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Workplace Disability Management Programs Promoting Return to Work: A Systematic Review

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Campbell Systematic Reviews

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Executive Summary

This report presents a Campbell systematic review on the effectiveness of workplace disability management programs (WPDM programs) promoting return to work (RTW), as implemented and practised by employers. The objectives of this review were to assess the effects of WPDM programs, to examine components or combination of components, which appear more highly related to positive RTW outcomes, and get an understanding of the research area to assess needed research.

Twelve databases were searched for peer-reviewed studies published between 1948 to July 2010 on WPDM programs provided by the employer to re-entering employees with injuries or illnesses (occupational or non-occupational). Screening of articles, risk of bias assessment and data extraction were conducted independently by pairs of review authors.

A total of 16,932 records were identified by the initial search. Of these, 599 papers were assessed for relevance. Thirteen studies (two non-randomized studies (NRS) and eleven single group 'before and after' studies (B & A)), including data from eleven different WPDM programs, met the inclusion criteria. There were insufficient data on the characteristics of the sample and the effect sizes were uncertain. However, narrative descriptions of the included program characteristics were rich, and provide valuable insights into program scope, components, procedures and human resources involved.

There is a lack of evidence to draw unambiguous conclusions on the effectiveness of employer provided WPDM programs promoting RTW. Thus, we could not determine if specific program components or specific sets of components are driving effectiveness.

The review adds to the existing knowledge base on WPDM program development, characteristics and evaluation. At an organizational level intervention, employer provided WPDM programs are multi-component constructs, offering a suite of policies and practices for injured or ill employees. The review identified 15 constituent program components, covering individual, organizational, and system level policies and practices, depicting key human resources involved in workplace program procedures and administration.

The majority of WPDM programs targeted musculoskeletal disorders, during the off-work and pre-return phase of the RTW process. Evidence on WPDM programs targeting mental health conditions and post return/stay at work was scant.

Future program evaluations ought to broaden their focus beyond the first phases of the RTW process and incorporate sustainable outcomes (e.g. job retention, satisfactory and productive job performance, work role functioning, and maintenance of job function).

Given the lack of WPDM programs evaluated in peer-reviewed publications, more attention needs to be given to locate and rigorously evaluate efforts from company studies that may still exist outside the peer reviewed published literature.

While many employers recognize the importance of WPDM and are adopting policies and practices to promote RTW, judging from this review, the existing evidence leaves room for more rigorous methodological studies to develop the present WPDM knowledge base. Prospectively, WPDM evaluation research also needs to enlarge its perspective and refine its analytic tools to examine information that is meaningful and cost effective to those who will benefit from it, to further advance the field.

The review findings might help explicate WPDM programs and their potential impact on RTW outcomes, and provide a more complete understanding of the research in the field of WPDM. This may inspire researchers, employers, and policy makers, who are interested not only in questions regarding the impact of programs, but also their nature, to promote future design and evaluation of DM in organizations.

List of key terms

B & A	Single group before and after study
DM	Disability management
DM policy	Disability management policy
DM practice	Disability management practice
ICF	International classification of functioning disability and health
ILO	International Labour Organization (Geneva: UN)
MSD	Musculoskeletal disorder
MSI	Musculoskeletal injuries
NRS	Non randomized study
OECD	Organization for Economic Corporation and Development (Paris)
OHS	Organizational health and safety
OPP	Organizational policy and practice
RCT	Randomized controlled trial
RTW	Return to work
RTW coordinator	Return to work coordinator
RTW intervention	Return to work intervention
RTW outcome	Return to work outcome
RTW policies	Return to work policies
RTW practices	Return to work practices
RTW process	Return to work process
RTW research	Return to work research
WC	Workers' compensation
WCB	Workers' compensation board

WHO	World Health Organization (Geneva)
WPDM	Workplace disability management

1 Background

1.1 DESCRIPTION OF THE CONDITION

The share of the working-age population relying on disability and sickness benefits as their main source of income has tended to increase in many OECD countries (OECD, 2003; OECD, 2008).Workplace inclusion of employees with disabling injury or illness continues to create a great challenge for most industrialized countries, where musculoskeletal and mental health disorders contribute to the inability to work (Corbiére et al., 2009; Waddell & Burton, 2005; WHO, 2005; WHO, 2003; Elders et al., 2000).

