workers	Individual studies	Upper extremity discomfort	◀▶	High	Goodman et al. 2012 [24]
Ergonomic keyboards	n. a.	1 quasi-experimental design, 1 RCT	Office workers	Individual studies	A: Phalen-test results B: Decrease of symptoms C: Endonitis and carpal tunnel syndrome D: Pain intensity	A: ▲ B: ▲ C: ◀▶ D: ▲	High	Goodman et al. 2012 [24]
Forearm supports	n. a.	1 RCT, 1 prospective parallel group design	Office workers	Individual studies	A: Neck/shoulder pain B: Short term hand/arm pain C: Long term hand/arm pain D: Risk rates for disorders in the left upper extremities	A: ▲ B: ◀▶ C: ▼ D: ▲	High	Goodman et al. 2012 [24]
Alternative mouse	Conventional mouse	2 RCTs	Office workers	MA	Incidence of neck/shoulder and right upper limb disorders	◀▶	Moderate	Hoe et al. 2012 [30]
Alternative mouse	Conventional mouse	2 RCTs	Office workers	MA	Neck pain	◀▶	Moderate	Chen et al. 2018 [23]
Alternative mouse with arm support	Conventional mouse with arm support	2 RCTs	Office workers	MA	A: Incidence of neck/shoulder and right upper limb disorders B: Neck/shoulder discomfort C: Right upper limb discomfort	A: ◀▶ B: ▲ C: ▲	A: Moderate B: Low C: Low	Hoe et al. 2012 [30]

Intervention	Comparison	Number and study design	Population/ Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Conventional mouse with arm support	Conventional mouse without arm support	2 RCTs	Office workers	MA	Incidence of neck/shoulder and right upper limb disorders	◀▶	Moderate	Hoe et al. 2012 [30]
Alternative mouse with arm support	Conventional mouse without arm support	2 RCTs	Office workers	MA	A: Neck/shoulder disorders B: Incidence of right upper limb disorders C: Upper body disorders (neck, shoulder, and upper extremity) D: Incidence of neck/shoulder and right upper limb disorders	A: ▲ B: ▲ C: ▲	A: Moderate B: Moderate C: Moderate	Hoe et al. 2012 [30]
Interventions targeting the work-rest cycle through supplementary pauses	Conventional pause schedule	4 RCTs	Varying professions	Narrativee	A: Intensity of musculoskeletal symptoms in general B: Musculoskeletal symptom intensity separately for the neck, back, shoulder/upper arm and forearm/wrist/hand	A: △ B: △	Moderate	Stock et al. 2018 [28]
A: Technical aids to prevent strenuous lifting B: Small aids	No intervention	1 RCT	Healthcare personnel	Individual study	1-week shoulder pain ratings	▲	Low	Hegewald et a. 2018 [32]
Workplace modifications	Advice, brochure or no intervention	5 RCTs	Varying professions (symptomatic and asymptomatic)	MA	Shoulder pain intensity	▲	Low	Lowry et al. 2017 [25]
Arm support	Conventional mouse	3 RCTs	Office workers	Narrativee	Neck pain	◀▶	Low	Chen et al. 2018 [23]

Intervention	Comparison	Number and study design	Population/ Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Alternative mouse with arm support	Conventional mouse without arm support	2 RCTs	Office workers	MA	Incidence of neck/shoulder and right upper limb disorders	▲	Low	Hoe et al. 2012 [30]
Feedback about computer workstation set-up & psychosocial aspects of work	Work as usual	1 RCT	Computer workers	Narrative	one-month prevalence of any musculoskeletal pain	◄►	Low	Stock et al. 2018 [28]
Lower monitor angle	High monitor angle	1 RCT	Office workers	Individual study	Neck pain	▲	Low	Chen et al. 2018 [23]
Interventions to reduce patient lifting in a hospital setting through safe lifting programs and equipment	Usual practice	1 RCT	Healthcare workers	Narrative	A: Frequency of work-related shoulder pain and of work-related low back pain B: Compensated musculoskeletal work injury rates and time loss injury rates	A: ◄► B: ◄►	Low	Stock et al. 2018 [28]
Supplementary breaks or reduced work hours	Conventional breaks and normal work hours	2 RCTs	Office workers	MA	Upper-extremity symptoms or pain, discomfort, work ability	◄►	Low	Hoe et al. 2012 [30]
Ergonomic adjustments (eg, keyboard, monitor, mouse)	No intervention	4 RCTs	A: Office workers in general B: Office workers symptomatic	MA	Neck pain	A: ◄► B: ▲	Low to very low	Chen et al. 2018 [23]
Technical patient handling equipment	No intervention	2 CBAs	Healthcare personnel	MA	Back pain at 1-year follow-up	▲	Very low	Hegewald et al. 2018 [32]
Supplementary work breaks	Conventional work breaks	3 RCTs	A: Office workers in general B: Office workers symptomatic	MA	Neck pain	A: ▲ B: ◄►	Very low	Chen et al. 2018 [23]

