Workplace interventions for preventing work disability (Review)

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TABLE OF CONTENTS

[Intervention Review]

Workplace interventions for preventing work disability

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ABSTRACT

Background

Work disability has serious consequences for all stakeholders and society. Workplace interventions are considered appropriate to facilitate return to work by reducing barriers to return to work, involving the collaboration of key stakeholders.

Objectives

To determine the effectiveness of workplace interventions compared to usual care or clinical interventions on work-related outcomes and health outcomes; and to evaluate whether the effects differ when applied to musculoskeletal disorders, mental health problems, or other health conditions.

Search methods

We searched the Cochrane Occupational Health Field Trials Register, CENTRAL, MEDLINE and EMBASE (EMBASE.com), and PsycINFO databases (to November 2007).

Selection criteria

We included randomized controlled trials of workplace interventions aimed at return to work for workers where absence from work because of sickness was reported as a continuous outcome.

Data collection and analysis

Two authors independently extracted data and assessed risk of bias of the studies. Meta-analysis and qualitative analysis (using GRADE levels of evidence) were performed.

Main results

We included six randomized controlled trials (749 workers): three on low back pain, one on upper-extremity disorders, one on musculoskeletal disorders, and one on adjustment disorders. Five studies were rated as having low risk of bias for the sickness absence outcome. The results of this review show that there is moderate-quality evidence to support the use of workplace interventions to reduce sickness absence among workers with musculoskeletal disorders when compared to usual care. However, workplace interventions were not effective to improve health outcomes among workers with musculoskeletal disorders. The lack of studies made it impossible to investigate the effectiveness of workplace interventions among workers with mental health problems and other health conditions. A comparison of a workplace intervention with a clinical intervention, in one study only, yielded similar results for sickness absence and symptoms for workers with mental health problems.

Authors' conclusions

As a result of the few available studies, no convincing conclusions can be formulated about the effectiveness of workplace interventions on work-related outcomes and health outcomes regardless of the type of work disability. The pooled data for the musculoskeletal disorders subgroup indicated that workplace interventions are effective in the reduction of sickness absence, but they are not effective in improving health outcomes. The evidence from the subgroup analysis on musculoskeletal disorders was rated as moderate-quality evidence. Unfortunately, conclusions cannot be drawn on the effectiveness of these interventions for mental health problems and other health conditions due to a lack of studies.

PLAIN LANGUAGE SUMMARY

Workplace interventions for preventing work disability

Six randomized controlled trials involving 749 workers were included in this systematic review. In five studies the workers had musculoskeletal disorders and in one study they had mental health problems. The results of this review show that there is moderate-quality evidence to support the use of workplace interventions to reduce sickness absence among workers with musculoskeletal disorders when compared to usual care. However, workplace interventions were not effective to improve health outcomes among workers with musculoskeletal disorders. Considering all the types of work disability together, the results showed low-quality evidence that workplace interventions are more effective than usual care in reducing absence from work because of sickness. Unfortunately, no conclusions could be drawn regarding interventions for people with mental health problems and other health conditions due to a lack of studies. In conclusion, care providers could implement workplace interventions in guiding workers disabled with musculoskeletal disorders if the main goal is return to work.

SUMMARY OF FINDINGS FOR THE MAIN COMPARISON *[Explanation]*

workplace interventions compared to usual care for workers on work disability

Patient or population: workers on work disability
Settings: occupational health
Intervention: workplace interventions
Comparison: usual care

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	usual care	workplace interventions				
Time until lasting RTW Days until lasting RTW Follow-up: 12 months	**Study population**		**HR 1.70** (1.23 to 2.35)	196 (1 study)	⊕⊕◯◯ **low**[2,3]	
	830 per 1000[1]	**951 per 1000** (887 to 984)				
	Medium risk population					
	[1]					
Time until first RTW Days until first RTW Follow-up: 12 months	**Study population**[4]		**HR 1.55** (1.32 to 2.16)	608 (5 studies)	⊕⊕◯◯ **low**[2,5]	
	799 per 1000	**917 per 1000** (880 to 969)				
	Low risk population[4]					
	500 per 1000	**658 per 1000** (599 to 776)				
	High risk population[4]					

	870 per 1000	**958 per 1000** (932 to 988)			
MSD-time until first RTW (sensitivity analysis) Days until first RTW Follow-up: 12 months	**Study population**		**HR 1.44** (1.15 to 1.82)	543 (4 studies)	⊕⊕⊕○ **moderate**[6]
	836 per 1000	**926 per 1000** (875 to 963)			
	Low risk population				
	754 per 1000	**868 per 1000** (801 to 922)			
	High risk population				
	870 per 1000	**947 per 1000** (904 to 976)			
Cumulative duration of sickness absence Days. Scale from: 0 to 365. Follow-up: 12 months	The mean cumulative duration of sickness absence ranged across control groups from **134-198 days**	The mean Cumulative duration of sickness absence in the intervention groups was **39.06 lower** (61.86 to 16.26 lower)		432 (3 studies)	⊕○○○ **very low**[2,7,8]
Recurrences Days until recurrence Follow-up: 12 months	**Study population**		**HR 0.42** (0.21 to 0.82)	99 (1 study)	⊕⊕○○ **low**[2,3]
	245 per 1000[1]	**111 per 1000** (57 to 206)			
	Medium risk population				
	[1]				

Functional status Roland Disability Questionnaire, outcome was measured on different scales in different studies. Scale from: 0 to 24. Follow-up: median 12 months	The mean functional status ranged across control groups from **5.3-22**	The mean Functional status in the intervention groups was **0.33 higher** (0.89 lower to 1.61 higher)		317 (4 studies)	⊕○○○ **very low**[2,8,9,10]	Scores estimated using a standardised mean difference of -0.06 [-0.29 to 0.16]
Pain Visual Analogue Scale, outcome was measured on different scales in different studies. Scale from: 0 to 10. Follow-up: 12 months	The mean pain ranged across control groups from **3.0 - 30.0** [11]	The mean Pain in the intervention groups was **0.52 higher** (0.08 lower to 1.12 higher)		317 (3 studies)	⊕⊕○○ **low**[2,12]	Scores estimated using a standardised mean difference of -0.19 [-0.41 to 0.03]

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; **HR:** Hazard ratio;

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] Mean baseline risk from the study, natural choice when there is only one study available.
[2] Data are not generalizable since there is only one study found on mental health problems and none on other health conditions.
[3] Sparse data, only one study for this outcome.
[4] Risks ranged from 0.50 to 0.87, therefore lowest and highest risks chosen.
[5] 3 out of 5 studies showed a benefit of the workplace intervention (= 60%), the other 2 studies showed no significant effect of the workplace intervention.
[6] 2 out of 4 studies showed a benefit of the workplace intervention (= 40%), the other 2 studies showed no significant effect of the workplace intervention.
[7] Only 2 out of 3 studies showed a significant effect (67%).
[8] Chi square statistic for heterogeneity is significant.

[9] 1 out of 4 studies scored 5 or lower on the risk of bias assessment (75% with low risk of bias)
[10] Studies selected that measured RTW certainly, therefore we may have missed additional studies on functional status.
[11] Risks were not divided normally around one estimate, therefore the range is presented.
[12] Studies selected that measured RTW certainly, therefore we may have missed additional studies on pain.

BACKGROUND

Description of the condition

Work disability is a major public health problem in western industrialized countries and has a considerable economic burden for society (Dorman 2000; Henderson 2005; OECD 2003). In the UK, the total annual costs of work disability were estimated at £11 billion (Department of Health 2004). Long-term absence because of sickness is responsible for only a fraction of the total sickness absence, however longer periods of absence account for over a third of the total days lost and are responsible for approximately 75% of the costs of work disability (Department of Health 2004). Besides the high costs for society, work disability may have serious consequences for workers. Being employed has a valuable societal role and is an important source of income. Work disability may, therefore, not only lead to a poorer quality of life and loss of social identity, it may even result in permanent exclusion from work.

Timely return to work is of great benefit for both the injured workers and their employers. In fact, we know that the longer a worker is on work disability the higher is the probability that the worker will not return to work due to both personal and work factors (Waddell 2004). At the personal level, motivation and self-efficacy make it harder to initiate return to work (Briand 2007; Labriola 2007). At the workplace level, co-workers take over the tasks of the worker on sick leave. The influence of personal and workplace factors has been identified by the International Classification of Functioning, Disability and Health (ICF) (World Health Organisation 2001). The ICF states that personal and workplace factors affect activity and participation levels; where return to work can also be considered (Wasiak 2007). Furthermore, if the cause of work disability is associated with the workplace then a return to an unchanged workplace (with or without appropriate treatment for the disorder) may be doomed to fail and may even lead to longer-term recurrences (Adler 2006; Sanderson 2006). Therefore, it is important to report on the research on individual workplace interventions aimed at reducing the barriers to return to work (Nordqvist 2003; Schultz 2007; Young 2005).

Description of the intervention

Studies indicate that return to work interventions should be carried out close to the workplace and in collaboration with the key stakeholders (Franche 2005; Frank 1998; Krause 1998). This Cochrane systematic review is aimed at obtaining knowledge about the effectiveness of interventions directed at work. In this review, workplace interventions are defined by either changes to the workplace or equipment, changes in work design and organization, changes in working conditions or work environment, and occupational (case) management with active stakeholder involvement of (at least) the worker and the employer (Anema 2004). The workplace interventions studied can be considered as a form of disability management for the individual worker that facilitates return to work by removing the barriers to return to work. Workplace interventions were compared with usual care (no intervention) or clinical interventions.

How the intervention might work

In occupational medicine a paradigm shift has occurred away from disease prevention and treatment to disability prevention and management (Loisel 2001). Evidence indicates that purely medical interventions do not show a positive effect on work-related outcomes (Loisel 2001; Nieuwenhuijsen 2008) and return to work is influenced by various psychosocial factors (Baldwin 1996; Steenstra 2005; Sullivan 2005; Turner 2007; WHO 2001). Long-term work disability is no longer seen simply as the consequence of a disorder but rather as the result of interactions between the worker and three systems: (1) the healthcare system, (2) the work environment, and (3) the financial compensation system (Franche 2002; Loisel 2001). Although this conceptual model has been derived from research on musculoskeletal disorders it can be applied to return to work processes for all types of work disability (including mental health problems and other health conditions) because both individual and work environment factors are involved and must be taken into account (Baril 2003; Briand 2007; Corbière 2006; Franche 2005; van Oostrom 2007; Young 2005).

Why it is important to do this review

Unlike other Cochrane reviews on return to work interventions, this systematic review is focused on workplace interventions to prevent work disability due to musculoskeletal disorders like back pain and upper-extremity disorders, mental health problems like depression and adjustment disorders, and other health conditions such as cardiovascular diseases or cancer. To our knowledge, no other systematic review includes such a variety of conditions and, therefore, this review is unique for reviews of the effectiveness of workplace interventions. By conducting this systematic review we were able to gain more insight into the effectiveness of workplace interventions as return to work interventions and into the broad applicability of these interventions, and into existing research gaps in this area.

OBJECTIVES

The objectives of this review were to:

- determine the effectiveness of workplace interventions in preventing long-term work disability among sick-listed workers, when compared to usual care or clinical interventions;

- determine whether there are differences between the effectiveness of workplace interventions for musculoskeletal disorders, mental health problems, and other health conditions.

METHODS

Criteria for considering studies for this review

Types of studies

This review comprised all randomized controlled trials (RCTs) concerning workplace interventions aimed at preventing work disability by means of job accommodation or involvement of at least the worker and the employer, as key stakeholders, in the return to work process.

Types of participants

We incorporated all studies concerning working age adults (18 to 65 years) who were on sick leave (full or part time). Workers with all types of work disability were included: musculoskeletal disorders, mental health problems, and other health conditions. The reasons for work disability could be either self-reported, diagnosed by a physician, or documented in an administrative file.

Types of interventions

The Cochrane Occupational Health Field has classified workplace interventions as appropriate for disability management (Schonstein 2006). For this review the term workplace intervention was used for interventions focusing on changes in the workplace or equipment, work design and organization (including working relationships), working conditions or work environment, and occupational (case) management with active stakeholder involvement of (at least) the worker and the employer (Anema 2004; Franche 2005a). Active involvement was defined as face-to-face conversations about return to work between (at least) the worker and the employer. This definition is a synthesis of the IEA definition of ergonomic interventions (Stapleton 2000) and the Waddell et al definition of occupational interventions (Waddell 2001). Changes in the workplace and equipment include changes in the furniture or the materials needed to perform the work. Changes in the work design and organization include changes in schedules or tasks, training in task performance, and altered working relationships with supervisor and co-workers. Changes in working conditions refer to the financial and contractual arrangements; changes in work environment concern noise, lighting, vibration, etc.

The definition of a workplace intervention was developed from studies on musculoskeletal disorders. However, some examples of interventions for mental health problems exist according to this definition. These interventions comprise at least advice about changes in work processes to facilitate return to work (Blonk 2006) or the preparation of a return to work plan with the worker and the supervisor (van Oostrom 2008; Vlasveld 2008). Identified workplace interventions were compared to usual care (for example no intervention, or guideline-based care) or clinical interventions (for example graded activity, problem-solving therapy).

As long as the workplace intervention was a structural part of the intervention (with the intention to apply the workplace intervention to all participants in the intervention group), studies with interventions that included more components than described in the definition of a workplace intervention were not excluded. Our definition allowed us to include only those interventions that were linked closely to the workplace and which focused on work adaptations or the involvement of stakeholders from the work environment. Interventions that were intended to simulate the demands of work in a clinical setting, without changes to or involvement of the workplace in the return to work process, were not included in this review.

Studies were also excluded if the intervention was:

- focused on primary prevention;
- not focused on return to work as the main goal;
- group based rather than individual based;
- focused on 'just' education about ergonomics, not resulting in work adaptations;
- aimed at posture modifications only.

Types of outcome measures

Primary outcomes

Many definitions of absence from work because of sickness (sickness absence) are known (Steenstra 2003). However, when studies used different sickness absence definitions we only analysed the data collected according to the following definitions.

- Time until a lasting return to work: a period of absence from the first day of sick leave to full return to work in previous or equal work for at least four weeks without dropping out.
- Time until first return to work: a period of absence from work because of sickness both preceded and followed by a period of at least one day at work (consensus definition, de Vet 2002).
- Cumulative duration of sickness absence: total days of sick leave during the follow-up period (resulting from one or more periods of absence).
- Recurrences of sickness absence: the number of days until a recurrence; or the frequency and duration of recurrent episodes of sick leave.

The definition for time until lasting return to work (RTW) was based on the Dutch social security system. Large differences exist in social security systems and the way sickness absence is registered (de Vet 2002), therefore, the cut-off point for lasting RTW at

four weeks is just one example. If studies reported a definition of prespecified time periods for lasting RTW the data from these studies were included in the time until lasting RTW outcome.
Not all sickness absence periods are alike in their consequences and a differentiation between short-term and long-term sickness absence is needed (Uegaki 2007). In the past, dichotomous outcomes were often used for absence caused by sickness. However, use of these measures results in a loss of information because there is no information on the exact duration of work disability and the episodic nature of work disability is neglected. Continuous sickness absence outcomes are now more frequently used. This is especially important when an intervention is focused on return to work and when sickness absence is the primary outcome of the study, as in this review. Therefore, studies that only reported a dichotomous measure of sickness absence were excluded from the review.

Secondary outcomes

Secondary outcomes were:

- functional status;
- quality of life, general health;
- symptoms;
- pain;
- direct and indirect costs of work disability.

These outcomes are likely to be meaningful for: workers who are on sick leave, their employers, their care providers (such as treating and occupational physicians), insurers, and the policymakers who are involved in decision making.

Search methods for identification of studies

Searches were not restricted by date, language or publication status.

Electronic searches

We searched the following electronic databases:

1. Cochrane Occupational Health Field Trials Register (to Issue 4, 2007);
2. The Cochrane Central Register of Controlled Trials (CENTRAL) (*The Cochrane Library*)(to Issue 4, 2007);
3. EMBASE.com (MEDLINE (1966 to 21 November 2007) and EMBASE (1974 to 21 November 2007) combined);
4. PsycINFO (1806 to 21 November 2007).