In particular, long-term sickness absence is a challenge associated with a series of negative economic and social consequences resulting in great societal impact (Vingård et al., 2004; Bloch & Prins, 2001; Galizzi & Boden, 1996). Long-term sickness absence often represents a substantial individual life event (Dembe, 2001), where the duration of absence due to injury or illness increases the future risk of receiving disability pension and permanent exclusion from the labor market (Lund et al., 2008; Labriola & Lund, 2007).

At the employer level long-term sickness absence may lead to lower productivity and quality, higher employee turnover and reduction in job satisfaction due to the added workload placed on other employees (Whitaker, 2001). Facilitating return-to-work (RTW) following work disability therefore receives continued attention from a wide spectrum of research fields and policy- and decision-makers (OECD, 2008; Waddell & Burton, 2005; Wynne & McAnaney, 2004; Thornton, 1998).

Many employers revise control absence policies to minimize loss in production while governments focus on early RTW policies (Cunningham & James, 2000; MacEachen et al., 2007). What has gained less attention is the actual development of sustainable management and inclusive work environments to prevent exclusion and prolonged absence leading to early retirement. Therefore a synthesis of the research on interventions to stimulate disability management, prevention of the onset of work disability, and practices promoting RTW is needed.

1.1.1 The concept of Disability Management

Disability Management (DM) is a concept which is rapidly emerging in business and industry as well as private and public rehabilitation. However, systematic or comprehensive DM promoting RTW are relatively recent phenomena (Harder & Scott,2005; Habeck & Hunt, 1999; Van Hooser & Rice, 1989). DM is often a multi-faceted challenge and may vary according to the present injury or illness and the cultural, legal and structural context of the labor market (Loisel et al., 2005a; Krause & Lund, 2004; Shrey & Hursh, 1999; Høgelund, 2003).

DM practices aimed at RTW involve dynamic interactions between the individual's health condition and contextual factors such as the employer, healthcare and social/compensation systems (Labriola, 2008; Schultz et al., 2007; Loisel et al., 2005a; Waddell & Burton, 2005; Pransky et al., 2004; Franche & Krause, 2002; Friesen, 2001). The recognition of the impact of social and contextual factors on RTW is also referred to as a paradigm shift from disease prevention and treatment to disability prevention and management (Loisel et al., 2001; Shrey, 1996).

Given the multi-faceted nature of DM, concrete interventions on RTW may be delivered by providers, both internal and external to the workplace. This means that inherent interventions related to DM practices may be directed or initiated at the workplace and that the current implementation of these interventions may take place within the workplace or in settings outside the workplace (van Oostrom et al., 2009; Franche et al., 2005; Harder & Scott, 2005). Recent research has highlighted the potential of a closer linkage between DM practices and the workplace (van Oostrom et al., 2009; Franche et al., 2005; Krause & Lund, 2004; Krause et al., 1998) and the workplace is put forward as a decisive arena for the management of RTW (MacEachen et al., 2006; James et al., 2006; Franche et al., 2005; Krause & Lund, 2004; King, 1998; Shrey, 1995). This has led to a growing interest in workplace DM as an effective effort to promote RTW.

DM in the workplace can be seen as organizational policies and practices which aim to minimize loss in production, reduce the magnitude of work disability, and prevent injuries or illnesses from becoming chronically disabling (Brewer et al., 2007; Williams & Westmorland, 2002; Amick et al., 2000a; Shrey & Hursh, 1999; Habeck & Hunt, 1999; Akabas et al., 1992).

While the term RTW is commonly used, the extent to which it has a shared and agreed upon meaning is limited. RTW can be referred to as an intervention, a process and an outcome (Young et al., 2005b). In this review we see RTW as an outcome. RTW refers to a variety of outcomes following work disability that describes the duration or extent of an inability to work due to functional limitations (Krause & Lund, 2004).