**Abbreviations:** CBA = controlled before-after studies; MA = meta-analyses; n. a. = not available; RCTs = randomised controlled trials

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Table 3: Overview of mixed interventions/programmes to prevent diseases of the musculoskeletal system

Intervention	Comparison	Number and study design	Population/ Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Education/ergonomics training, workplace modification	No intervention	1 quasi-experimental design	Office workers	Individual study	Work-related musculoskeletal disorders	▲	High	Goodman et al. 2012 [24]
Workplace interventions with several components (including exercise, workplace modifications, breaks)	No intervention	5 RCTs	Computer users	Individual studies <sup>1</sup>	Pain prevalence or pain severity, sick leave	◀▶	Low to Moderate	Aas et al. 2011 [22]
Participatory ergonomic interventions based on training groups of workers to analyze work, identify problems and propose solutions	Work as usual	4 RCTs, 1 non-RCT	Varying professions	Narrative	A: Three-month prevalence of neck pain and low-back pain B: Back pain intensity C: Number of days with any musculoskeletal pain D: Three-month prevalence of musculoskeletal sick leave	A: ◀▶ B: ◀▶ C: ◀▶ D: ◀▶	A: Very low B: Low C: Low D: Low	Stock et al. 2018 [28]
Provision of and education in patient handling with small aids	No intervention or usual practice	1 non-RCT	Nurses, nursing aids, teachers	Individual study	A: 1-month prevalence of low back pain B: 1-month prevalence of upper arm pain C: 1-year follow-up: 7-day prevalence of low back pain and shoulder pain	A: ▼ B: ▲ C: ▲	Very low to low	Freiberg et al. 2016 [31]
Small aids	Mechanical aids	1 RCT	Nurses, nursing aids, teachers	Individual study	1-year follow-up: 7-day prevalence of low back pain and shoulder pain	▲	Very low to low	Freiberg et al. 2016 [31]

Intervention	Comparison	Number and study design	Population/ Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Ergonomic training and equipment	No intervention	1 RCT	Office workers	Individual study	Frequency and intensity of neck, shoulder, or wrist/hand ache or pain	◀▶	Very low	Hoe et al. 2012 [30]
Provision of and education in patient handling with small aids	One-time ergonomic education	1 non-RCT	Nurses, nursing aids, teachers	Individual study	12-month prevalence of low back pain	◀▶	Very low	Freiberg et al. 2016 [31]
Technical patient handling equipment (i.e., nursing beds, low nursing home beds, bed movers, mobile lifts, wall lifts, overhead lifts, ceiling lifts, day care chairs, or mechanical position change aids); as a solitary measure or as part of a multimodal intervention	No intervention	A) 4 CBAs B) 1 CBA C) 2 CBAs	Gesundheitspersonal	A: MA B: Individual study C: Individual studies	A: Musculoskeletal injury claims B: Repeated musculoskeletal injuries (follow-up: 2 years) C: Cervical spine (neck) injuries	A: ▲ B: ▲ C: ◀▶	Very low	Hegewald et al. 2018 [32]
Multi-component interventions (e.g. training, guidelines for patient transfer, physical exercise, ergonomic interventions)	n. a.	2 cohort studies with control group, 1 RCT	Healthcare personnel	Individual study	A: Pain B: Sickness absence C: Accidents	A: ◀▶ B: ◀▶ C: ▲	n. a.	Richardson et al. 2018 [26]

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<sup>1</sup> Results of all five RCTs were described separately; one RCT had positive effects, all others showed no significant effects. Pooled results of two studies also show no effect.