The search strategies are presented in Appendix 1.

Searching other resources

We searched the reference lists of relevant review articles and eligible studies. We made personal contact with experts in the field of occupational health in order to identify ongoing and unpublished studies.

Data collection and analysis

The methods of this review followed the Cochrane Handbook for Systematic Reviews of Interventions (Version 5.0) (Higgins 2008).

Selection of studies

Titles and abstracts (if available) of all identified studies were stored in a new database in Reference Manager. A bibliography was generated after removing the double references, which included the title, keywords, and abstract of each reference found.
The study selection was completed in two steps. In the first step, two review authors (SHO and MTD) screened the titles, keywords, and abstracts of all references retrieved by the literature search to determine if articles met the inclusion criteria. The inclusion criteria were: study design was an RCT, participants were sick-listed workers, the intervention under study met the definition of a workplace intervention, and sickness absence was measured continuously. A standardized digital form with inclusion criteria was designed for this purpose. In the second step, the review authors retrieved the full-text article for studies where inclusion or exclusion could not be based on the screening in the first step. These were fully reviewed and subsequently assessed for inclusion. A consensus procedure was used to resolve disagreements about the selection of RCTs and a third review author (JRA) was consulted if the disagreement persisted. For each study excluded, the criteria for exclusion (design, intervention, population, and outcome) and whether the exclusion was based on screening in the first or second step was documented.

Data extraction and management

Two review authors (SHO and MTD) independently extracted the data onto a pre-designed data extraction form. This form included essential study information about the participants, interventions, outcome measures, and results. A small sample of the articles was initially used to test whether the form was feasible, according to the two reviewers. If there were any disagreements about the data extraction, consensus was achieved by discussion among the review authors. A third review author (HCWV) was consulted if the disagreements persisted. If articles did not contain sufficient information then the authors of the articles were contacted. All authors were sent a standardized form with questions about the content of the intervention and asked for a copy of the standardized intervention protocol (if available).

Assessment of risk of bias in included studies

Two review authors (SHO and MTD) independently assessed the risk of bias of the RCTs. Risk of bias was assessed using an adapted version of the checklist recommended by the Cochrane Back Group (Furlan 2008), which is in accordance with the guidelines in the Cochrane Handbook for Systematic Reviews of Interventions (Higgins 2008). The criteria regarding blinding of inter-

vention providers and participants were not used because the context of the workplace does not allow blinding (Schonstein 2003; Tveito 2004).

The following criteria were assessed:

- was the method of randomisation adequate (adequate sequence generation)?
- was the treatment allocation concealed (allocation concealment)?
- was the outcome assessor blinded to the intervention (blinding)?
- was the drop-out rate described and acceptable?
- was an intention-to-treat analysis performed?
- was the report of the study free of suggestion of selective outcome reporting (free of selective reporting)?
- were the groups similar at baseline regarding the most important prognostic factors?
- were co-interventions avoided or similar?
- was compliance acceptable in all groups?
- was the timing of the outcome assessment comparable in all groups?

The criteria were scored as 'yes', 'no', and 'unclear'. A consensus method was used to resolve disagreements, and a third review author (HCWV) was consulted if the disagreements persisted. The review authors pilot-tested the methodological quality assessment on two articles not included in the review. For articles that did not contain sufficient information on one or more of the methodological criteria (score 'don't know') the authors were contacted for additional information. We tried to locate the authors' current working address through their most recent publication in PubMed, the Internet, or a request for information sent to the address listed on the article. If the authors could not be contacted, or the information was no longer available, the criterion was scored as 'unclear'. We did not contact authors a second time when the extra information provided was not sufficient to change the score into 'yes' or 'no'.

Assessment of heterogeneity

Heterogeneity due to differences in populations was investigated by performing subgroup analyses of the type of disability: due to musculoskeletal disorders, mental health problems, or other health conditions. Sensitivity analyses were conducted by analysing only high quality RCTs.

Data synthesis

The data were pooled with Review Manager 5.0 software. The results of each RCT were plotted as point estimates with corresponding 95% confidence intervals (CI).

Most outcomes regarding absence because of sickness were time-to-event data (time until lasting RTW, time until first RTW, time until recurrence). Usually, Cox proportional hazard model is used to analyse time-to-event data. In this approach, workers who do not RTW during the entire follow up period are censored to be sure that the total follow up period is analysed as sick leave. Cox proportional hazard regression models were usually used to determine a hazard ratio. We performed log transformations of the hazard ratios. We then combined the study results using the generic inverse variance method with the estimates of log hazard ratios and standard errors from the results of Cox proportional hazards regression models. For one study the results of Cox proportional hazard regression models were not available. Therefore, a hazard ratio was estimated based on the log rank test (Parmar 1998). For all analyses, the random-effects model was used because of the heterogeneity in the type of work disability, duration of sickness absence, and the variation in interventions among studies.

Cumulative duration of sickness absence was usually presented as a continuous outcome and, therefore, the mean difference was calculated. Functional status, quality of life, pain, and symptoms were continuous outcomes. For these continuous data, mean differences or standardized mean differences (with 95% CI) were determined to summarize the effect; depending on whether or not these outcomes were measured with different scales. Changes from baseline scores and final post-intervention scores in the forest plots could not be combined when using standardized mean differences. Therefore, we calculated or requested the final post-intervention scores for all self-reported outcomes. In a randomized controlled trial, mean differences based on changes from baseline can usually be assumed to address exactly the same underlying intervention effects as analyses based on final measurements (Higgins 2008).

For the self-reported outcomes, separate analyses for short-term and long-term data were not possible due to a lack of sufficient data on the short-term outcomes.

The results on the costs data were summarized in Table 1.

Qualitative analysis

We assessed the overall quality of the evidence for each outcome using an adapted GRADE approach (GRADE working group 2004) as recommended by the Cochrane Back Review Group (Furlan 2008). The quality of the evidence for a specific outcome was based on the study design, limitations of the study, consistency of results, directness, precision, and publication bias. GRADE profiler software (version 3.2) was used.

The GRADE criteria were operationalised in the following way.

- Limitations of the study refers to the risk of bias assessment of studies. Studies with more than 5 points on the risk of bias assessment were regarded as studies with a low risk of bias. If 75% or more of the studies for a specific outcome scored above 5, this item was scored in the category: no limitations. If 50% to 75% of the studies scored above 5, this was scored: serious limitations. If less than 50% of the studies scored above 5: very serious limitations.

- Consistency refers to the similarity of estimates of treatment effects for the outcome across studies. Study results were considered consistent if direction, effect size, and statistical

significance were sufficiently similar to lead to the same conclusions. Consistency in direction was defined as 75% or more of the studies showing either a benefit or no effect of the workplace intervention. In the case of a benefit, consistency in effect size was defined as 75% or more of the studies showing a clinically important or unimportant effect. Minimal clinically relevant differences were derived from existing literature and summarized in Table 2. For some outcomes no cut-off point for a clinically relevant difference was found. Therefore, this criterion was not used for the rating of that outcome as this is a criterion in the guidelines of the Cochrane Back Group but not in the guidelines of the GRADE approach (included in the software). Consistency in statistical significance was defined by the Chi^2 test for heterogeneity.

- Directness (generalisability) refers to the extent to which the participants, interventions, and outcomes in the studies were comparable to those defined in the inclusion criteria of the review. If there was uncertainty about generalisability of the results, or if the results were more applicable to a specific population rather than a general population on work disability, serious or very serious limitations were assigned.

- Precision of the evidence refers to the confidence in the results. It takes into account the number of studies, patients, and events; and width of the CIs for each outcome. Data were interpreted to be imprecise as multiple studies were combined in a meta-analysis but the CI was sufficiently wide that the estimate could either support or refute the effectiveness of the workplace intervention. In the case of imprecise data serious limitations were assigned. Serious limitations could also be assigned if data were judged to be sparse, that is if only one study was available for an outcome, or fewer than 75% of the studies presented data that could be included in the meta-analysis.

- Publication bias refers to the probability of selective publication of studies and outcomes.

The overall quality of the evidence for each outcome was the result of the combination of the assessments in all domains. The GRADE group recommends four levels of evidence, as follows.

- High-quality evidence: where there are consistent findings among 75% of RCTs with low risk of bias and that are generalisable to the population in question. There are sufficient data, with narrow confidence intervals. There is no known or suspected publication bias.
- Moderate-quality evidence: one of the domains is not met.
- Low-quality evidence: two of the domains are not met.
- Very low-quality evidence: three of the domains are not met.
- No evidence: no RCTs are identified that address this outcome.

RESULTS

Description of studies

See: Characteristics of included studies; Characteristics of excluded studies.

Literature search and study selection

The literature search produced a yield of 683 references in EMBASE.com, 369 in CENTRAL, 393 in PsycINFO, and 49 in the Cochrane Occupational Health Field Trials Register. After removing duplicate references, the electronic search identified a total number of 1350. Two review authors assessed the titles, keywords, and abstracts of all 1350 records. The authors selected 30 potentially eligible studies and retrieved the full publication for each. Twenty-one articles were excluded after further examination. reasons for exclusion can be found in the table 'Characteristics of excluded studies'. Ten articles from six studies were left (see the table 'Characteristics of included studies'). Handsearching of the reference lists of relevant review articles and eligible studies and personal contact with 10 experts in the field of occupational health generated one extra potentially eligible study (Cheng 2007). However, this study was excluded after further examination, the reason for exclusion can be found in the table 'Characteristics of excluded studies'.

Participants: types of disorders and duration of work disability

Three studies concerned workers with back pain (Anema/Steenstra 2007; Loisel 1997; Verbeek 2002). The short-term work disability outcome extended from a minimum of 10 days (Verbeek 2002) to two to six weeks (Anema/Steenstra 2007) and four weeks to three months (Loisel 1997). One study described that the participants had developed back pain at work (Loisel 1997). One study included workers with work-related upper-extremity disorders (Feuerstein 2003). The duration of work disability prior to randomisation was less clear in this study. Inclusion was possible when the claim was accepted within 90 days of filing. One study included work-disabled workers with musculoskeletal disorders (Arnetz 2003); the exact duration of work disability before randomisation was not described in this study. Only one study examined the effectiveness of workplace intervention on mental health problems (Blonk 2006). The study population consisted of self-employed workers with psychological complaints (defined as adjustment disorders such as burnout and stress). For this study, immediate inclusion in the study took place when sick-listed workers reported being disabled (Blonk 2006). In the studies of Feuerstein and Loisel (Feuerstein 2003; Loisel 1997) the disability was work related; none of the other studies reported whether the condition for work disability was work related or not. The only reported restrictions with regard to age, sex, and ethnicity of the participants were working age and sufficient understanding of the national language to fill in the questionnaires. Whether workers on part-time sick leave were included was not reported in most

studies. Two studies reported inclusion of workers when assigned to light or modified duties (Feuerstein 2003; Loisel 1997). One study reported 32 participants with co-morbidities (Loisel 1997) and another study considered co-morbidity as a prognostic factor (Anema/Steenstra 2007). Also, one study reported 39 participants with psychosocial problems at baseline (Verbeek 2002). In the studies that recruited participants with musculoskeletal disorders at baseline, none formally registered the secondary development of mental health problems.

Time and setting characteristics

The one study published before 2000 was conducted in Quebec, Canada (Loisel 1997). Of the other five studies, four were conducted in Europe (Anema/Steenstra 2007; Arnetz 2003; Blonk 2006; Verbeek 2002) and one in the US (Feuerstein 2003). Of the four European studies, three were conducted in the Netherlands and one was conducted in Sweden (Arnetz 2003). Participants were working in several economic sectors (industry, health care, office administration, and agriculture) in most studies (Anema/Steenstra 2007; Arnetz 2003; Blonk 2006; Feuerstein 2003; Loisel 1997). In the study of Verbeek all participants worked in hospitals (Verbeek 2002). Four studies reported the duration of the recruitment period: 20 months (Blonk 2006), 22 months (Feuerstein 2003), 24 months (Anema/Steenstra 2007), and 28 months (Loisel 1997).

Work interventions

A questionnaire about the content of the interventions was returned by all authors. We also received the standardized intervention protocol from three authors (Anema/Steenstra 2007; Blonk 2006; Feuerstein 2003). The content of the intervention is described in Table 3 based on information from the published papers and the questionnaires. Regarding the content of the interventions, changes to the workplace and equipment was found in all studies, changes of work design and organizations in 5 out of 6 studies, whereas changes to working conditions and work environment were applied less often. Case management with the worker and employer (supervisor) occurred in four studies (according to the authors) (Anema/Steenstra 2007; Arnetz 2003; Feuerstein 2003; Loisel 1997). The worker, the supervisor or employer, and a professional in occupational health were always involved in the interventions; except for the study concerning adjustment disorders where no supervisor was involved due to self-employment (Blonk 2006). Insurer representatives were involved in two studies (Arnetz 2003; Blonk 2006) and union representatives in one study (Loisel 1997). In general the number of contacts in the workplace intervention was not described in detail but ranged from one to six contacts. Face-to-face contact took place in all studies; often at the workplace and in one study at the occupational health services (Verbeek 2002). The authors viewed the goal of the intervention contacts as return to work (Anema/Steenstra 2007); guidance about return to work (Verbeek 2002); formulation of a return to work plan (Feuerstein 2003); and observing and modifying work conditions (Arnetz 2003; Loisel 1997). In three studies the main aim was to identify what was needed for a worker to be able to work (Anema/Steenstra 2007; Arnetz 2003; Loisel 1997). In one study, the occupational physician was expected to arrange a return to work date with the injured worker (Anema/Steenstra 2007).

Usual care

The usual care conditions were less extensively described in most studies. Despite the fact that studies explored the effectiveness of workplace interventions only three studies had a usual care condition in an occupational setting: guideline-based low back pain care by the occupational physician (Anema/Steenstra 2007); an eight-week return to work plan (Arnetz 2003); and usual case management comprising monitoring of the claims process and surveillance of medical treatment (Feuerstein 2003). The other studies had usual care consisting of treatment by the attending physician (Loisel 1997) or the general practitioner (Blonk 2006; Verbeek 2002).

In two studies, the workplace intervention was followed by a clinical intervention when return to work was not achieved within a predefined period of eight weeks (Anema/Steenstra 2007; Loisel 1997). This meant that workplace and clinical interventions did not start concurrently. The study by Blonk was a three-armed trial: a workplace intervention was compared with a clinical intervention (cognitive behavioral therapy) and with usual care (Blonk 2006).

Outcomes

Studies were selected if they reported on the exact duration of work disability. One study used self-reported outcomes with regard to sickness absence (Loisel 1997) and five studies used administrative outcomes (Anema/Steenstra 2007; Arnetz 2003; Blonk 2006; Feuerstein 2003;Verbeek 2002). Time until lasting RTW was reported in one study (Anema/Steenstra 2007). Time until first RTW was the most common outcome used in the studies (Blonk 2006; Feuerstein 2003; Loisel 1997; Verbeek 2002). For one study, which distinguished between time until first partial RTW and time until first full RTW (Blonk 2006), we decided to use time until first full RTW to avoid introducing any difference from the outcomes of the other studies. The one study that published a study protocol described the outcome as time until first RTW (Steenstra 2003) but did not publish the results of this outcome (Anema 2007). Therefore, the Cox regression output regarding this outcome was requested and obtained from the authors. Another study did not publish results on the time until first RTW (Feuerstein 2003). It was clear from the papers that they had collected these data thus the unpublished analysis was requested in order to avoid obvious publication bias. The outcome cumulative duration of sickness absence was reported in three stud-

ies (Anema/Steenstra 2007; Arnetz 2003; Verbeek 2002). Recurrences of sickness absence were reported in percentages and a hazard ratio in one study (Verbeek 2002). The definition of lasting RTW as used by the study of Anema/Steenstra corrected for recurrences within four weeks of return to work (Anema/Steenstra 2007). The other studies did not take the durability of return to work into account.

Functional status was measured in the three back pain studies (Anema/Steenstra 2007; Loisel 1997; Verbeek 2002) and the upper-extremity disorder study (Feuerstein 2003). Of these four studies, two used the Roland-Morris disability questionnaire (Anema/Steenstra 2007; Verbeek 2002), one used the Oswestry questionnaire (Loisel 1997), and one used the upper-extremity functional limitations scale (Feuerstein 2003). The study of mental health problems reported no outcome on functioning.