Work disability following injury or illness can be wholly or partly work-related. Thus, the work environment often limits the actual space for recovery, which employees face upon their return (Krause & Lund, 2004). In this review the term 'work disability' refers to individuals who have discontinued their participation in occupational activities, and includes time off work as well as any on-going work limitations. This approach is consistent with the definition of disability advanced by the International Classification of Functioning, Disability and Health (ICF) (Young et al., 2005b; WHO, 2001).

This review considers employees whose ability to perform customary work tasks are endangered when an acquired physical injury (e.g., musculoskeletal disorders; back pain, neck pain or whiplash), illness (e.g., cancer or stroke) or mental health disorder (e.g. stress disorder, depression or anxiety) results in functional limitations and sickness absence.

To place our approach to work disability in the larger context of DM, it would be reasonable to argue that the type of components encompassed in employer provided DM have the potential to prevent exclusion and enhance a better understanding of the management of RTW at the workplace (James et al., 1997). We acknowledge that our demarcation of DM and work disabilities included is less than ideal, given the lack of attention paid to other types of pre-existing disabilities or impairments. Nevertheless, this approach still has considerable value as an, albeit partial, indication of how far employers really are seeking to secure safe RTW and stay at work through the adoption of DM in organizational contexts.

1.2 DESCRIPTION OF THE INTERVENTION

1.2.1 Workplace Disability Management

This review focuses on the form of DM that takes place within the workplace-setting and is labeled Workplace Disability Management (WPDM) (Williams & Westmorland, 2002; Shrey, 1995; Akabas et al., 1992). On the whole, WPDM is defined as a comprehensive and cohesive employer based approach to managing complex needs of people with work disability within a given work environment (Shrey, 1995; Harder & Scott, 2005). The aim of WPDM is successful job maintenance and RTW (Akabas et al., 1992). WPDM may focus on the disablement process (Verbrugge & Jette, 1994) in its earliest stages after the work disabling injury or illness has occurred (*secondary prevention*) (Frank et al., 1996). Suitable WPDM practices can also help people manage complicated, long-term or chronic health problems (*tertiary prevention*) (Garcy et al., 1996). Both secondary and tertiary approaches to RTW may involve interventions at the individual, organizational or societal level or a combination of these (Labriola, 2008; Loisel et al., 2005a).

In this review 'Workplace Disability Management' is operationally defined as: *Policies and procedures, in which the employer, systematically ensure an on-going, timely and pro-active alertness towards the allocation, organization and coordination of resources to the practical management of return to work and staying at work within the workplace.*

By the term *workplace* emphasis is placed on the domain of the workplace level. We focused on WPDM in the context of secondary prevention, which in effect concentrates attention on the arrangements that employers have in place to facilitate the return to work of employees who are unable to work as a result of injury or illness.

Employers may develop WPDM programs to guide their effort in helping sick listed employees back to work (Williams & Westmorland, 2002; Shrey, 1995; Akabas et al., 1992) (see pg.10 for a list of components). WPDM programs utilize services, people, and procedures to facilitate safe and timely RTW (Shrey et al., 2006; Williams & Westmorland, 2002; Shrey, 1995; Akabas et al., 1992). This makes WPDM programs unique in providing organizational support to workplace practices on RTW, bridging interventions and strengthening corporate culture expectations and collaboration across problems and stakeholders in the workplace (Amick et al., 2000a; Shrey, 1995; Van Hooser & Rice, 1989).

In practice, having a WPDM program in place may clarify the procedures and activities for both employers and employees when an injury or illness occurs. The employee may, when sick-listed, receive information on how the workplace can support the employee in the progress from injury or illness to safe RTW. This would keep the employee from feeling excluded from the workplace and at the same time secure an on-going evaluation of their situation and initiatives taken. On the other hand, employers will have proper procedures and services in place on how they should register and respond to sick-listed employees and monitor initiatives towards RTW.

All WPDM programs may provide an integrative framework for the complex and sensitive issue of RTW that gives the employer and employee a unique opportunity to structure services in relation to the present health condition and achieve consensus on expectations and the possibilities for suitable accommodation opportunities.

1.3 HOW THE INTERVENTION MIGHT WORK

In this review, the presence of a WPDM program refers to situations where organizational policies and practices (OPP) for the management of RTW (Amick et al., 2000a; Shrey, 1995; Hunt & Habeck, 1993) exist. Employer-provided and initiated WPDM can and does rely on policies and procedures for its impact.