**Table 4: Overview of behavioural interventions for the prevention of occupational injuries**

Intervention	Comparison	Number and study design	Population/ Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Active training (face-to-face instruction)	Passive training (folders or videos)	1 retrospective cohort study	Health or hospital staff	Individual study	Noncompliance with PPE use	◄►	Very low	Verbeek et al. 2016 [40]
Active training (face-to-face instruction)	Passive training (folders or videos)	1 retrospective cohort study	Health or hospital staff	Individual study	Noncompliance with doffing guidance	▲	Very low	Verbeek et al. 2016 [40]
Drug-free workplace programme	No intervention	1 ITS	Construction workers	Individual study	A: non-fatal injuries in the year following implementation B: non-fatal injuries in the years thereafter	A: ▲ B: ▲	Very low	van der Molen et al. 2018 [35]
Safety campaign	No intervention	1 ITS	Construction workers	Individual study	A: initial decrease in injuries at the company level B: sustained decrease in injuries at the company level C: initial decrease in injuries at the regional level D: sustained decrease in injuries at the regional level	A: ◄► B: ▲ C: ◄► D: ▼	Very low	van der Molen et al. 2018 [35]
Safety training interventions	No intervention	1 ITS, 1 CBA	Construction workers	Individual studies	A: non-fatal injuries, immediate effect B: non-fatal injuries, trend	A: ◄► B: ◄►	Very low	van der Molen et al. 2018 [35]
Educational interventions	No intervention	3 RCTs	Agricultural workers	MA	Injuries	◄►	n. a.	Rautiainen et al. 2008 [34]
Insurance premium discount program	No intervention	1 ITS	Agricultural workers	Individual study	A: Injuries, immediate effect B: Injuries, progressive effect	A: ▲ B: ◄►	n. a.	Rautiainen et al. 2008 [34]

**Abbreviations:** CBA = controlled before-after studies; ITS = interrupted time series; MA = meta-analyses; n. a. = not available; RCTs = randomised controlled trials

**Explanations for column Result:** Effect direction: up arrow = positive health effects, down arrow = negative health effects, sideways arrows = mixed effects / contradictory results; statistical significance: black arrow:  $p < 0.05$ ; grey arrow:  $p > 0.05$ ; empty arrow: no statistical data reported

Table 5: Overview of relational interventions for the prevention of occupational injuries

Intervention	Comparison	Number and study design	Population/ Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Blunt suture needles	Sharp suture needles	10 RCTs	Surgical staff	MA	Glove perforations per surgeon per operation	▲	High	Parantainen et al. 2011 [38]
Double gloves	Single gloves	8 RCTs	Healthcare personnel	MA	Dexterity: outer glove perforations – number of perforations	◀▶	Moderate	Mischke et al. 2014 [37]
Double gloves	Single gloves	12 RCTs	Healthcare personnel	MA	A: Inner glove perforations B: Blood stains on the skin	A: ▲ B: ▲	A: Moderate B: Moderate	Mischke et al. 2014 [37]
Double indicator gloves	Double standard gloves	2 RCTs	Healthcare personnel	MA	Inner glove perforations	◀▶	Moderate	Mischke et al. 2014 [37]
Triple special gloves	Double standard gloves	2 RCTs	Healthcare personnel	MA	Inner glove perforations	▲	Moderate	Mischke et al. 2014 [37]
Blunt suture needles	Sharp suture needles	4 RCTs	Surgical staff	MA	Self-reported needle stick injuries	▲	Moderate	Parantainen et al. 2011 [38]
Legislation - Interruption	No legislation	2 ITS	Healthcare personnel	MA	Percutaneous exposure injuries caused by needles: A: Change in level B: Change in slope	A: ▲ B: ▲	A: Moderate B: Very low	Reddy et al. 2017 [39]
Legislation - Gradual introduction	No legislation	1 ITS	Healthcare personnel	Individual study	Percutaneous exposure injuries caused by needles: A: Change in level B: Change in slope	A: ▲ B: ▲	A: Low B: Low	Reddy et al. 2017 [39]
Thicker gloves	Thinner gloves	2 RCTs	Healthcare personnel	MA	Inner glove perforations	◀▶	Low	Mischke et al. 2014 [37]
One fabric glove over one normal glove	Two normal gloves	3 RCTs	Healthcare personnel	MA	Inner glove perforations	▲	Low	Mischke et al. 2014 [37]
Double indicator gloves	Standard gloves (single or double)	2 RCTs	Healthcare personnel	MA	Inner glove perforations	▲	Low	Mischke et al. 2014 [37]
Triple gloves	Double gloves	1 RCT	Healthcare personnel	Individual study	Inner glove perforations	▲	Low	Mischke et al. 2014 [37]
Safe passive injection systems	Safe active injection systems	1 ITS	Healthcare personnel	Individual study	Needlestick injuries	◀▶	Low	Reddy et al. 2017 [39]
Safe active intravenous systems	Regular systems	4 RCTs	Healthcare personnel	MA	Incidences of blood contamination	▼	Low	Reddy et al. 2017 [39]