Two of the six studies assessed quality of life and general health as a separate outcome (Feuerstein 2003; Verbeek 2002). This outcome was assessed by the SF-12 (Feuerstein 2003) and the Nottingham health profile (Verbeek 2002).

A follow up of symptoms was reported in two studies. For adjustment disorders the depression anxiety stress scale was used (Blonk 2006) and for work-related upper-extremity disorders a modified version of the carpal tunnel symptom severity scale was used (Feuerstein 2003). The Arnetz study reported baseline measurements of symptoms but no follow up of symptoms was conducted (Arnetz 2003).

Pain level or intensity was assessed in the three studies on low back pain (Anema/Steenstra 2007; Loisel 1997; Verbeek 2002). Of these three studies two used a 10-point visual analogue scale (Anema/Steenstra 2007; Verbeek 2002) and one used the McGill Melzack questionnaire (Loisel 1997).

Direct and indirect costs of work disability were measured in three studies (Anema/Steenstra 2007; Arnetz 2003; Loisel 1997) but not in a similar manner. Two studies differed in the perspective applied for the cost analysis: a societal perspective (Anema/Steenstra 2007), and an insurer perspective (Loisel 1997). The third study did not provide information on the perspective applied (Arnetz 2003). In these three studies, the direct intervention costs and indirect costs of sick leave were measured. One study did not however measure costs of other treatments (direct medical costs) (Arnetz 2003), while the other studies measured use of other healthcare resources and calculated the accompanying costs (Anema/Steenstra 2007; Loisel 1997).

Follow up

All studies reported a follow-up period of 12 months for the absence of sickness outcome (Anema/Steenstra 2007; Arnetz 2003; Blonk 2006; Feuerstein 2003; Loisel 1997; Verbeek 2002). For the other outcomes, which were all self reported, follow up was at: 10 months (Blonk 2006), 16 months (Feuerstein 2003), and 12 months (Anema/Steenstra 2007; Loisel 1997; Verbeek 2002). In one study, costs data were collected for a mean of 6.4 years (range 5.1 - 7.5 years) (Loisel 1997).

Short-term results (less than three months) regarding the outcomes of this review were rarely reported in the published articles of the studies. Only two studies reported either three-month (Verbeek 2002) or four-month (Blonk 2006) results on the self-reported outcomes (see the 'Characteristics of included studies' table).

Risk of bias in included studies

For assessment of the risk of bias in the studies we combined the information from all papers reporting on the same study. Initially there was disagreement between the review authors on 23% of the items scored (kappa = 0.57). Most disagreements were resolved by discussion. The third review author had to make a final decision in five of a total of 60 decisions. For the methodological criteria that scored 'don't know' the authors were contacted for additional information. All six authors responded to our request. Table 4 gives the final scores based on the extra information provided by the authors. We changed 11 items that initially scored 'don't know'. Eight items were changed to 'yes' and three items were changed to 'no'. Seven items retained a 'don't know' score in spite of the extra information provided. Five studies scored six or more out of 10 points (Anema/Steenstra 2007; Arnetz 2003; Feuerstein 2003; Loisel 1997; Verbeek 2002), which was classified as low risk of bias. One study scored less than six points (Blonk 2006).

Risk of bias was different for the other outcomes due to the self-reported character of these outcomes. The scores on the items blinding of the outcome assessor, drop-out, and intention-to-treat analysis, changed for the secondary outcomes in some studies. This resulted in lower total scores for most studies (Table 4) with three studies assessed as having low risk of bias (Anema/Steenstra 2007; Loisel 1997; Verbeek 2002) and three studies that scored less than 5 points in the risk of bias assessment (Arnetz 2003; Blonk 2006; Feuerstein 2003). Figure 1 presents the scores for each item. Blinding of the outcome assessor and comparable timing of the outcome assessment scored 'yes' in all studies. With regard to blinding of the outcome assessor, five of the six studies used administrative sickness absence data that was collected without knowledge about group allocation. The most prevalent shortcomings were found in the item about compliance. Figure 2 shows the score on each item ordered for each study.

Figure 1. Methodological quality graph: review authors' judgements about each methodological quality item presented as percentages across all included studies.

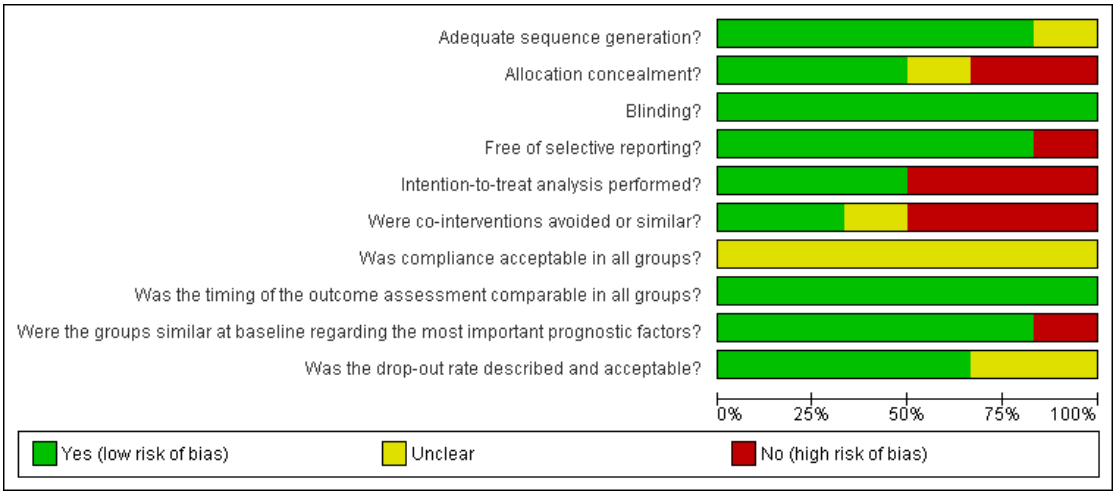


Figure 2. Methodological quality summary: review authors' judgements about each methodological quality item for each included study.

Effects of interventions

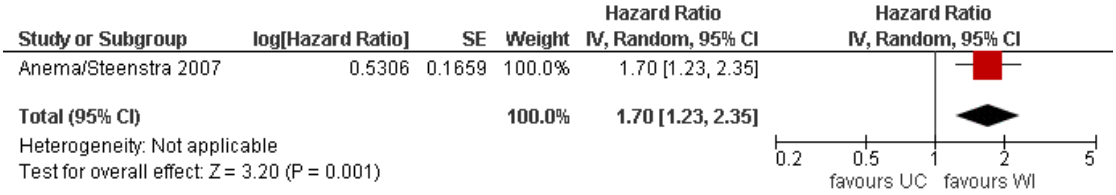
See: **Summary of findings for the main comparison**; **Summary of findings 2**

1. Workplace interventions compared to usual care

Sickness absence

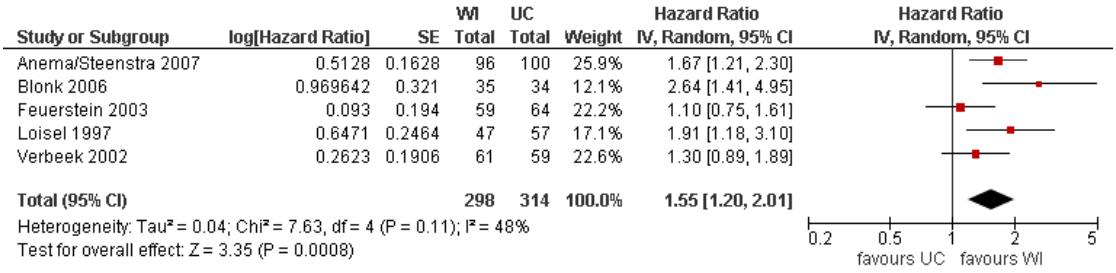
The first pre-defined outcome regarding sickness absence, time until lasting RTW, significantly favoured the workplace intervention with a hazard ratio of 1.70 (95% CI 1.23 to 2.35) (Figure 3), based on one study (Anema/Steenstra 2007).

Figure 3. Forest plot of comparison: 1 workplace intervention versus usual care, outcome: 1.1 Time until lasting RTW.



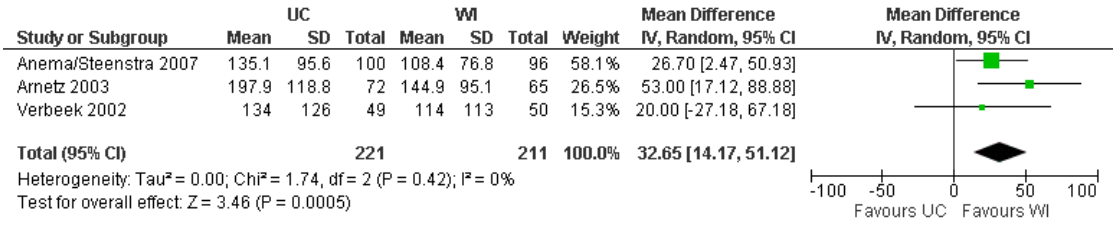
The pooled analysis of the outcome on time until first RTW showed that workplace interventions were more effective than usual care, with a pooled hazard ratio of 1.55 (95% CI 1.20 to 2.01) (Figure 4) (Anema/Steenstra 2007; Blonk 2006; Feuerstein 2003; Loisel 1997; Verbeek 2002). For musculoskeletal disorders, subgroup analysis showed a reduction of the pooled hazard ratio to 1.44 (95% CI 1.15 to 1.82). The sensitivity analysis with high quality studies used the same studies as with the subgroup analysis for musculoskeletal disorders. The exact duration of time until first RTW was presented with a median in all studies (see table 'Characteristics of included studies'). The difference in median duration of time until first return to work between the workplace intervention group and the usual care group ranged from 14 days (Feuerstein 2003) to 198 days (Blonk 2006).

Figure 4. Forest plot of comparison: 1 workplace intervention versus usual care, outcome: 1.2 Time until first RTW.



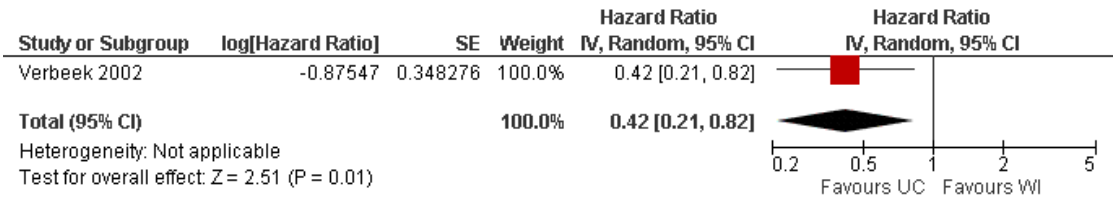
Three studies reported the cumulative duration of sickness absence (Anema/Steenstra 2007; Arnetz 2003; Verbeek 2002). The pooled analysis showed a significant advantage of the workplace interventions compared to usual care with a mean difference of -39.06 days (95% CI -61.86 to -16.26) (Figure 5).

Figure 5. Forest plot of comparison: 1 workplace intervention versus usual care, outcome: 1.3 Cumulative duration of sickness absence.



Recurrences of sick leave were reported in one study (Verbeek 2002) and showed a recurrence rate of 25% in the usual care group and 51% in the workplace intervention group, with a corresponding hazard ratio of 0.42 (95% CI 0.21 to 0.82) (Figure 6).

Figure 6. Forest plot of comparison: 1 workplace intervention versus usual care, outcome: 1.4 Time until recurrence.

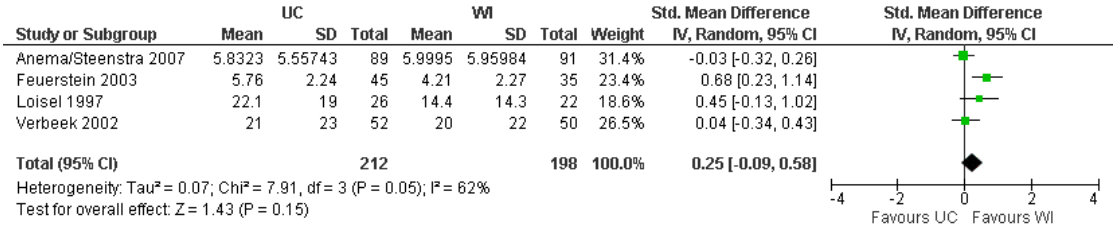


The qualitative analysis showed low quality of evidence for all four outcomes regarding sickness absence (see Summary of findings table 1). Time until first RTW was most frequently used (5 studies, 612 participants). For time until first RTW, a workplace intervention was more effective than usual care at the 12-month follow up, with a hazard ratio of 1.55 (95% CI 1.32 to 2.16). This effect remained for the musculoskeletal disorders subgroup, with moderate quality of evidence from four studies and a hazard ratio of 1.44 (95% CI 1.15 to 1.82).

Functional status

No statistically significant difference in functional status was found at 12-month follow up. The mean difference was 0.25 (95% CI -0.09 to 0.58) between workers on sick leave who received the workplace intervention and those who received usual care (Figure 7) (Anema/Steenstra 2007; Feuerstein 2003; Loisel 1997; Verbeek 2002). The qualitative analysis showed very low-quality evidence from four studies (317 participants) (Summary of findings table 1). Sensitivity analyses with three low risk of bias studies resulted in a pooled mean difference of 0.06 (95% CI -0.16 to 0.29) (Anema/Steenstra 2007; Loisel 1997; Verbeek 2002).

Figure 7. Forest plot of comparison: 1 workplace intervention versus usual care, outcome: 1.5 Functional status.



Quality of life and general health

The data from two studies on general health could not be pooled because the data were reported as scale scores rather than total scores. Both studies used different questionnaires with different scales (Feuerstein 2003; Verbeek 2002). Of these studies one found a significant difference between the two groups at 16-month follow up, in favour of the workplace intervention group (Feuerstein 2003).

Symptoms

Symptoms data could not be pooled to provide one figure because one study reported the scores for each of the three scales separately (Blonk 2006). The authors of this study reported that scores for depression, anxiety, and stress had decreased after four-month follow up in both groups; this effect was still visible at 10 months. At 10 months the mean difference for anxiety was -0.50 (95% CI -4.03 to 3.03), for depression it was -4.00 (95% CI -9.04 to 1.04), and for stress -0.80 (95% CI -5.07 to 3.47) (Figure 8; Figure 9; Figure 10). The study on upper-extremity disorders showed a mean difference of -0.30 (95% CI -0.63 to 0.03) (Figure 11) (Feuerstein 2003). This was assigned as very low-quality evidence for the outcome.

Figure 8. Forest plot of comparison: 1 workplace intervention versus usual care, outcome: 1.6 Symptoms - Depression.

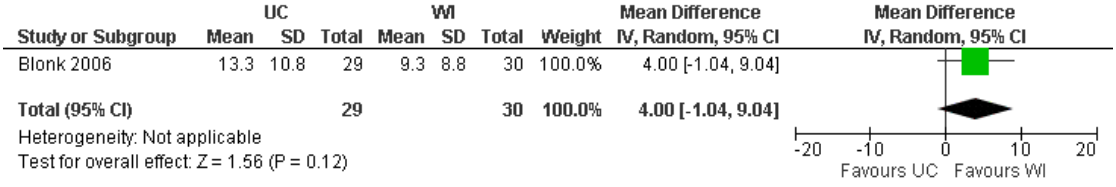


Figure 9. Forest plot of comparison: 1 workplace intervention versus usual care, outcome: 1.7 Symptoms - Anxiety.

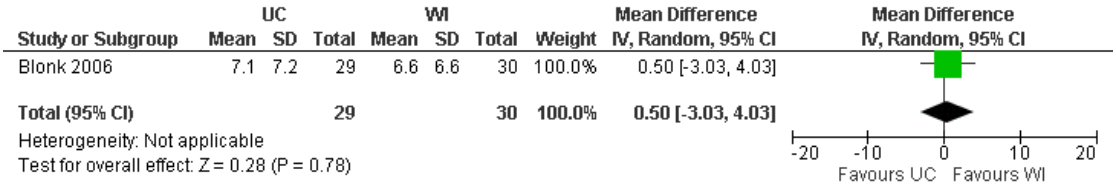


Figure 10. Forest plot of comparison: 1 workplace intervention versus usual care, outcome: 1.8 Symptoms - Stress.