Interventions and program components come as a result of, and have power because of, decisions and procedures within the workplace. This is a major distinguishing feature of WPDM, whereas provider-driven DM must rely only on the impact of interventions and program components alone as a commodity or services offered to the workplace. This is why this review incorporated workplace organizational policies and practices in its scope, in order to capture the organizationally relevant factors involved in WPDM and RTW outcomes.

We conceptualize a WPDM program as: *an organizational rehabilitation program provided by the employer or through a company-wide department, consisting of an integrated set of components promoting safe and timely return to work and sustained job retention within the work environment.*

A WPDM program therefore relates to conditions of the practical implementation of RTW activities, who is responsible for initiating RTW activities, and how RTW activities are organized and managed. WPDM programs are typically offered by the employer in collaboration with key parties in the workplace (e.g., managers, supervisors, labor union representatives, occupational health and safety officers, human resource officers, occupational therapist or rehabilitation service councilors) (Shrey & Hursh, 1999). However, the presence, composition and involvement of workplace key parties in RTW processes may vary according to OHS systems, variations in the extent of employee ill health and injury, company size, work undertaken and cultural context (Shaw et al., 2008; Amick et al., 2000a; Frank, 1998; James et al., 1997; Drury 1991).

The duration of WPDM programs or specific program components in a WPDM program may vary according to the individual health condition and disability phase (e.g., acute, sub-acute or recovery phase) (Franche & Krause, 2002, Frank et al., 1996), phase-specificity of the RTW process (off work, pre-return, post return) (Young et al., 2005b), and work environments. Attention to the different phases in the RTW process (i.e., while the employee is off work, when the employee returns back to work, and once back at work during the phase of sustainability of work ability) may seem important when evaluating the scope of WPDM-programs and their constituent components (Tjulin et al., 2010).

The impact of work environments and their relation to duration of disability often seem to be overshadowed by clinical aspects of RTW. Thus the provision of work environments services (e.g., human resources, labor relations and personnel management services, accommodations, availability of modified work (schedule, duties) and access to alternative placements is emphasized by ILO and WHO, as factors that may play an equally profound role on work opportunities, where DM and duration of disability also can be considered (WHO, 2001; ILO, 2002). Components of WPDM programs therefore may be aimed at the individual, group and organizational level or a combination of these.

Multiple program components have been recognized by research and advocacy groups as established DM practices (Franche et al., 2005; Shrey, 1995; Habeck et al., 1991). WPDM programs may consist of components such as these below (see also Appendix 1):

- Early contact and intervention
- Workplace assessment
- Provision of workplace accommodations
- Transitional work opportunities
- Modified and/or tailored work (schedule, duties)
- Access to alternative placements
- RTW coordination or case management
- RTW policies
- Active employee participation
- Joint labor-management commitment
- Revision of workplace roles in RTW (e.g. redefine task and re-delegation of responsibilities)
- Education of workplace staff (e.g. supervisors, OHS or union repr., case managers)
- Preventive strategies to avoid disability occurrence
- Information systems that enhance accountability, on-going monitoring of disability cases and program evaluation
- Multidisciplinary work-rehabilitation services; vocational (e.g. job-replacement, job sharing and job training), clinical (either *psychological* (e.g. cognitive therapy, motivation or control exercise) or *physical* (e.g. graded activity, participatory ergonomics or 'work hardening')).

1.4 WHY IT IS IMPORTANT TO DO THIS REVIEW

Corporate social responsibilities, in areas such as work disability, are promoted by many social actors in society from governments to corporations and many employers recognize the importance of DM in promoting RTW (Williams & Westmorland, 2002; Whitaker, 2002). However, many employers face a huge challenge in managing the RTW process, in a situation where more responsibility for disability management and disability prevention is placed upon employers (Eakin et al., 2002; Frick et al., 2000). Inability and lack of compliance towards RTW from employers may lead to huge variation, in the way DM practices are conducted in the workplace. This is a challenge that demands more knowledge on the development, implementation and evaluation of successful DM programs within the workplace-setting (Krause & Lund, 2004; Williams & Westmorland, 2002).