Safe active intravenous systems	Regular systems	1 RCT	Healthcare personnel	Individual study	Incidence of blood leakage	▲	Low	Reddy et al. 2017 [39]
Safe passive intravenous systems	Regular systems	2 RCTs	Healthcare personnel	MA	Incidences of blood contamination	◀▶	Low	Reddy et al. 2017 [39]
Double gloving method	Single gloving method	1 cross-over simulation study	Healthcare personnel	Individual study	A: Contamination B: Noncompliance with guidance	A: ▲ B: ▶	A: Very low B: Very low	Verbeek et al. 2016 [40]
Centers for Disease Control and Prevention recommended doffing	Individual doffing	1 RCT	Healthcare personnel	Individual study	Contamination	▲	Very low	Verbeek et al. 2016 [40]
European and national safety and health regulations and standards for construction sites	Not applicable	5 ITS	Construction workers	MA	A: Fatal injuries, change in level B: Fatal injuries, change in slope C: Non-fatal injuries, change in level D: Non-fatal injuries, change in slope	A: ▶▶ B: ▶▶ C: ▶▶ D: ▶▶	Very low	van der Molen et al. 2018 [35]
Gowns	Aprons	1 Randomised cross-over simulation study	Healthcare personnel	Individual study	Contamination	▲	Very low	Verbeek et al. 2016 [40]
Multiple safe devices	Not applicable	2 ITS	Healthcare personnel	MA	Percutaneous exposure injuries caused by needles	▶▶	Very low	Reddy et al. 2017 [39]
Multiple safe devices	Regular devices	1 CBA	Healthcare personnel	Individual study	Percutaneous exposure injuries caused by needles	▲	Very low	Reddy et al. 2017 [39]
PPE with Powered Air Purifying Respirator Attire	Enhanced respiratory and contact precautions attire	1 RCT	Healthcare personnel	Individual study	A: Any contamination B: Noncompliance with donning guidance C: Noncompliance with doffing guidance	A: ▲ B: ▼ C: ▶▶	A: Very low B: Very low C: Very low	Verbeek et al. 2016 [40]
Safe blood collection systems	Regular systems	1 RCT	Healthcare personnel	Individual study	A: Needlestick injuries immediate follow up B: Blood splashes	A: ▶▶ B: ▶▶	A: Very low B: Very low	Reddy et al. 2017 [39]