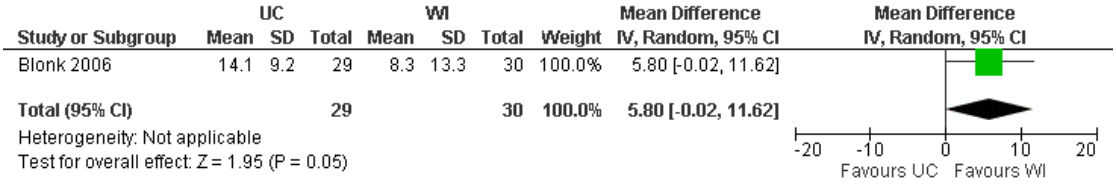
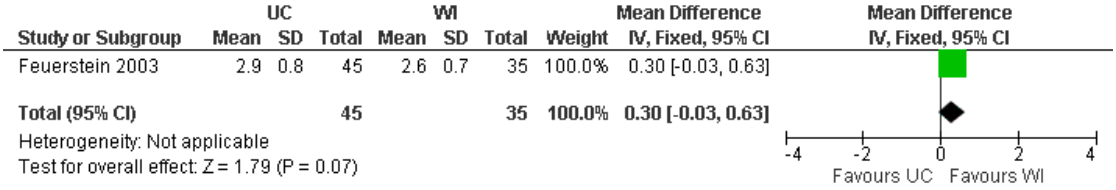


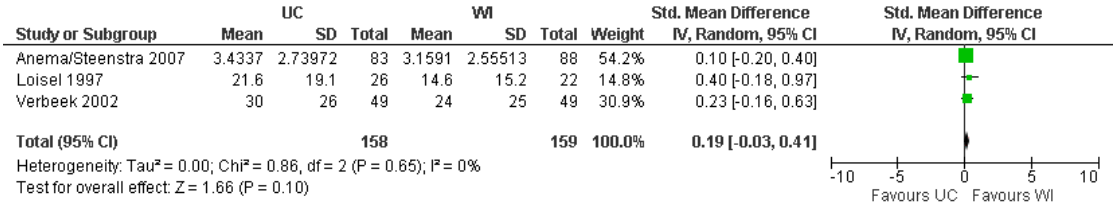
Figure 11. Forest plot of comparison: 1 workplace intervention versus usual care, outcome: 1.9 Symptoms - Upper extremity.



Pain

Regarding pain, the three studies on lower back pain (LBP) reported baseline and follow-up values (Anema/Steenstra 2007; Loisel 1997; Verbeek 2002). None of these studies found a significant difference in pain between the workplace intervention group and usual care group, resulting in a pooled mean difference of -0.19 (95% CI -0.41 to 0.03) (Figure 12). The qualitative analysis showed the low quality of the evidence (Summary of findings table 1).

Figure 12. Forest plot of comparison: 1 workplace intervention versus usual care, outcome: 1.10 Pain.



Direct and indirect costs of work disability

Cost outcomes were not pooled as the outcomes were not considered comparable across the three studies (Table 1). One study reported no significant difference in costs (Anema/Steenstra 2007). Two studies reported lower costs in the workplace intervention group (Arnetz 2003; Loisel 1997).

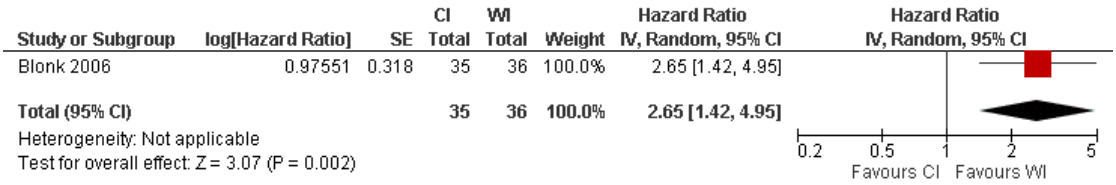
2. Workplace interventions compared to clinical interventions

Comparisons between interventions could be performed only when interventions were started at the same time. In two studies the workplace intervention was followed by a clinical intervention if return to work was not achieved within eight weeks (Anema/Steenstra 2007; Loisel 1997). It was not possible to compare the workplace and clinical interventions because the clinical intervention followed the workplace intervention and some participants received both. This meant that just one study included a valid comparison of a workplace intervention with a clinical intervention (Blonk 2006).

Sickness absence

A hazard ratio of 2.65 (95% CI 1.42 to 4.95) was found (Figure 13) (Blonk 2006). The qualitative analysis showed very low quality of evidence (Summary of findings table 2).

Figure 13. Forest plot of comparison: 2 workplace intervention versus clinical intervention, outcome: 2.1 Time until first RTW.



Symptoms

The mean difference in symptoms was -2.00 (95% CI -5.52 to 1.52) for anxiety, -2.40 (95% CI -6.90 to 2.10) for depression, and -1.90 (95% CI -6.21 to 2.41) for stress, at 10 months (Figure 14; Figure 15; Figure 16) (Blonk 2006). This evidence was regarded as very low quality.

Figure 14. Forest plot of comparison: 2 workplace intervention versus clinical intervention, outcome: 2.2 Symptoms - Depression.

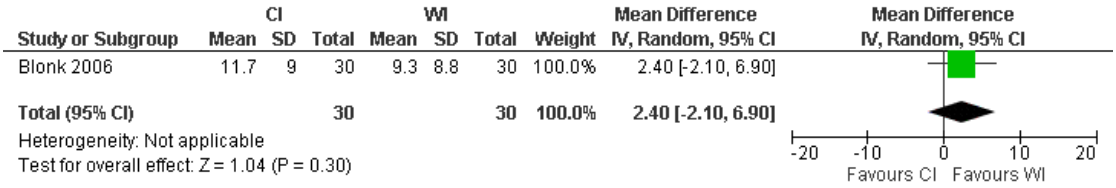


Figure 15. Forest plot of comparison: 2 workplace intervention versus clinical intervention, outcome: 2.3 Symptoms - Anxiety.

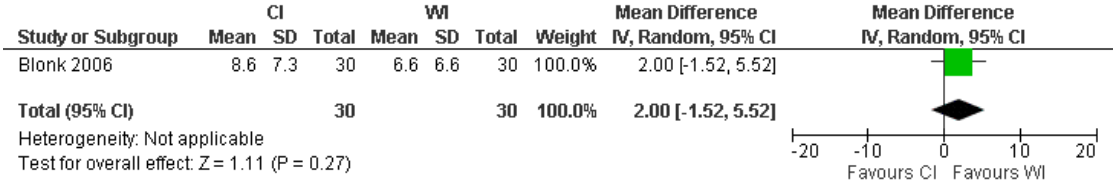
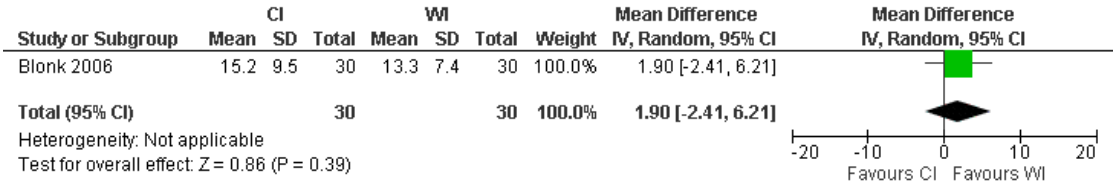


Figure 16. Forest plot of comparison: 2 workplace intervention versus clinical intervention, outcome: 2.4 Symptoms - Stress.



ADDITIONAL SUMMARY OF FINDINGS *[Explanation]*

workplace interventions compared to clinical interventions for workers on work disability

Patient or population: workers on work disability
Settings: occupational health
Intervention: workplace interventions
Comparison: clinical interventions

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	clinical interventions	workplace interventions				
Time until first RTW Days until first RTW Follow-up: 12 months	**Study population**		**HR 2.65** (1.42 to 4.95)	71 (1 study)	⊕◯◯◯ **very low**[2,3,4]	
	472 per 1000[1]	**816 per 1000** (596 to 958)				
	Medium risk population					
	[1]					

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; **HR:** Hazard ratio;

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] Mean baseline risk from the study, natural choice when there is only one study available.
[2] Study scored 4 points on risk of bias assessment.

[3] Data are not generalizable since only one study on mental health problems addressed this comparison.
[4] Sparse data, only one study for this outcome.

DISCUSSION

Summary of main results

This systematic review identified six randomised controlled trials that evaluated the effects of workplace interventions on work disability. Five studies included workers with musculoskeletal disorders and one involved workers with mental health problems. The results of this review show that there is moderate-quality evidence to support the use of workplace interventions to reduce sickness absence among workers with musculoskeletal disorders when compared to usual care. No evidence was found to use workplace interventions on health outcomes. The lack of studies made it impossible to investigate the effectiveness of workplace interventions among workers with mental health problems and other health conditions.

Overall completeness and applicability of evidence

The results for the musculoskeletal disorders subgroup indicate a discrepancy between the work-related outcomes and the health outcomes. The lack of effect on health outcomes may be explained by the focus of a workplace intervention on reducing barriers to return to work and not on the symptomatic recovery from musculoskeletal disorders. Return to work seems to be influenced by a worker's ability to function and to adapt to the pain and symptoms rather than through complete disappearance of pain and other symptoms (Baldwin 2007; Bültmann 2007). This supports the hypothesis that return to work and resolution of symptoms are not equivalent. Work disability is a complex problem because it is multifactorial and multiple players are involved (Frank 1998; Loisel 2001; Schultz 2007). Workplace interventions address the work disability problem and not the underlying medical problem. For care providers, this may suggest that workplace interventions are appropriate for sick-listed workers with musculoskeletal disorders if return to work is the primary treatment goal. This treatment goal is in line with the ICF model of the World Health Organisation (WHO) (World Health Organisation 2001) in which the WHO stated that restoration of (work) participation should be a major treatment goal.

Based on current evidence, there is a growing demand in the literature for workplace interventions with active stakeholder involvement. As Frank (1998) stated, it is a challenge to bring all the relevant societal players together for the prevention of disability (Frank 1998) because each of the stakeholders has different interests, values, and language (Loisel 2005). In the studies in this review, stakeholders from the workplace were involved but stakeholders from outside the workplace were frequently not. However, there were only six studies eligible for this systematic review. There may be several reasons for the low number of studies. Firstly, the current focus of return to work interventions is still more on improving the worker's capacity by training or therapy (that is graded activity, cognitive behavioral therapy) than on adapting the workplace or formulating a return to work plan. This is especially the case for mental health problems and other health conditions. Another Cochrane systematic review identified studies on psychological interventions for depression but did not find any workplace interventions (Nieuwenhuijsen 2008). Secondly, the lack of studies on workplace interventions that facilitate return to work for mental health problems could be explained by the lack of recognition of mental health problems in some compensation systems, difficulties in establishing the work-relatedness of mental health problems (a prerequisite for receiving compensation in several countries), and existence of stigma related to mental health problems. For other health conditions, like cancer, research into effective interventions is also lacking. However, the importance of taking environmental factors into account, and more specifically workplace factors, has been recognized for both mental health problems and other health conditions (Berry 1992; Nachreiner 2007; Sanderson 2006). Within a few years results from some currently ongoing studies on workplace interventions for mental health problems will be available (van Oostrom 2008; Vlasveld 2008). Perhaps these studies may provide some direction in the search for return to work interventions for mental health problems.

Quality of the evidence

The risk of bias assessment showed generally low risk of bias for the absence caused by sickness outcome, except in two studies. Usually two extra criteria about blinding of the participants and the care providers are incorporated in the risk of bias assessment. The main argument for the lack of applicability of these criteria was that the workplace setting often does not allow blinding of participants or care providers, especially if high degrees of worker participation and workplace changes are part of the intervention. An attempt to include these criteria would probably have led to a biased restriction of evidence in favour of the more clinical interventions. However, neglecting these two items does not imply that they are not important or that they are not sources of bias. Not blinding participants and care providers remains a source of bias in occupational health research.

The studies scored relatively low on risk of bias and the significant results on the RTW outcomes were consistent. Therefore, the overall assessment of low-quality evidence could be surprising. The updated Cochrane handbook published in 2008 recommends use of the directness (generalisability) criteria to assign the quality of evidence (GRADE). Serious problems with regard to directness were present in this review because the results are mainly based on the musculoskeletal disorders subgroup, and not for mental health problems and other health conditions. Secondly, the study populations differed among the studies. For instance, while all studies on musculoskeletal disorders studied employees, the Blonk study studied self-employed workers (Blonk 2006). Because the factors influencing return to work may be different for the self employed, these results cannot be generalized to employees. On the other

hand, the fact that effectiveness was shown for different study populations is a strength for the quality of the evidence, which could not be rated in the quality of the evidence with GRADE. The limitations regarding directness were not found for the subgroup musculoskeletal disorders, therefore moderate quality evidence was assigned. Moreover, almost all participants in the included studies had less than three months of work disability. Effectiveness of workplace interventions for workers on long-term work disability was not studied.

There is a paucity of literature on whether an effect on return to work is important or unimportant (providing a minimally important change). For some other (mainly self-reported) outcomes, cut-off points for minimal clinically important change have been clearly formulated (Ostelo 2005; Ostelo 2008). This minimally important change has not been defined for sickness absence. Ostelo et al reported that from a socioeconomic point of view each day of earlier return to work is important (Ostelo 2008). Other literature suggests that a worthwhile effect can be different for each type of intervention, because it requires weighing evidence about the beneficial effects of the intervention against costs and risks of the intervention (Herbert 2005). For this review, the use of the one day cut-off point was not appropriate because one day at work followed by a recurrence is usually not considered as a successful return to work (de Vet 2002). Due to a lack of agreement on minimal important changes for return to work, we decided not to use this criterion in the risk of bias assessment.

Potential biases in the review process

There might be a chance that we have missed relevant unpublished studies. Nevertheless, we tried to minimize selection bias in our search by screening references of identified trials and systematic reviews, contacting experts in the research field, and by using no language restrictions. Careful screening of the identified papers resulted in one study that measured RTW outcomes but which did not publish the results (Feuerstein 2003). Exclusion of this study would have introduced publication bias, especially as this study showed no significant improvement for return to work. Therefore, we contacted the authors and requested the data about return to work, symptoms, functioning, and general health.

This review included randomised controlled trials only since methodologically weaker designs can easily lead to bias. In the field of occupational health, randomisation is sometimes difficult to perform. However randomisation seems not to be a problem in these individual RTW interventions (Verbeek 2007). Despite this, it should be realized that high quality prospective studies in workplaces could add relevant information to this review.

The use of dichotomous outcomes for sickness absence may have resulted in a loss of information because the exact duration of work disability and the episodic nature of work disability is neglected. Using continuous sickness absence outcomes is especially important when an intervention is targeted on return to work and when sickness absence is the primary outcome of the study. Therefore, this review excluded four studies that only reported a dichotomous measure of sickness absence (Cheng 2007; Haldorsen 1998; Lindh 1997; Nilsson 1996). In addition, the results on secondary outcomes might not completely represent all available evidence on these outcomes since inclusion of studies was based on reporting of a continuous RTW outcome measure. However, it is not likely that incorporation of more studies on our secondary outcomes will change the conclusions since other reviews support the lack of effect on health outcomes (Franche 2005).