In spite of the growth in the literature on the effectiveness of workplace-based interventions in RTW, WPDM programs are only implicitly highlighted, and WPDM programs that promote RTW have to our knowledge not been analyzed separately in

a systematic way. A recent Cochrane review by van Oostrom and colleagues (van Oostrom et al., 2009) evaluated whether effects of workplace based-interventions on RTW differed when applied to musculoskeletal disorders (MSD), mental health problems or other health conditions. The review only included RCTs. Interventions were included as long as they were closely linked or directed at the workplace and there were some sort of collaboration with the employer. This implies that a broader range of clinical interventions, from providers within the healthcare-setting were included. The results of the review show moderate evidence that workplace-based RTW-interventions can reduce sickness absence among employees with MSD disorders compared to usual care (van Oostrom et al., 2009).

In their extensive review of workplace-based RTW interventions on MSD, Franche and colleagues (Franche et al., 2005) found evidence suggesting that workplace-based RTW-interventions on MSD can reduce work disability duration and associated costs; however the evidence regarding their impact on quality of life was weaker. There was moderate evidence for positive effects associated with components such as; early contact, modified work and the presence of a RTW-coordinator. They underline that there is a need for a better understanding related to which organizational factors that promote RTW effectively (Franche et al., 2005). The importance of workplace involvement is also noted by Carroll and colleagues in their review of RTW among employees with low back pain. Stakeholder participation and work modification were more effective at returning employees to work than other workplace-linked interventions (Carroll et al., 2010).

WPDM is also covered in several non-systematic literature reviews (Krause & Lund, 2004; Williams & Westmorland, 2002). In their evaluation of employer based RTW programs Krause and Lund observed that interventions with some form of modified work improved RTW and reduced lost work days after occupational injury. They also highlight that the effect of the elements in employer provided RTW programs need to be supported by more comprehensive research that focus on the role of the workplace and the interactions between employer and employee in the RTW-process (Krause & Lund, 2004). Williams and Westmorland (2002) outline the essential elements of successful WPDM. They suggest that active employer participation, supportive work climate and collaboration between labor and management are crucial factors in facilitating RTW (Williams & Westmorland, 2002).

In contrast to prior systematic reviews, focusing on workplace based RTW interventions, we sought to dig further into the role of the workplace by narrowing our focus to DM practices that are part of an employer provided WPDM program. We have accordingly placed a clear restriction on the providers and the content of interventions included in this review, thereby excluding interventions initiated by stakeholders outside the workplace (i.e., community and healthcare-based vocational and clinical interventions directed at the workplace). In doing this, we

aimed to capture the organizationally mediated factors of WPDM programs and analyze their effect on RTW outcomes.

Focusing on the development and synthesis of knowledge that can assist employers in their DM efforts has several important payoffs with relevance to policy and decision-makers. Put into practice WPDM programs may provide responsive and sustainable organizational policies and practices that can guide “onsite” interventions, internal coordination and bridge collaboration outside the workplace. This may lead to a better use of human resources, reduce dependence on public sickness and disability benefits (sick-leave wages) and contribute to a healthier and more inclusive working life. Furthermore it is necessary to continue to review the available literature as new research is published. This may strengthen future funding for the development of new research projects on WPDM. This review sets out to serve these purposes.

2 Objective of the review

The objective of this review was to assess the effectiveness of Workplace Disability Management Programs promoting RTW. In particular, we set out to:

- Compare WPDM programs to no treatment, treatment as usual or alternative intervention;
- Examine components of WPDM programs which appear more highly related to positive outcome;
- Look at the existing literature and get an understanding of the research area and its development, research potentials and assess needed research areas.

3 Methods

3.1 CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

3.1.1 Types of studies

The study designs included in the review were:

- Randomized controlled trials (RCTs) including cluster randomization and quasi randomized study designs (i.e., participants are allocated by means such as alternate allocation, person's birth date, the date of the week or month, case number or alphabetical order).
- Non randomized control study designs (quasi experimental designs) such as controlled two group study designs, and study designs using observational data, where statistical methods such as modeling or differences in differences are used to establish a counterfactual and estimate an effect.
- We suspected that there were not many RCTs and non randomized control study designs in the field of WPDM for RTW. To give a better sense of what is going on in the field and to capture the major studies in area of WPDM we therefore also included single group study designs with before and after measures[1].