Safe blood collection systems	Not applicable	2 ITS	Healthcare personnel	Individual studies	Number of reported sharps injuries: A: Change in level B: Change in slope	A: ▲ B: ◀▶	A, B: Very low	Reddy et al. 2017 [39]
Safe injection systems	Regular systems	1 RCT, 1 CBA	Healthcare personnel	Individual studies	Needlestick injuries	▲	Very low	Reddy et al. 2017 [39]
Safe intravenous systems	Regular systems	1 RCT, 1 CBA	Healthcare personnel	Individual studies	Needlestick injuries	◀▶	Very low	Reddy et al. 2017 [39]
Safe intravenous systems	Regular systems	2 ITS	Healthcare personnel	Individual studies	Number of reported sharps injuries: A: Change in level B: Change in slope	A: ▼ B: ◀▶	A, B: Very low	Reddy et al. 2017 [39]
Sharps containers	Not applicable	2 ITS	Healthcare personnel	Individual studies	Number of reported sharps injuries	◀▶	Very low	Reddy et al. 2017 [39]
Sharps containers	No containers	1 CBA	Healthcare personnel	Individual study	Number of reported sharps injuries	▲	Very low	Reddy et al. 2017 [39]
Safety inspections and sanctions for violations	No intervention	1 ITS	Construction workers	Individual study	A: Non-fatal injuries, change in level B: Non-fatal injuries, change in slope	A: ◀▶ B: ◀▶	Very low	van der Molen et al. 2018 [35]
Subsidy for scaffolding	No intervention	1 CBA	Construction workers	Individual study	Injuries	A: ◀▶	Very low	van der Molen et al. 2018 [35]
Mandatory random and for-cause alcohol testing programme	Not applicable	2 ITS	Occupational drivers	Narrative	A: Level of injuries, immediate effect B: Level of injuries, long-term trend	A: ▲ B: ◀▶	Limited <sup>1</sup>	Cashman et al. 2009 [36]
Mandatory random drug testing programme	Not applicable	2 ITS	Occupational drivers	Narrative	A: Level of injuries, immediate effect B: Level of injuries, long-term trend	A: ▼ B: ▲	Limited <sup>1</sup>	Cashman et al. 2009 [36]
PPE made of more breathable material	Regular PPE	1 exposure simulation study	Healthcare personnel	Individual study	A: Contamination	A: ◀▶	A: Very low	Verbeek et al. 2016 [40]
Double gloves	Single gloves	2 RCTs	Healthcare personnel	MA	Needlestick injuries	▲	n. a.	Mischke et al. 2014 [37]

Legislation on rollover protective structures or Safety Cabins on new tractors	Not applicable	1 ITS	Agricultural workers	MA	Fatal injuries: A: immediate effect B: progressive effect	A: ◀▶ B: ▲	n. a.	Rautiainen et al. 2008 [34]
Legislation on rollover protective structures or Safety Cabins on all tractors	Not applicable	1 ITS	Agricultural workers	MA	Fatal injuries: A: immediate effect B: progressive effect	A: ◀▶ B: ▼	n. a.	Rautiainen et al. 2008 [34]
Legislation banning Endosulfan pesticide	Not applicable	1 ITS	Agricultural workers	Individual study	Injuries: A: immediate effect B: progressive effect	A: ▼ B: ▲	n. a.	Rautiainen et al. 2008 [34]

**Abbreviations:** CBA = controlled before-after studies; ITS = interrupted time series; MA = meta-analyses; n. a. = not available; RCTs = randomised controlled trials

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<sup>1</sup> Defined as: Limited evidence - one low quality RCT or one CBA study or one ITS

**Table 6: Overview of mixed interventions/programmes for the prevention of occupational injuries**

Intervention	Comparison	Number and study design	Population/ Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Occupational health and safety services	n. a.	1 CBA	Construction workers	Individual study	Injuries	◀▶	n. a.	van der Molen et al. 2018 [35]

**Abbreviations:** CBA = controlled before-after studies; n. a. = not available

**Explanations for column Result:** Effect direction: up arrow = positive health effects, down arrow = negative health effects, sideways arrows = mixed effects / contradictory results; statistical significance: black arrow:  $p < 0.05$ ; grey arrow:  $p > 0.05$ ; empty arrow: no statistical data reported

**Table 7: Overview of behavioural interventions to prevent skin and lung diseases**

Intervention	Comparison	Number and study design	Population/Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Educational intervention	No intervention	1 RCT, 4 CBA	Farm and construction workers	Partially narrative, partially MA	Self-reported respiratory protective equipment use	◀▶	Very low	Luong Thanh et al. 2016 [42]
Skin protection education	No intervention	3 Cluster-RCTs	Varying professions	MA	Signs of occupational irritant hand dermatitis	◀▶	Very low	Bauer et al. 2018 [43]
Conventional training with additions (biosimulated vision training, program active or passive teaching, computer-simulated training)	Conventional training (lectures, books)	1 Cluster-RCT 2 RCTs	Health workers, adults (not specified)	Narrative	Correct use of respiratory protective equipment	◀▶	Very low	Luong Thanh et al. 2016 [42]
Trainings based on motivating interviews	Conventional lectures	1 CBA	Production line workers	Narrative	Use of respiratory protective equipment	▲	Very low	Luong Thanh et al. 2016 [42]
Training for the correct use of respiratory masks or personal protective equipment	No training	1 CBA	Hospital workers	Narrative	Proportion of correctly used respirators	◀▶	Very low	Luong Thanh et al. 2016 [42]
Training for behavioural change: interventions intended to affect worker's behavioural compliance (by affecting actions that workers take to comply with health and safety precautions)	n. a.	5 RCTs, 3 CBA, 1 multiple baseline study	Varying professions	Narrative	Exposure to occupational health hazards	▲	n. a.	Lunt et al. 2011 [41]