The outcome return to work is currently a topic for discussion because work disability is a recurrent phenomenon (Infante-Rivard 1997; Wasiak 2006). A first return to work does not necessarily mark the end of the period of work disability (Young 2005). Therefore, time until first RTW is not regarded as a rigorous outcome and is sometimes even described as misleading (Baldwin 1996; Baldwin 2006). Recently Côté et al found that almost a third of workers with an incident episode of back pain experienced recurrent spells of work absenteeism during the following year (Côté 2008). However, the studies in this review most often reported the first RTW outcome. Outcomes that consider recurrence were found in two studies only (Anema/Steenstra 2007; Verbeek 2002), measured by the outcome lasting RTW or time until recurrence, respectively. Successful return to work was defined as an interconnected period of four weeks without recurrence of sick leave. The authors described that they chose the four-week period because four weeks is regarded as a lasting return to work in Dutch occupational care (Steenstra 2003). This shows that the choice for return to work outcomes depends on the social security context. Paying no attention to sustained return to work is a pitfall; therefore, future studies should assess outcomes that take recurrences of work disability into account. Furthermore, most studies used data on sickness absence from administrative databases, except for one study which used self-reported data. Whether use of self-reported or administrative data is better is not clear from the existing literature (Ferrie 2005; Fleten 2004; Pole 2006).

AUTHORS' CONCLUSIONS

Implications for practice

Workplace interventions were effective to reduce sickness absence among workers with musculoskeletal disorders, however, were not effective to improve health outcomes among workers with musculoskeletal disorders. The evidence from the subgroup analysis on musculoskeletal disorders was rated as moderate-quality evidence and was based on only five studies. Unfortunately, due to a lack of studies, conclusions for effectiveness of these interventions for mental health problems and other health conditions cannot be drawn.

The message for care providers in occupational health is to implement workplace interventions in guiding workers with work disability due to musculoskeletal disorders, rather than to rely on worker-focused interventions only. However, since this review showed a lack of effects on health outcomes, all stakeholders in the return to work process (worker, supervisor, healthcare providers, unions, insurers) should agree on a common goal, that is the facilitation of return to work.

Implications for research

There is clearly a need for more research on the effectiveness of workplace interventions for mental health problems and other health conditions before we can have confidence that extension of our conclusions to these types of disabilities is valid. Studies should improve or extend the workplace interventions with other intervention components that facilitate improvement of health status. In order to allow better comparisons, researchers should agree on the use of outcome measures for sickness absence.

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* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Anema/Steenstra 2007

Methods	RCT, multicenter, the Netherlands. Randomisation: cluster randomisation, level of occupational physician. A member of the research team randomised occupational physicians using a series of random numbers. Recruitment: an occupational physician informed the researchers whether inclusion in the study is justified on medical grounds. Duration recruitment: October 2000 - October 2002. Follow up: 12 months.
Participants	196 were randomised (work intervention: 96; usual care:100). Inclusion criteria: low back pain defined as pain localised in the lower back without a specific underlying cause between the lower angle of the scapulae and above the buttocks, sick leave from regular work for 2 to 6 weeks, age 18-65 y, understand Dutch language. Exclusion criteria: specific causes of low back pain such as herniated discs with pareses, paralysis, spinal tumour, spinal fracture, ankylosing spondilitis, spinal stenosis, spondylolisthesis, specific rheumatological diseases, pregnancy, serious psychiatric disorders (ICD-10 code: M51, M51.2, M51.4, M51.3, M51.8, M40-M54, M45, M46.0, M46.1, M46.8, M49, and M46.9), a legal conflict at work, sick-listed due to low back pain less than one month prior to the current episode of sick leave. Type of disability: musculoskeletal (diagnosis by occupational physician). Duration of absence prior to randomisation: 2-6 weeks.
Interventions	Work intervention (WI). Stakeholders involved: ergonomist, injured worker, supervisor, possible other stakeholders, occupational physician, general practitioner. Standardized treatment: a worksite assessment and work adjustments based on methods used in participatory ergonomics, observation of the worker's tasks by the ergonomist, ranking obstacles for RTW independently by the worker and the supervisor, meeting of the group of stakeholders to brainstorm and discuss about all possible solutions, achieving consensus regarding feasible solutions, communication between the occupational physician and the general practitioner to prevent conflicting advice, and occupational physician arranged RTW date with the worker. Usual care (UC). Stakeholders involved: injured worker, occupational physician, general practitioner. Standardized treatment: Dutch occupational guideline on low back pain advice for non-specific low back pain. Education about the good prognosis, coping with low back pain, fear of movement, planning for resumption of normal activities, advice to return to work within 2 weeks in the absence of further problems, if necessary temporary work adjustments regarding working hours or job content, optional workplace visit, optional consult general practitioner or other medical specialist
Outcomes	Sickness absence: administrative data used. Time until lasting RTW: duration of sick leave in calendar days from the first day of sick leave to full return to work in own or equal work, for at least 4 weeks without (partial or full) dropping out. Median work intervention = 77 days, usual care = 104 days, Hazard Ratio 1.7 (1.2 - 2.3)

	Time until first RTW: duration of sick leave in calendar days from the first day of sick leave to full return to work in own or equal work. Median work intervention = 69.5 days, usual care = 98.5 days, HR 1.67 (1.22 - 2.31) Cumulative duration of sickness absence: total duration of sick leave due to low back pain (including all recurrences of sick leave episodes) was calculated for the entire 12-month follow up. Mean (SD) work intervention = 108.4 (76.8) days, usual care = 135.1 (95.6) days Functional status: Roland-Morris disability questionnaire. Mean at 12 months (SD) work intervention = 6.0 (5.9) days, usual care = 5.8 (5.6) days Pain: Visual Analogue Scale. Mean at 12 months (SD) work intervention = 3.2 (2.6), usual care = 3.4 (2.7) Costs: direct medical costs (use of pain medication, medical and alternative medical resources), direct intervention costs and indirect costs (production losses due to sick-leave). Societal and employers perspective
Notes	

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	'A series of random numbers' (p. 3, Steenstra 2003)
Allocation concealment?	Yes	A - Adequate (Information gathered from personal contact with authors.)
Blinding? outcome assessor	Yes	Primary outcomes: 'In this study records on sick leave were obtained from the occupational health services from the various co-operating companies. Registration of sick leave is a continuous process in occupational health services.' (p. 4, Steenstra 2003) Secondary outcomes are self-reported, therefore for the secondary outcomes 'no' is assigned
Free of selective reporting?	Yes	The results from all important pre-specified outcomes (in published study protocol) have been adequately reported in the published report of the trial (judged on basis of Steenstra 2003 and Anema 2007).
Intention-to-treat analysis performed?	Yes	'All statistical analyses will be performed according to the intention-to-treat principle.' (p. 4, Steenstra 2003)

Were co-interventions avoided or similar?	No	'Co-interventions could not always be avoided. By informing the patients' general practitioner we tried to minimise co-interventions. In both the intervention and control groups we registered co-interventions by asking the worker and the occupational physician.' (p. 4, Steenstra 2003) 'Workers still on sick leave at 8 weeks are randomised for the Graded Activity intervention.' (p. 4, Steenstra 2003) 'Additional treatments in this group of 96 workers applied by other care givers than the occupational physician were: regular physiotherapy for 62 of 96 workers, manual therapy for 21 of 96 workers, Cesar therapy for 5 of 96 workers, chiropractor care for 7 of 96 workers, and a visit to a neurologist for 8 of 96 and to a orthopedic surgeon for 2 of 96 workers. There were no statistical differences between the (co)interventions received by the workers who received the workplace intervention or not.' (p. 294, Anema 2007) The Graded Activity intervention is a co-intervention, however, part of the study design
Was compliance acceptable in all groups?	Unclear	'According to our strict criteria, in 61.8% of the cases, the participatory ergonomic intervention was applied completely according to the protocol.' (p. 277, Anema 2003a) These data are based on the first 35 workers in the workplace intervention group only
Was the timing of the outcome assessment comparable in all groups?	Yes	'There is a 1-year follow-up with assessments at 12 weeks, 26 weeks and 52 weeks after first day of sick leave.' (p. 4, Steenstra 2003) 'Registration of sick leave is a continuous process in occupational health services.' (p. 4, Steenstra 2003)
Were the groups similar at baseline regarding the most important prognostic factors?	Yes	Table 2 (p. 294, Anema 2007)
Was the drop-out rate described and acceptable?	Yes	Drop out: 'Ten of 96 (10%) workers did not receive intervention: 5 workers returned to work before an appointment for

		the workplace intervention was made. Five workers did not participate in the workplace intervention due to a work scheduling problem (n=3), a medical reason (n=1), or a work conflict (n=1). None of the workers stopped during this intervention.' (p. 294, Anema 2007) Primary outcome: none because data retrieved from administrative database Secondary outcomes: 'For 24 workers (12%), no follow-up data regarding the secondary outcome measures could be collected.' (p. 294, Anema 2007)

Arnetz 2003

Methods	RCT, multicenter, Sweden. Randomisation: level worker. Participants were selected at random from the total pool of eligible participants. Every participant was allocated to either the intervention or reference group, based on the scheduled time of their visit to the local insurance branch office. In an interview with the insurance agency case manager and occupational therapist/ergonomist, potential participants were asked about their interest to participate in the project both in writing and verbally. Recruitment: potential study participants were selected from the roster of all sick leave cases at the two local branches of the National Insurance Agency. Duration recruitment: not reported. Follow up: 12 months.
Participants	137 were randomised (work intervention: 65; usual care:72). Inclusion criteria: diagnosed first or recurrent musculoskeletal disorders. Prior history of musculoskeletal disorders did not disqualify a person from inclusion as long as they recovered sufficiently to return to work during the interim period. Type of disability: musculoskeletal (diagnostic classification based on sick leave certificate) Duration of absence prior to randomisation: not described.
Interventions	Work intervention (WI). Stakeholders involved: insurance agency case manager, occupational therapist/ergonomist, employer, worker. Standardized treatment: early workplace-based intervention consisting of an interview focused on the social and occupational situation, possible adaptation at work, possibility of vocational training, all stakeholders meet at the worker's workplace, ergonomic assessment workplace, introduction appropriate ergonomic improvements, optional vocational training by a personal training schedule and instruction at work by the ergonomist, employer was encouraged to complete a rehabilitation investigation. Usual care (UC). Stakeholders involved: not reported. Non-standardized treatment: 8-week RTW plan (but only a minority actually conducted it)

Outcomes	Sickness absence: administrative data used. Cumulative duration of sickness absence: mean number of sick days Mean at 12 months (SD) work intervention = 144.9 (11.8) days, usual care = 197.9 (14) days. Other definition: mean days of paid rehabilitation. Costs: direct intervention costs and indirect costs (total reimbursement paid)
Notes	

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	'Computerized randomization table' (Information gathered from personal contact with authors.)
Allocation concealment?	No	C - Not adequate 'The allocation to the control or reference group, respectively, was concealed for the employees at the local insurance branch offices as well as to the scientist responsible for data analysis. It was not possible to conceal group allocations to participating employees with musculoskeletal disorders, nor the insurance branch managers or the ergonomist that were part of the team visiting the employers together with the employee with musculoskeletal disorders-related sickness absenteeism.' (p. 500, Arnetz 2003) 'All consecutive cases fulfilling the inclusion criteria were written into the randomisation table.' (Information gathered from personal contact with authors.)
Blinding? outcome assessor	Yes	Primary outcomes: Table 2, cumulative number of sick leave days generated from the local branch of the National Health Insurance Agency. (p. 502, Arnetz 2003) Secondary outcomes: self-reported, therefore for the secondary outcomes 'no' is assigned
Free of selective reporting?	Yes	The results from all important pre-specified outcomes (in methods) have been adequately reported in the published report of the trial (judged on basis of Arnetz 2003).

Arnetz 2003 (*Continued*)

Intention-to-treat analysis performed?	Yes	Primary outcome: Information on data on compensated sick days were tracked for all employees using the National Insurance official. (Information gathered from personal contact with authors.) Secondary outcomes: not reported, therefore for the secondary outcomes 'unclear' is assigned
Were co-interventions avoided or similar?	Unclear	Not reported.
Was compliance acceptable in all groups?	Unclear	Not reported.
Was the timing of the outcome assessment comparable in all groups?	Yes	Baseline, 6-months and 12-months follow-up (p. 501 and 502, Arnetz 2003).
Were the groups similar at baseline regarding the most important prognostic factors?	Yes	Table 1 (p. 501, Arnetz 2003).
Was the drop-out rate described and acceptable?	Unclear	Drop-out rate not reported. Primary outcome: none because data retrieved from administrative database Secondary outcomes not reported.

Blonk 2006

Methods	RCT, the Netherlands. Randomisation: level worker. "Randomly assigned". Recruitment: Self-employed individuals called upon their insurance company for disability benefits were briefly informed about the study and asked whether they wished to receive additional information before deciding whether to participate. Duration recruitment: 20 months Follow up: 10 months, RTW 360 days.
Participants	122 were randomised (workplace intervention (WI): 40; cognitive behavioural therapy (CBT): 40; control group (CG): 42). Inclusion criteria: self-employed individuals insured at a private insurance company with adjustment disorders like burnout and job stress. Exclusion criteria: psychiatric disorders (based on a shortened version of the Composite International Diagnostic Interview (CIDI)), not willing to postpone current (psychotherapeutic) treatment. Type of disability: mental health (self-reported and CIDI interview conducted by psychologist) Duration of absence prior to randomisation: immediate inclusion in the study when reporting being disabled

Blonk 2006 (*Continued*)

Interventions	Work intervention (WI). Stakeholders involved: self-employed individual, labour expert. Standardized treatment: combined intervention consisting of a brief cognitive behavioural therapy-derived intervention focusing on work stress, relaxation and time management including homework assignments, combined with both individual-focused and workplace interventions. A labour expert gave advice on work processes and provided suggestions on how to lower the workload and job demands and increase the decision latitude. Partial RTW was discussed. Cognitive Behavioural Therapy (CBT). Stakeholders involved: self-employed individual, psychologist. Standardized treatment: commonly used protocol in the Netherlands, consisting of cognitive restructuring and on registration of symptoms and situations, later sessions focused on work resumption, time-management, workplace interventions, conflict handling and fatigue, the assignments were related to the work situation. Usual Care (UC). Stakeholders involved: self-employed individual, general practitioner. Standardized treatment: two brief sessions with general practitioner to check the legitimacy of the work-disability benefit (no treatment group)
Outcomes	Sickness absence: administrative data used. Time until first RTW: length of time until full RTW. Median WI = 122 days, UC = 320 days, Hazard Ratio = 2.6 Other definition: length of time until partial RTW. Symptoms: Depression Anxiety Stress scale, Maslach Burnout inventory Depression at 4 months: Mean (SD) WI = 10.6 (9.0), UC = 14.4 (10.3) Depression at 10 months: Mean (SD) WI = 9.3 (8.8), UC = 13.3 (10.8) Anxiety at 4 months: Mean (SD) WI = 7.8 (6.6), UC = 8.9 (6.9) Anxiety at 10 months: Mean (SD) WI = 6.6 (6.6), UC = 7.1 (7.2) Stress at 4 months: Mean (SD) WI =14.2 (8.3), UC = 16.6 (8.2) Stress at 10 months: Mean (SD) WI = 13.3 (7.4), UC = 14.1 (9.2) Exhaustion at 4 months: Mean (SD) WI = 3.0 (1.7), UC = 3.4 (1.7) Exhaustion at 10 months: Mean (SD) WI = 2.9 (1.5), UC = 3.0 (1.8) Depersonalization at 4 months: Mean (SD) WI = 2.2 (1.5), UC = 2.3 (1.6) Depersonalization at 10 months: Mean (SD) WI = 1.9 (1.4), UC = 2.3 (1.6) Professional efficacy at 4 months: Mean (SD) WI =4.1 (1.0), UC = 3.9 (1.3) Professional efficacy at 10 months: Mean (SD) WI = 4.3 (1.0), UC = 4.0 (1.4)
Notes	Pre-test questionnaire was received after randomisation. No numbers given of post-hoc tests for differences between the three groups

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	Randomisation done by use of a dice (Information gathered from personal contact with authors)

Allocation concealment?	No	B - Unclear Use of a dice is not regarded as concealed.
Blinding? outcome assessor	Yes	Primary outcomes: 'These data were extracted from the database system of the insurance company'. (p. 136, Blonk 2006) Secondary outcomes are self-reported, therefore for the secondary outcomes 'no' is assigned
Free of selective reporting?	Yes	The results from all important pre-specified outcomes (in methods) have been adequately reported in the published report of the trial (judged on basis of Blonk 2006).
Intention-to-treat analysis performed?	No	'Furthermore, eight participants did not receive the assigned treatment because of miscommunication at the insurance company. As a result, the number of participants who filled in the pre-test questionnaire and received the assigned treatment was 36 in each condition.' (p. 133, Blonk 2006)
Were co-interventions avoided or similar?	No	Not registered (Information gathered from personal contact with authors)
Was compliance acceptable in all groups?	Unclear	Compliance is 67% (calculated based on p. 133 and 134, Blonk 2006).
Was the timing of the outcome assessment comparable in all groups?	Yes	'Respondents received questionnaires before the intervention (pre-test), and 4 months (post-test) and 10 months (follow-up) after the onset of the intervention.' (p. 133, Blonk 2006)
Were the groups similar at baseline regarding the most important prognostic factors?	No	Not reported for the three groups separately (p. 134, Blonk 2006).
Was the drop-out rate described and acceptable?	Unclear	Drop-out not reported, eight participants did not receive the assigned treatment, but not reported how many dropped-out Primary outcome: 'At the follow-up, the number of participants was 30, 30 and 29, respectively.' (p. 134, Blonk 2006) Loss to follow up is 10% for CBT group, 12,5% for work intervention group, and 15% for control group Secondary outcomes: 'The number of par-

		ticipants who returned all questionnaires was 30, 28, and 28.' (p. 134, Blonk 2006) Loss to follow up is 25% for CBT group, 30% for work intervention group, and 33% for control group

Feuerstein 2003

Methods	RCT, multicenter, in 10 metropolitan areas in the United States. Randomisation: level worker. "Randomly assigned". Recruitment: work-related upper-extremity disorders (WRUED) claimants were sent a letter from the Medical Director of the US Department of Labor's Office of Workers' Compensation Programs inviting them to participate in the study. Duration recruitment: March 1999 - December 2000. Follow up: 12 months sickness absence, 16-month self-reported outcomes
Participants	205 were randomised (work intervention: 96; usual care: 100). Inclusion criteria: age 18-65 y, accepted single WRUED-related workers' compensation claim, no past claims/cases in the previous 2 years, claim accepted and adjudicated as work-related within 90 days of filing, and still out of work or on modified duty at the time of claim adjudication, and at least one WRUED from the following ICD-9 categories: mononeuritis, enthesopathies, tendon disorder, soft tissue, nerve root and plexus, cervical disorders, osteoarthrosis, and muscle/ligament/fascia disorders. Type of disability: musculoskeletal (diagnosis ICD-9). Duration of absence prior to randomisation: a minimum of 90 days
Interventions	Work intervention (WI). Stakeholders involved: worker, case manager, supervisor, injury company specialist, medical providers, claims examiner. Standardized treatment: Quality medical case management and initial interview focused on domains that may affect injury recovery and RTW. Development of case management plan, and active problem solving to overcome potential RTW barriers. Work site ergonomic assessment to identify ergonomic factor that may contribute to risk of re-injury or delay of RTW and consequently providing ergonomic accommodations. Preventing re-injury and follow-up by increasing the claimants self-efficacy for monitoring and preventing future symptoms. Usual care (UC). Stakeholders involved: worker, case manager. Standardized treatment: Usual case management in which services often are limited to monitoring of the claims process and surveillance of medical treatment. Traditional case management usually fails to properly address ergonomic and psychosocial factors shown to be risk factors for WRUEDs and their associated disability
Outcomes	Sickness absence: administrative data used. Time until first RTW: number of days from the cleaned-up initial evaluation date and the truncated cleaned-up RTW date. Median work intervention = 21 weeks, usual care = 23.1 weeks, Hazard Ratio = 1.09.

	Functional status: Upper-Extremity Functional Limitations scale. Mean at 16 months (SD) work intervention = 4.82 (2.6), usual care = 5.31 (2.5) General health status: SF-12. General distress at 16 months: Mean (SD) work intervention = 49.1 (12.8), usual care = 43.0 (11.8) Physical health at 16 months: Mean (SD) work intervention = 36.5 (9.2), usual care = 34.7 (9.1) Symptoms: Carpal Tunnel Symptom severity scale. Mean at 16 months (SD) work intervention = 2.6 (0.7), usual care = 2.9 (0.8)
Notes	

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	Creation of a spreadsheet using a random number generator (Information gathered from personal contact with authors)
Allocation concealment?	Unclear	Not reported.
Blinding? outcome assessor	Yes	Primary outcomes: 'RTW was determined using administrative data extracted from computerized operational management systems used by the US Department of Labor's Office of Workers' Compensation Programs to administer workers' compensation benefits to federal employees.' (p. 806 Feuerstein 2003) Secondary outcomes are self-reported, therefore for the secondary outcomes 'no' is assigned
Free of selective reporting?	No	Data about the return to work outcome are not published yet.
Intention-to-treat analysis performed?	No	In the analysis received less participants than randomised were included, probably due to a lack of complete baseline self-report data of several participants (Information gathered from personal contact with authors) 'After excluding those persons with unavailable RTW data, who were on limited/restricted duty, or RTW dates that preceded the postintervention assessment (ie, before the 4-month standardized time allotted for case management services), 61 individuals

		were examined in regression analyses for time until RTW.' (p. 808, Feuerstein 2003)
Were co-interventions avoided or similar?	Yes	No statistically significant differences between the two groups (Information gathered from personal contact with authors)
Was compliance acceptable in all groups?	Unclear	Not reported.
Was the timing of the outcome assessment comparable in all groups?	Yes	'Postintervention assessments involved the completion of a mailed questionnaire 4 months after one's case manager completed the initial evaluation (ie, the time allowed by OWCP for provision of case management services). Similar follow-up questionnaires were mailed 6 and 12 months after the end of the intervention phase.' (p. 805, Feuerstein 2003)
Were the groups similar at baseline regarding the most important prognostic factors?	Yes	Table 1. (p. 807, Feuerstein 2003)
Was the drop-out rate described and acceptable?	Yes	Primary outcome: none because data retrieved from administrative databases Secondary outcomes: 20% at 4 months and 37% at 16 months (Information gathered from personal contact with authors). Therefore for the secondary outcomes 'no' is assigned

Loisel 1997

Methods	RCT, multicenter, Canada, Quebec. Randomisation: cluster randomisation, level workplace. Randomisation was carried out during a meeting of the oversight committee. Recruitment: the management of the participating workplaces identified workers filing claims for back pain and were compared with those in the workers compensation board master files. After 4 weeks of absence from work (or assignment to light duties) had been accumulated during 1 year, the worker and attending physician were offered the opportunity to participate in the study. Duration recruitment: 1 September 1991 - 31 December 1993. Follow up: 12 months for RTW; 5,1-7 years for costs.
Participants	130 were randomised (after randomisation 14 subjects were excluded because they did not meet the inclusion criteria and 12 did not respond to any follow-up visit; work intervention: 47; usual care:57). Inclusion criteria: thoracic or lumbar back pain incurred at work that had caused an absence from work (or an assignment to light duties) for more than 4 weeks and less

	than 3 months, age from 18 to 65 years, and back pain accepted for compensation by the Quebec workers compensation board. Exclusion criteria: pregnant workers, workers with spinal fracture, significant degenerative spinal disease (spondylolisthesis, grade 2 or more), a non-mechanical spinal disease (tumour or infection), major comorbid condition that might limit participation. Type of disability: musculoskeletal (accepted for compensation by workers compensation board) Duration of absence prior to randomisation: 4 weeks to 3 months
Interventions	Work intervention (WI). Stakeholders involved: worker, occupational physician, ergonomist, representatives union, representatives management, supervisor/employer, medical specialist (GP, co-workers). Standardized treatment: visit to occupational physician and participatory ergonomics evaluation conducted by an ergonomist. Occupational physician could recommend investigation or treatment or set up light duties to facilitate a return to usual tasks. Ergonomic intervention consists of work site evaluation to determine the need for job modifications, observation of worker's tasks, meeting for specific ergonomic "diagnosis", submission of precise solutions to employer. Usual care (UC). Stakeholders involved: worker, physician (other treatment providers). Treatment: treatment from attending physician, who was at liberty to prescribe any test, treatment, or referral to a specialist for care
Outcomes	Sickness absence: administrative data used. Time until first RTW: duration of absence from regular work. Median work intervention = 67 days, usual care = 131 days, Hazard Ratio = 1.91 (1.18 - 3.1). Other definition: duration of absence from any work (regular work or light duties). Functional status: Oswestry questionnaire. Mean at 12 months (SD) work intervention = 14.4 (14.3), usual care = 22.1 (19) Pain: visual analogue scale. Mean at 12 months (SD) work intervention = 14.6 (15.2), usual care = 21.6 (19.1) Costs: direct medical costs (usual health care costs), direct intervention costs and indirect costs (income replacement costs). Insurance provider perspective
Notes	

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Unclear	Not reported for workplace intervention.
Allocation concealment?	Yes	A - Adequate 'Randomization was carried out during a meeting of the oversight committee (see Organization of the Study, later in the ar-

		ticle).' (Loisel 1997a) 'The conduct of the study was overseen by a committee including investigators from the University of Sherbrooke, responsible for developing and implementing the study; investigators from McGill University, responsible for its evaluation; and representatives from the employers, the unions, and the workers compensation board, responsible for ensuring participation. The McGill evaluation team had no contact with the study site, the work sites, or the participants. It organized the randomization process and was responsible for data analysis.' (Loisel 1997a)
Blinding? outcome assessor	Yes	Primary outcomes: return to regular work or not was collected by question to the worker by the physician making the assessment (3, 6, 9, 12 months after work cessation) and blinded to the randomization status (Information gathered from personal contact with authors) Secondary outcomes are self-reported, therefore for the secondary outcomes 'no' is assigned
Free of selective reporting?	Yes	The results from all important pre-specified outcomes (in methods) have been adequately reported in the published report of the trial (judged on basis of Loisel 1997).
Intention-to-treat analysis performed?	No	'Fourteen out of the 130 randomized workers (11%) failed to meet the inclusion criteria (noncases). This retrospective ineligibility was because of premature inclusion (less than 28 days of absence: 2 cases, a clerical error) or late inclusion (more than 90 days of absence: 12 cases, late declaration by the employer) of the patients in the study. These cases were distributed in the four randomization groups.' (Loisel 1997a)
Were co-interventions avoided or similar?	Yes	(Information gathered from personal contact with authors)
Was compliance acceptable in all groups?	Unclear	Not reported.

Loisel 1997 (*Continued*)

Was the timing of the outcome assessment comparable in all groups?	Yes	'The first assessment (baseline) was scheduled at 4 weeks accumulated absence (study entry), and the final follow-up assessment 1 year after the initial absence from work. Two intermediate visits, 12 and 24 weeks after the initial absence, were scheduled to improve compliance with the study protocol.' (Loisel 1997a)
Were the groups similar at baseline regarding the most important prognostic factors?	Yes	Table 2 (Loisel 1997a)
Was the drop-out rate described and acceptable?	Yes	Primary and secondary outcomes: 26 participants (not specified for each group). (Loisel 1997a)

Verbeek 2002

Methods	RCT, multicenter, the Netherlands. Randomisation: cluster randomisation, level patient. A sealed opaque envelope containing a note including the allocation of the patient was opened. The assignment was based on block randomisation using a random numbers table. Recruitment: The administrative worker/occupational health nurse informed eligible subjects about the project. Follow up: 12 months.
Participants	120 were randomised (work intervention: 61; usual care:59). Inclusion criteria: sick leave with low back pain for at least 10 days, working in department that approved participation, specified pain located below the scapula and above the gluteal fold, no consultation with occupational physician for low back pain in the past 3 months, no pregnancy, understanding of Dutch language. Type of disability: musculoskeletal (based on diagnosis or self-report is not described) Duration of absence prior to randomisation: a minimum of 10 days
Interventions	Work intervention (WI). Stakeholders involved: worker, occupational physician, supervisor (general practitioner, physiotherapist). Treatment: management guideline for low back pain for occupational physician consisting of early diagnostics and interventions aimed at removing barriers for return to normal work, advice about exercise and education, advice about modifying the work demands, evaluation. Optional interventions are conferring with general practitioner or physiotherapist and advising or consulting the employer. Usual care (UC). Stakeholders involved: worker, supervisor, general practitioner (occupational physician later). Standardized treatment: medical treatment by general practitioner, patients did not visit the occupational physician during the first 3 months of sick leave

Outcomes	Sickness absence: administrative data used. Time until first RTW: time until RTW (working as many hours as before absence). Median work intervention = 51 days, usual care = 62 days, Hazard Ratio = 1.3 Cumulative duration of sickness absence: number of days lost over a 1 year period for all reasons and for low back pain For low back pain mean (SD) work intervention = 114 (113) days, usual care = 134 (126) days For all reasons mean (SD) work intervention = 125 (110) days, usual care = 145 (124) days Recurrences: time until recurrence. Median work intervention = 262 days, usual care = ?, HR = 2.4 (1.2 - 2.7). (In the original paper by Verbeek, there is a question mark for the recurrence value for usual care. See Table 2 of Verbeek 2002.) Functional status: Roland-Morris disability questionnaire. Mean at 3 months (SD) work intervention = 26 (24), usual care = 32 (28) Mean at 12 months (SD) work intervention = 20 (22), usual care = 21 (23) General health perception: Nottingham health profile. Pain at 3 months: Mean (SD) work intervention = 26 (29), usual care = 33 (32) Pain at 12 months: Mean (SD) work intervention = 18 (26), usual care = 22 (30) Physical mobility at 3 months: Mean (SD) work intervention = 17 (17), usual care = 23 (21) Physical mobility at 12 months: Mean (SD) work intervention = 15 (20), usual care = 19 (21) Lack of energy at 3 months: Mean (SD) work intervention = 18 (28), usual care = 22 (35) Lack of energy at 12 months: Mean (SD) work intervention = 20 (34), usual care = 10 (26) Emotional reactions at 3 months: Mean (SD) work intervention = 11 (20), usual care = 14 (24) Emotional reactions at 12 months: Mean (SD) work intervention = 12 (23), usual care = 8.7 (17) Social isolation at 3 months: Mean (SD) work intervention = 5.5 (15), usual care = 6.1 (17) Social isolation at 12 months: Mean (SD) work intervention = 4.5 (15), usual care = 3.4 (11) Sleep problems at 3 months: Mean (SD) work intervention = 11 (20), usual care = 15 (24) Sleep problems at 12 months: Mean (SD) work intervention = 8.5 (19), usual care = 8.5 (21) Pain: Visual Analogue Scale Mean at 3 months (SD) work intervention = 24 (25), usual care = 30 (26) Mean at 12 months (SD) work intervention = 31 (25), usual care = 38 (26)
Notes	

Risk of bias

Item	Authors' judgement	Description

Adequate sequence generation?	Yes	'The assignment was based on block randomization using a random numbers table. ' (p. 1844, Verbeek 2002)
Allocation concealment?	Yes	A - Adequate 'The administrative worker or the occupational health nurse of the specific occupational health service informed eligible subjects about the project. After informed consent, a sealed opaque envelope containing a note was opened. This note stated whether the patient was assigned to the occupational physician (i.e., the intervention group) or to the reference group.' (p. 1844, Verbeek 2002)
Blinding? outcome assessor	Yes	Primary outcomes: 'Sick leave data also were determined from computerized record systems of the occupational health services.' (p. 1845, Verbeek 2002) Secondary outcomes are self-reported, therefore for the secondary outcomes 'no' is assigned
Free of selective reporting?	Yes	The results from all important pre-specified outcomes (in methods) have been adequately reported in the published report of the trial (judged on the basis of Verbeek 2002).
Intention-to-treat analysis performed?	Yes	'The analysis was performed on an intention-to-treat basis.' (p. 1846, Verbeek 2002)
Were co-interventions avoided or similar?	No	'For the first 3 months of sick leave, the groups did not differ in terms of consultations with general practitioners, therapists, or specialists. (p. 1847, Verbeek 2002) Reported for the first 3 months only.
Was compliance acceptable in all groups?	Unclear	'Although the patients in the reference group were not invited for a consultation with their occupational physician during the first 3 months, 14 patients in this group (24%) went to see their occupational physician during this period on their own initiative. In the intervention group, two pa-

		tients did not visit the occupational physician, one because the physician's appointment schedule did not permit it before he had returned to work and one because the original diagnosis was changed.' (p. 1846, Verbeek 2002)
Was the timing of the outcome assessment comparable in all groups?	Yes	'The follow-up evaluation over the 12-month period consisted of monthly postal questionnaires' (p. 1845, Verbeek 2002)
Were the groups similar at baseline regarding the most important prognostic factors?	Yes	Table 1 (p. 1846, Verbeek 2002).
Was the drop-out rate described and acceptable?	Yes	Drop out: 'In the intervention group, two patients did not visit the occupational physician' (p. 1844, Verbeek 2002) Primary outcome: none because data retrieved from administrative database Secondary outcomes: 'The baseline questionnaire was returned by 117 patients (98%). After 3 months, 110 questionnaires were returned (92%), and 108 questionnaires were completed after 12 months (90%). The monthly questionnaires on health care utilization and sick leave during the first 3 months were returned by 110 patients (92%).' (p. 1846, Verbeek 2002)