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**Table 8: Overview of relational interventions to prevent skin and lung diseases**

Intervention	Comparison	Number and study design	Population/ Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Barrier creams	No intervention	4 RCTs, 1 Cluster-RCT	Varying professions	MA	Signs of occupational irritant hand dermatitis	◄►	Low	Bauer et al. 2018 [43]
Barrier cream plus moisturizers	No intervention	3 RCTs, 1 Cluster-RCT	Varying professions	MA	Signs of occupational irritant hand dermatitis	◄►	Low	Bauer et al. 2018 [43]
Moisturizers	No intervention	3 RCTs, 1 Cluster-RCT	Varying professions	MA	Signs of occupational irritant hand dermatitis	◄►	Low	Bauer et al. 2018 [43]

**Abbreviations:** CBA = controlled before-after studies; MA = meta-analyses; RCTs = randomised controlled trials

**Explanations for column Result:** Effect direction: up arrow = positive health effects, down arrow = negative health effects, sideways arrows = mixed effects / contradictory results; statistical significance: black arrow:  $p < 0.05$ ; grey arrow:  $p > 0.05$ ; empty arrow: no statistical data reported

**Table 9: Overview of behavioural interventions to prevent work-related hearing loss**

Intervention	Comparison	Number and study design	Population/ Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Earplugs with instruction	Earplugs without instruction	2 RCTs	Varying professions	MA	Attenuation of noise	▲	Moderate	Tikka et al. 2017 [44]

**Abbreviations:** MA = meta-analyses; RCTs = randomised controlled trials

**Explanations for column Result:** Effect direction: up arrow = positive health effects, down arrow = negative health effects, sideways arrows = mixed effects / contradictory results; statistical significance: black arrow:  $p < 0.05$ ; grey arrow:  $p > 0.05$ ; empty arrow: no statistical data reported

**Table 10: Overview of relational interventions to prevent work-related hearing loss**

Intervention	Comparison	Number and study design	Population/Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Exposure information	Training as usual	1 RCT	Construction workers	Individual study	Mean noise level	◄►	Low	Tikka et al. 2017 [44]
Use of hearing protection <sup>1</sup>	n. a.	1 RCT, 3 CBA	n. a.	n. a.	Noise exposure	▲	Low	Tikka et al. 2017 [44]

New stricter legislation	Not applicable	1 ITS	Coal mines	Individual study	Median personal noise exposure A: Immediate effect B: Long-term trend	A: ▲ B: ▲	Very low	Tikka et al. 2017 [44]
Earmuffs	Earplug	2 CBA	Workers with noise exposition above 88–94 dB(A)	MA	Hearing loss	◀▶	Very low	Tikka et al. 2017 [44]

**Abbreviations:** CBA = controlled before-after studies; ITS = interrupted time series; MA = meta-analyses; n. a. = not available; RCTs = randomised controlled trials

**Explanations for column Result:** Effect direction: up arrow = positive health effects, down arrow = negative health effects, sideways arrows = mixed effects / contradictory results; statistical significance: black arrow:  $p < 0.05$ ; grey arrow:  $p > 0.05$ ; empty arrow: no statistical data reported

<sup>1</sup>Total result on hearing protection devices only mentioned in Abstract, no further information given in review

**Table 11: Overview of mixed interventions/programmes to prevent work-related hearing loss**

Intervention	Comparison	Number and study design	Population/Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Hearing loss prevention programme	Audiometric testing	1 RCT	Agricultural students involved in farm work	Individual study	Hearing loss average	◀▶	Moderate	Tikka et al. 2017 [44]
Well-implemented hearing loss prevention programme	Less well-implemented HLPP for hearing loss	4 CBA	Varying professions	MA	Hearing loss STS	▲	Very low	Tikka et al. 2017 [44]
Hearing loss prevention programme	Non-exposed workers	3 CBA	Varying professions	MA	Hearing loss average	▼	Very low	Tikka et al. 2017 [44]
Hearing loss prevention programme with exposure information	Hearing loss prevention programme without exposure information	1 CBA	Various workers of an aluminium smelter	Individual study	Hearing loss average	▲	Very low	Tikka et al. 2017 [44]