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Bendix 1998	Intervention did not fulfil inclusion criteria, no supervisor involved or work adaptations planned
Beutel 2005	Not all participants had a job at baseline.
Bonde 2005	Not all participants had a job at baseline.
Brouwers 2006	Intervention did not fulfil inclusion criteria, no supervisor involved or work adaptations planned
Cheng 2007	Sickness absence outcome was measured as a dichotomous outcome only: RTW rate at 4-week follow up
Eshoj 2001	Intervention did not fulfil inclusion criteria, no supervisor involved or work adaptations planned. The sickness absence outcome was measured as dichotomous outcome only: vocational status (inactive employment as opposed to not inactive employment) at 12-month follow up

(*Continued*)

Haldorsen 1998	Sickness absence outcome was measured as dichotomous outcome only: RTW rate at 12 months
Haldorsen 2002	Workplace intervention was occasional.
Jousset 2004	Not all workers were on sick leave at baseline and intervention did not fulfil inclusion criteria
Karjalainen 2003	Not all workers were on sick leave at baseline.
Lindh 1997	Sickness absence outcome was measured as dichotomous outcome only: work status at 9 months, 1, 3, and 5-year follow up
Magnussen 2007	Intervention did not fulfil inclusion criteria, group-based and individual follow up focused on medical examination and assessment of work ability only
Meijer 2006	Intervention did not fulfil inclusion criteria, no supervisor involved or work adaptations planned
Nilsson 1996	Sickness absence outcome measured as dichotomous outcome only: rate of RTW each 6 months to 36 months follow up
Nystuen 2003	Intervention did not fulfil inclusion criteria, could be group or individual-based and there was no supervisor involved or work adaptations planned
Nystuen 2006	Intervention did not fulfil inclusion criteria, could be group or individual-based and no supervisor involved or work adaptations planned
Rupp 1994	Intervention did not fulfil inclusion criteria, no supervisor involved or work adaptations planned. Sickness absence outcome was measured as dichotomous outcome only: employment status
Scheel 2002	Intervention did not fulfil inclusion criteria, no supervisor involved or work adaptations planned
Schene 2007	The primary author of this paper notified that the intervention did not comply with the definition of a workplace intervention. The standardized intervention protocol confirmed this
Van den Hout 2003	The workplace intervention was part of both interventions in this study

DATA AND ANALYSES

Comparison 1. Workplace intervention versus usual care

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Time until lasting RTW	1		Hazard Ratio (Random, 95% CI)	1.70 [1.23, 2.35]
2 Time until first RTW	5	612	Hazard Ratio (Random, 95% CI)	1.55 [1.20, 2.01]
3 Cumulative duration of sickness absence	3	432	Mean Difference (IV, Random, 95% CI)	32.65 [14.17, 51.12]
4 TIme until recurrence	1		Hazard Ratio (Random, 95% CI)	0.42 [0.21, 0.82]
5 Functional status	4	410	Std. Mean Difference (IV, Random, 95% CI)	0.25 [-0.09, 0.58]
6 Symptoms - Depression	1	59	Mean Difference (IV, Random, 95% CI)	4.0 [-1.04, 9.04]
7 Symptoms - Anxiety	1	59	Mean Difference (IV, Random, 95% CI)	0.5 [-3.03, 4.03]
8 Symptoms - Stress	1	59	Mean Difference (IV, Random, 95% CI)	5.80 [-0.02, 11.62]
9 Symptoms - Upper extremity	1	80	Mean Difference (IV, Fixed, 95% CI)	0.30 [-0.03, 0.63]
10 Pain	3	317	Std. Mean Difference (IV, Random, 95% CI)	0.19 [-0.03, 0.41]

Comparison 2. Workplace intervention versus clinical intervention

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Time until first RTW	1	71	Hazard Ratio (Random, 95% CI)	2.65 [1.42, 4.95]
2 Symptoms - Depression	1	60	Mean Difference (IV, Random, 95% CI)	2.40 [-2.10, 6.90]
3 Symptoms - Anxiety	1	60	Mean Difference (IV, Random, 95% CI)	2.0 [-1.52, 5.52]
4 Symptoms - Stress	1	60	Mean Difference (IV, Random, 95% CI)	1.90 [-2.41, 6.21]

Analysis 1.1. Comparison 1 Workplace intervention versus usual care, Outcome 1 Time until lasting RTW.

Review: Workplace interventions for preventing work disability

Comparison: 1 Workplace intervention versus usual care

Outcome: 1 Time until lasting RTW

Study or subgroup	log [Hazard Ratio] (SE)	Hazard Ratio IV,Random,95% CI	Weight	Hazard Ratio IV,Random,95% CI
Anema/Steenstra 2007	0.5306 (0.1659)		100.0 %	1.70 [1.23, 2.35]
Total (95% CI)			**100.0 %**	**1.70 [1.23, 2.35]**
Heterogeneity: not applicable				
Test for overall effect: Z = 3.20 (P = 0.0014)				

Analysis 1.2. Comparison 1 Workplace intervention versus usual care, Outcome 2 Time until first RTW.

Review: Workplace interventions for preventing work disability

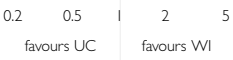
Comparison: 1 Workplace intervention versus usual care

Outcome: 2 Time until first RTW

Study or subgroup	WI N	UC N	log [Hazard Ratio] (SE)	Hazard Ratio IV,Random,95% CI	Weight	Hazard Ratio IV,Random,95% CI
Anema/Steenstra 2007	96	100	0.5128 (0.1628)		25.9 %	1.67 [1.21, 2.30]
Blonk 2006	35	34	0.969642 (0.321)		12.1 %	2.64 [1.41, 4.95]
Feuerstein 2003	59	64	0.093 (0.194)		22.2 %	1.10 [0.75, 1.61]
Loisel 1997	47	57	0.6471 (0.2464)		17.1 %	1.91 [1.18, 3.10]
Verbeek 2002	61	59	0.2623 (0.1906)		22.6 %	1.30 [0.89, 1.89]
Total (95% CI)					**100.0 %**	**1.55 [1.20, 2.01]**

Heterogeneity: $Tau^2 = 0.04$; $Chi^2 = 7.63$, df = 4 (P = 0.11); $I^2 = 48\%$

Test for overall effect: Z = 3.35 (P = 0.00080)



Analysis 1.3. Comparison 1 Workplace intervention versus usual care, Outcome 3 Cumulative duration of sickness absence.

Review: Workplace interventions for preventing work disability

Comparison: 1 Workplace intervention versus usual care

Outcome: 3 Cumulative duration of sickness absence

Study or subgroup	UC N	Mean(SD)	WI N	Mean(SD)	Mean Difference IV,Random,95% CI	Weight	Mean Difference IV,Random,95% CI
Anema/Steenstra 2007	100	135.1 (95.6)	96	108.4 (76.8)		58.1 %	26.70 [2.47, 50.93]
Arnetz 2003	72	197.9 (118.8)	65	144.9 (95.1)		26.5 %	53.00 [17.12, 88.88]
Verbeek 2002	49	134 (126)	50	114 (113)		15.3 %	20.00 [-27.18, 67.18]
Total (95% CI)	**221**		**211**			**100.0 %**	**32.65 [14.17, 51.12]**

Heterogeneity: Tau² = 0.0; Chi² = 1.74, df = 2 (P = 0.42); I² =0.0%

Test for overall effect: Z = 3.46 (P = 0.00053)

Analysis 1.4. Comparison 1 Workplace intervention versus usual care, Outcome 4 TIme until recurrence.

Review: Workplace interventions for preventing work disability

Comparison: 1 Workplace intervention versus usual care

Outcome: 4 TIme until recurrence

Study or subgroup	log [Hazard Ratio] (SE)	Hazard Ratio IV,Random,95% CI	Weight	Hazard Ratio IV,Random,95% CI
Verbeek 2002	-0.87547 (0.348276)		100.0 %	0.42 [0.21, 0.82]
Total (95% CI)			**100.0 %**	**0.42 [0.21, 0.82]**

Heterogeneity: not applicable

Test for overall effect: Z = 2.51 (P = 0.012)

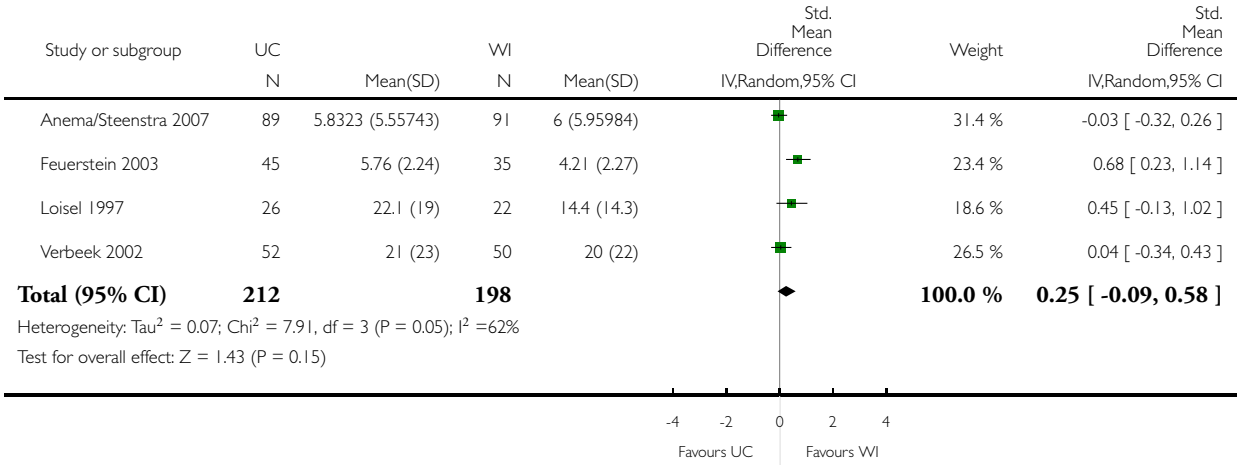
Test for subgroup differences: Not applicable

Analysis 1.5. Comparison 1 Workplace intervention versus usual care, Outcome 5 Functional status.

Review: Workplace interventions for preventing work disability

Comparison: 1 Workplace intervention versus usual care

Outcome: 5 Functional status

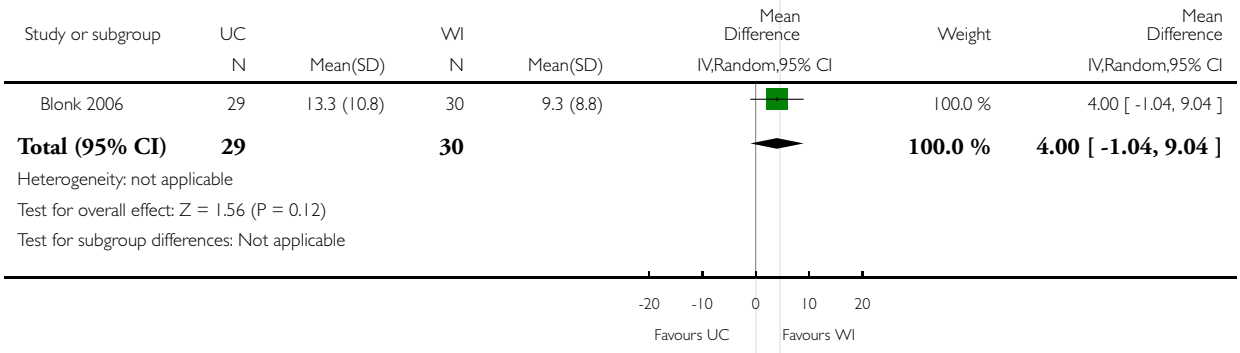


Analysis 1.6. Comparison 1 Workplace intervention versus usual care, Outcome 6 Symptoms - Depression.

Review: Workplace interventions for preventing work disability

Comparison: 1 Workplace intervention versus usual care

Outcome: 6 Symptoms - Depression

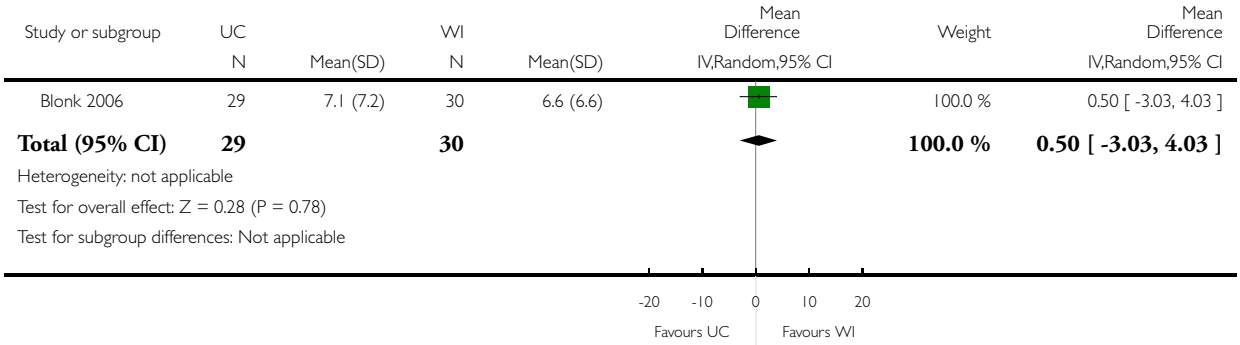


Analysis 1.7. Comparison 1 Workplace intervention versus usual care, Outcome 7 Symptoms - Anxiety.

Review: Workplace interventions for preventing work disability

Comparison: 1 Workplace intervention versus usual care

Outcome: 7 Symptoms - Anxiety

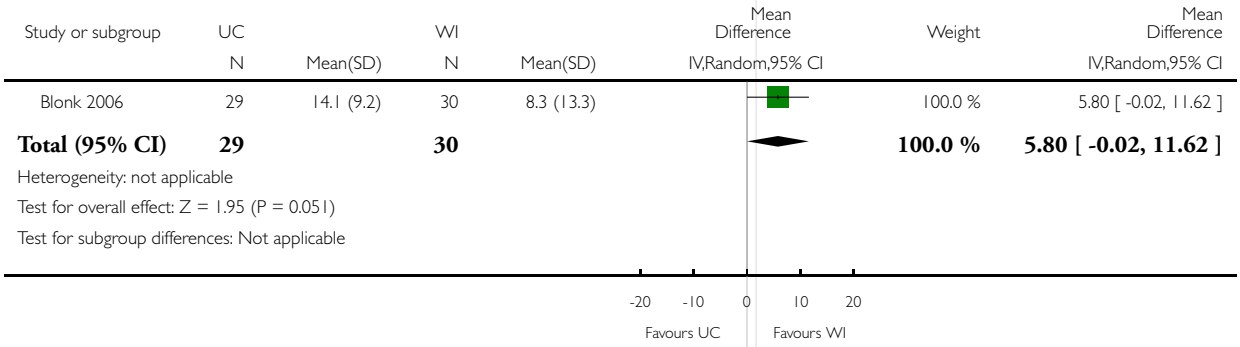


Analysis 1.8. Comparison 1 Workplace intervention versus usual care, Outcome 8 Symptoms - Stress.

Review: Workplace interventions for preventing work disability

Comparison: 1 Workplace intervention versus usual care

Outcome: 8 Symptoms - Stress



Analysis 1.9. Comparison 1 Workplace intervention versus usual care, Outcome 9 Symptoms - Upper extremity.

Review: Workplace interventions for preventing work disability

Comparison: 1 Workplace intervention versus usual care

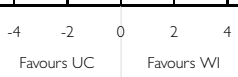
Outcome: 9 Symptoms - Upper extremity

Study or subgroup	UC N	Mean(SD)	WI N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
Feuerstein 2003	45	2.9 (0.8)	35	2.6 (0.7)		100.0 %	0.30 [-0.03, 0.63]
Total (95% CI)	**45**		**35**			**100.0 %**	**0.30 [-0.03, 0.63]**

Heterogeneity: not applicable

Test for overall effect: Z = 1.79 (P = 0.074)

Test for subgroup differences: Not applicable



Analysis 1.10. Comparison 1 Workplace intervention versus usual care, Outcome 10 Pain.

Review: Workplace interventions for preventing work disability

Comparison: 1 Workplace intervention versus usual care

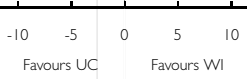
Outcome: 10 Pain

Study or subgroup	UC N	Mean(SD)	WI N	Mean(SD)	Std. Mean Difference IV,Random,95% CI	Weight	Std. Mean Difference IV,Random,95% CI
Anema/Steenstra 2007	83	3.4337 (2.73972)	88	3.16 (2.55513)		54.2 %	0.10 [-0.20, 0.40]
Loisel 1997	26	21.6 (19.1)	22	14.6 (15.2)		14.8 %	0.40 [-0.18, 0.97]
Verbeek 2002	49	30 (26)	49	24 (25)		30.9 %	0.23 [-0.16, 0.63]
Total (95% CI)	**158**		**159**			**100.0 %**	**0.19 [-0.03, 0.41]**

Heterogeneity: $Tau^2 = 0.0$; $Chi^2 = 0.86$, df = 2 (P = 0.65); $I^2 = 0.0\%$

Test for overall effect: Z = 1.66 (P = 0.098)

Test for subgroup differences: Not applicable



Analysis 2.1. Comparison 2 Workplace intervention versus clinical intervention, Outcome 1 Time until first RTW.

Review: Workplace interventions for preventing work disability

Comparison: 2 Workplace intervention versus clinical intervention

Outcome: 1 Time until first RTW

Study or subgroup	CI N	WI N	log [Hazard Ratio] (SE)	Hazard Ratio IV,Random,95% CI	Weight	Hazard Ratio IV,Random,95% CI
Blonk 2006	35	36	0.97551 (0.318)		100.0 %	2.65 [1.42, 4.95]
Total (95% CI)					**100.0 %**	**2.65 [1.42, 4.95]**

Heterogeneity: not applicable

Test for overall effect: Z = 3.07 (P = 0.0022)

Test for subgroup differences: Not applicable

Analysis 2.2. Comparison 2 Workplace intervention versus clinical intervention, Outcome 2 Symptoms - Depression.

Review: Workplace interventions for preventing work disability

Comparison: 2 Workplace intervention versus clinical intervention

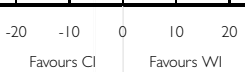
Outcome: 2 Symptoms - Depression

Study or subgroup	CI N	Mean(SD)	WI N	Mean(SD)	Mean Difference IV,Random,95% CI	Weight	Mean Difference IV,Random,95% CI
Blonk 2006	30	11.7 (9)	30	9.3 (8.8)		100.0 %	2.40 [-2.10, 6.90]
Total (95% CI)	**30**		**30**			**100.0 %**	**2.40 [-2.10, 6.90]**

Heterogeneity: not applicable

Test for overall effect: Z = 1.04 (P = 0.30)

Test for subgroup differences: Not applicable



Analysis 2.3. Comparison 2 Workplace intervention versus clinical intervention, Outcome 3 Symptoms - Anxiety.

Review: Workplace interventions for preventing work disability

Comparison: 2 Workplace intervention versus clinical intervention

Outcome: 3 Symptoms - Anxiety

Study or subgroup	CI N	Mean(SD)	WI N	Mean(SD)	Mean Difference IV,Random,95% CI	Weight	Mean Difference IV,Random,95% CI
Blonk 2006	30	8.6 (7.3)	30	6.6 (6.6)		100.0 %	2.00 [-1.52, 5.52]
Total (95% CI)	**30**		**30**			**100.0 %**	**2.00 [-1.52, 5.52]**

Heterogeneity: not applicable

Test for overall effect: Z = 1.11 (P = 0.27)

Test for subgroup differences: Not applicable

Analysis 2.4. Comparison 2 Workplace intervention versus clinical intervention, Outcome 4 Symptoms - Stress.

Review: Workplace interventions for preventing work disability

Comparison: 2 Workplace intervention versus clinical intervention

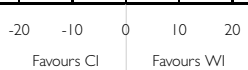
Outcome: 4 Symptoms - Stress

Study or subgroup	CI N	Mean(SD)	WI N	Mean(SD)	Mean Difference IV,Random,95% CI	Weight	Mean Difference IV,Random,95% CI
Blonk 2006	30	15.2 (9.5)	30	13.3 (7.4)		100.0 %	1.90 [-2.41, 6.21]
Total (95% CI)	**30**		**30**			**100.0 %**	**1.90 [-2.41, 6.21]**

Heterogeneity: not applicable

Test for overall effect: Z = 0.86 (P = 0.39)

Test for subgroup differences: Not applicable



ADDITIONAL TABLES

Table 1. Cost outcomes

Study	Cost outcomes	Notes
Anema/Steenstra 2007	Total costs: • WI: 8993 euros. • UC: 9109 euros. Ratio of 1 day: 19 euros.	No major difference in costs between work intervention and usual care but work intervention is associated with larger effects
Arnetz 2003	Total reimbursement from the health insurance system: • WI: 57564 Skr • UC: 73178 Skr Direct cost of WI was 550000 Skr. Total savings 972900 Skr. Benefit-to-cost ratio: 6,8.	Total reimbursement from the health insurance system significantly lower in work intervention group
Loisel 1997	1-year follow up. Saved consequence of disease costs against standard care: 604 CAD Cost-benefit: 220 CAD. 6,4 year follow-up. Saved consequence of disease costs against standard care: 10697 CAD Cost-benefit: 16827 CAD. Lower costs in the workplace intervention than in the control group. Significance was not calculated	There were a small number of very costly cases.

Table 2. Clinical relevant differences

Outcome	Measurement instrument	Clinical relevant difference	Reference	Judgement of clinical relevance appropriate
Lasting RTW	Days	every day of earlier return to work is important	Ostelo 2005	No
First RTW	Days	every day of earlier return to work is important	Ostelo 2005	No
Cumulative duration of absence	Days	*		No
Recurrences	Days	*		No
Functional status	RDQ	2/3 points	Furlan 2008	Yes

Table 2. Clinical relevant differences (*Continued*)

	Oswestry	10 points	Ostelo 2005	Yes
	Upper-extremity functional limitations scale	*	No information available	Yes
Pain	VAS	30%	Furlan 2008	Yes
Symptoms - anxiety	DASS	*		Yes
Symptoms - depression	DASS	*		Yes
Symptoms - stress	DASS	*		Yes
Costs	Value	*		No

Cells marked with (*) indicate the review authors were unable to find literature of a clinically relevant difference for that particular outcome.

Table 3. Content of the interventions

General characteristics of interventions	Specific characteristics interventions	Anema/ Steenstra	Arnetz	Blonk	Feuerstein	Loisel	Verbeek
applied components definition workplace intervention	changes workplace or equipment	x	x	x	x	x	x
	changes work design and organisation including working relationships	x	x	x		x	x
	changes in working conditions			x		x	
	changes to the work environment	x			x	x	
	case management with	x	x		x	x	

Table 3. Content of the interventions (*Continued*)

	worker and employer						
contacts	number of meetings	3	1	5-6	4-5	?	? - 3
	duration contact	1h	?		1-2h	1-3h	20 min
stakeholders involved	worker	x	x	x	x	x	x
	employer / supervisor	x	x	self-employed	x	x	x
	occupational physician					x	x
	occupational nurse	x			x		
	ergonomist	x	x			x	
	representative of an union					x	
	representative of an insurer		x	x			
type of contact	face-to-face	x	x	x	x	x	x
	by phone					x	
place of contact	at workplace	x	x	x	x	x	
	other				home and provider office		OHS
main treatment provider, work intervention		ergonomist, occupational nurse	insurance agency case manager	labour expert	nurse case manager	ergonomist	occupational physician
training treatment provider, work intervention		yes	?	yes	yes	?	yes

A 'x' mark indicates that the study fits the specific intervention characteristic. A '?' mark indicates that it is unclear whether the study fits the specific intervention characteristic.

Table 4. Total risk of bias scores

	Primary outcomes (work-related outcomes)	Secondary outcomes (health outcomes)
Anema/Steenstra 2007	8	8
Arnetz 2003	6	4
Blonk 2006	4	3
Feuerstein 2003	6	4
Loisel 1997	7	6
Verbeek 2002	8	7

Risk of bias was assessed using an adapted version of the checklist recommended by the Cochrane Back Group (Furlan 2008).

APPENDICES

Appendix 1. Detailed search strategies

The searches were conducted on 21 November 2007. No date restrictions were applied to any of the searches.

EMBASE.com (1974 to 21 November 2007)

1. RTW interventions

(vocational-rehabilitation/exp OR occupational-intervention OR disability-prevention OR disability-management OR 'disability'/de/dm_dm,dm_pc,dm_th OR 'work disability'/de/dm_dm,dm_pc,dm_th OR occupational-rehabilitation/exp OR workplace-intervention OR modified-duty OR modified-duties OR vocational-guidance OR case-manager OR case-management OR ergonomics OR 'ergonomic *3 approach' OR 'ergonomic *3 training' OR 'ergonomic *3 education' OR 'ergonomic *3 counselling' OR job-accommodation OR on-the-job-program OR workplace-accommodation OR modified-work OR supported-employment OR work-reintegration-plan OR light-duty OR work-site-visit OR work-visit OR work-adjustment OR solution-focused-intervention OR 'vocational *3 counselling' OR 'vocational *3 placement' OR 'vocational *3 training' OR 'occupational disease'/exp/dm_dm,dm_th)

2. Methodological filter and exclusion of chemicals and drugs

(random*:ti,ab OR clinical-trial OR clinical-trials OR health-care-quality/exp) NOT ('chemicals and drugs'/exp/mj)

3. #1 AND #2

Outcome terms were important for this review. However, Emtree terms such as work-disability and disease-duration were very broad, and were combined with population terms. On the other hand, specific terms for outcome were suitable to be incorporated without the population terms. Therefore we searched with two combinations.

4. Specific terms for outcomes

(absenteeism/exp OR (((worktime OR work-time) OR workday*) AND (loss OR lost)) OR return-to-work OR returns-to-work OR sick-leave OR work-resumption/de OR sick-absence OR sickness-absence OR lost-workdays OR sick-listed OR work-resumption OR duration-of-absence OR work-reentry-rate OR time-loss-from-work OR time-lost-from-work)

5. More general terms for outcomes, if used singly, were too broad, and therefore we used them in combination with terms for population.
(absenteeism/exp OR (((worktime OR work-time) OR workday*) AND (loss OR lost)) OR return-to-work OR returns-to-work OR sick-leave OR (work AND limitation*) OR job-performance/de OR work-resumption/de OR sick-absence OR sickness-absence OR 'disease duration'/exp OR work-disability/de OR work-disability OR disability-prevention OR disability/de OR disability-management OR employment-after-rehabilitation OR (regain AND (employment OR work)) OR lost-workdays OR (compensation AND cost*) OR work-resumption OR duration-of-absence OR work-reentry-rate OR time-loss-from-work OR time-lost-from-work) AND (employee/exp OR employee* OR employer/exp OR employer* OR worker/exp OR worker* OR workman* OR work-site OR worksite OR workman-compensation/de OR workers-compensation OR benefit-duration OR time-on-benefits OR workplace/de OR workplace OR work-environment/de OR supervisor*)
#3 AND #4
#3 AND #5
The methodological filter we used is a best sensitive methodological filter for EMBASE.com, to identify a set of relevant RCTs that is as complete as possible (Wong 2006)

CENTRAL (Issue 4, 2007)

1. Terms for population/place of application of intervention
(employee* OR employer* OR worker* OR manpower OR "work site" OR worksite OR "workman compensation" OR "workers' compensation" OR workplace OR "work environment" OR "work capacity" OR supervisor*)
2. Terms for outcome
(absenteeism OR ((worktime OR workday*) AND (loss OR lost)) OR "return to work" OR "returns to work" OR "sick leave" OR "job performance" OR "work resumption" OR "sick absence" OR "sickness absence" OR "disease duration" OR "work disability" OR "disability prevention" OR disability OR "disability management" OR "employment after rehabilitation" OR "regain employment" OR "regain work" OR "lost workdays" OR "duration of absence" OR "work reentry rate" OR "time loss from work" OR "time lost from work")
#1 AND #2
This search was restricted to CENTRAL (the Cochrane Central Register of Controlled Trials)

PsycINFO (1806 to 21 November 2007)

1. Terms for intervention
(DE=("vocational rehabilitation" or "supported employment" or "vocational evaluation" or "work adjustment training" or "occupational adjustment" or "disability management" or "case management") or KW=("workplace intervention*" or "job accommodation*" or "workplace accommodation*" or "modified work" or "work site visit" or "ergonomic*" or "occupational intervention" or "disability prevention" or "occupational rehabilitation" or "workplace intervention" or "modified duty" or "light duty" or "modified duties" or "vocational guidance" or "case manager" or "on the job program" or "work reintegration plan" or "solution focused intervention" or "vocational counseling"))
2. Terms for outcome
((DE=("employee absenteeism" or "reemployment" or "employee leave benefits")) or KW=("return to work" or "returns to work" or "work disability" or "employment after rehabilitation" or "time loss from work" or "time lost from work" or "work rehabilitation" or "absenteeism" or "work resumption" or "sick leave" or "sick listed" or "sick absence*" or "sickness absence*" or "absenteeism" or "worktime loss" or "work time loss" or "workday loss" or "work resumption" or "lost workdays" or "duration of absence" or "work reentry rate" or "time loss from work" or "time lost from work"))
#1 AND #2.

Cochrane Occupational Health Field's Specialised register

1. a code for research design: RCT-study (all non-indexed fields)
2. a code for outcome: disability-outcome (all non-indexed fields)

HISTORY

Protocol first published: Issue 1, 2008

Review first published: Issue 2, 2009

Date	Event	Description
27 March 2008	Amended	Converted to new review format.

CONTRIBUTIONS OF AUTHORS

SHO conducted the study selection, quality assessment, data extraction, data analysis, and drafted the text. MTD conducted the study selection, quality assessment, data extraction, and reviewed the review. HCWV was the third person for the quality assessment and data extraction, provided advice for the data analysis and reviewed the review. JRA was the third person for the study selection and reviewed the review. RLF, WM, ES and PL reviewed the review.

DECLARATIONS OF INTEREST

Four co-authors of this review (JRA, HCWV, WM and PL) are also authors of some of the included studies. In order to avoid conflicts of interest, SHO and MTD conducted the risk of bias assessment and data extraction of the studies. In case of disagreement, a third review author (HCWV) was consulted.

SOURCES OF SUPPORT

Internal sources

- No sources of support supplied

External sources

- Ministry of Social Affairs and Employment, Aladdin funding, Netherlands.

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

The differences between the protocol and the review are as follows.

1. Use of an extra criterion for the risk of bias assessment (F: were reports of the study free of suggestion of selective outcome reporting?) as advised in the new guidelines of the Cochrane Back Group (Furlan 2008).

2. Reporting on pain and symptom outcomes as additional secondary outcomes, since these are important outcomes for workers and care providers, and most studies present results on these outcomes.

INDEX TERMS

Medical Subject Headings (MeSH)

*Absenteeism; *Occupational Health; Low Back Pain [prevention & control]; Mental Disorders [*prevention & control]; Musculoskeletal Diseases [*prevention & control]; Occupational Diseases [*prevention & control]; Randomized Controlled Trials as Topic; Workplace

MeSH check words

Humans