**Abbreviations:** CBA = controlled before-after studies; MA = meta-analyses; RCTs = randomised controlled trials; STS: standard threshold shift,



**Explanations for column Result:** Effect direction: up arrow = positive health effects, down arrow = negative health effects, sideways arrows = mixed effects / contradictory results; statistical significance: black arrow:  $p < 0.05$ ; grey arrow:  $p > 0.05$ ; empty arrow: no statistical data reported

**Table 12: Overview of general behavioural occupational health and safety interventions**

Intervention	Comparison	Number and study design	Population/Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Occupational safety and health inspections	No inspections	1 RCT, 2 CBA, 1 ITS	Motor carrier drivers in ITS; various industries in other studies	Individual studies	Fatal and non-fatal injuries A: Short- and medium-term ( $\emptyset$ 21 and 24 months) B: Long-term ( $\emptyset$ 36 and 48 months)	A: ◀▶ B: ▲	Low	Mischke et al. 2013 [45]
Occupational safety and health inspections	No inspections	1 RCT	Varying professions	Individual study	Physical workload	◀▶	Low	Mischke et al. 2013 [45]

**Abbreviations:** CBA = controlled before-after studies; ITS = interrupted time series; MA = meta-analyses; n. a. = not available; RCTs = randomised controlled trials

**Explanations for column Result:** Effect direction: up arrow = positive health effects, down arrow = negative health effects, sideways arrows = mixed effects / contradictory results; statistical significance: black arrow:  $p < 0.05$ ; grey arrow:  $p > 0.05$ ; empty arrow: no statistical data reported

**Table 13: Overview of general mixed occupational health and safety interventions/programmes**

Intervention	Comparison	Number and study design	Population/Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
Workplace interventions	Usual care	8 RCTs	Varying professions, after sickness absence	MA	Cumulative duration of sickness absence A: Total B: Persons with musculoskeletal disorders	A: ▲ B: ▲ C: ◀▶	High	van Vilsteren et al. 2015 [46]

Intervention	Comparison	Number and study design	Population/Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
					C: Persons with mental health problems			
Workplace interventions	Usual care	5 RCTs	Varying professions, after sickness absence	MA	Pain	▲	High	van Vilsteren et al. 2015 [46]
Workplace interventions	Usual care	5 RCTs	Varying professions, after sickness absence	MA	Time until first return-to-work	▲	Moderate	van Vilsteren et al. 2015 [46]
Workplace interventions	Usual care	1 RCT	Varying professions, after sickness absence	Individual study	Risk of recurrences of sick leave	▼	Moderate	van Vilsteren et al. 2015 [46]
Workplace interventions	Usual care	6 RCTs	Varying professions, after sickness absence	MA	Functional status (Roland disability questionnaire)	▲	Moderate	van Vilsteren et al. 2015 [46]
Workplace interventions	Usual care	6 RCTs	Varying professions, after sickness absence	MA	Time until lasting return-to-work A: Total B: Persons with musculoskeletal disorders C: Persons with mental health problems D: Persons with cancer	A: ◀▶ B: ▲ C: ◀▶ D: ◀▶	Very low	van Vilsteren et al. 2015 [46]
Workplace interventions	Usual care	4 RCTs	Varying professions, after sickness absence	MA	Depression	◀▶	Very low	van Vilsteren et

Intervention	Comparison	Number and study design	Population/Setting	Method of data synthesis	Outcome	Result	Quality of evidence	Author and year
								al. 2015 [46]

**Abbreviations:** MA = meta-analyses; RCTs = randomised controlled trials

**Explanations for column Result:** Effect direction: up arrow = positive health effects, down arrow = negative health effects, sideways arrows = mixed effects / contradictory results; statistical significance: black arrow:  $p < 0.05$ ; grey arrow:  $p > 0.05$ ; empty arrow: no statistical data reported