Single-subject designs were excluded.

The objectives of this review were to explore both absolute and relative effects, hence eligible comparisons groups included no treatment, treatment as usual and alternative interventions.

3.1.2 Types of participants

The following criteria served as background for the inclusion of participants in the review:

- Employees (from the public or private sector) on sick-leave with an inability to work due to physical injury, illness or mental health disorders:

[1]Included studies with single group before and after measures are reported in a narrative description.

- Physical injuries may relate to different kinds of musculoskeletal disorders such as; back pain, limb problems, neck and shoulder injuries, rheumatoid arthritis, osteoarthritis, whiplash, carpal tunnel syndrome etc.
- Mental health disorders may relate to psychiatric or psychosocial illnesses such as; depression, stress, anxiety, somatic illness, fatigue etc.
- Other illnesses (for example cancer, neurological illness, stroke, and eye strain).

Unemployed persons were excluded as well as persons with a pre-existing permanent or total impairment.

3.1.3 Types of interventions

This review focused on WPDM programs that were:

- Characterized as an 'onsite' WPDM or RTW program;
- Provided by the employer or initiated by the employer in collaboration with key players in the workplace;
- Addressed the duration or extent of an inability to work due to physical injury or mental illness;
- Implemented within the workplace setting.

This definition included only those studies where program components were linked to a WPDM program, provided by the employer and put into practice at the workplace focusing on secondary prevention and the involvement of stakeholders within the work environment.

WPDM programs could consist of a diverse set of components. In our selection of studies the inclusion of WPDM programs was guided by the criteria listed in section 1.3 (the components are expanded in Appendix 1). This means that we only included WPDM programs where at least one of the program components addressed and modified features of the employee's actual job, work tasks, equipment, work station, work schedule or mode of interaction with key players in the workplace (e.g., co-workers and supervisors). As long as the WPDM program was a structural part of the intervention (with the intention to apply the program components to all participants in the intervention group) studies that included more components or other components than listed under section 1.3 were not excluded as long as they met the inclusion criteria. WPDM programs that contain clinical components as an integrated part of the program were only included if:

- The program was provided by the employer;
- The intervention was put into practice within the workplace setting.

This means that other types of provider-based interventions (provided by health-care or community), that could be described as a DM or RTW program/intervention, were excluded. Accordingly stand-alone individual clinical/medical interventions that were not part of a WPDM program were excluded, as they were not primarily initiated by the employer and there was minimal or no integration within the workplace.

WPDM program interventions could be compared with 'usual services,' other interventions, and no intervention. Due to the diversity in types of illnesses and injury that a WPDM program has to target, the duration and intensity of specific interventions could vary according to the specific condition and the activities needed. Accordingly there were no minimum restrictions related to duration and intensity of the programs. We recorded exact details on duration, intensity and frequency of the WPDM program(s) evaluated within each included study.

3.1.4 Types of outcomes

Successful RTW is traditionally measured as a dichotomous outcome. However, RTW may be seen as a time-to-event outcome as the employee's RTW status or experience can be measured throughout the RTW process (Wasiak et al., 2007; Young et al., 2005b). No sickness absence period is alike, and employees may experience recurrences of sickness absence and only gradually recover from their injury or illness (Bültman et al., 2007; Krause & Lund, 2004; Butler, 1995). Therefore, to capture important information about the effects of WPDM programs on sickness absence duration and sustainability, RTW was handled as a continuous outcome (Pransky et al., 2005; Amick et al., 2000b).

3.1.4.1 Primary outcomes

First return to work, duration of return to work and days lost from work:

- Return to work measured dichotomously as first return to work (this measure is relevant but treated with caution as it neglects the episodic nature of work disability);
- Duration of sickness absence measured continuously via time-to-event data (e.g., periods of sickness absence followed by return to work);
- Reduction in lost days from work (e.g., defined cumulatively as the duration of all days lost from work beginning with the date of injury).

3.1.4.2 Secondary outcomes

Modification or change of job function and job functioning:

- The functional health consequences (e.g. how an employee's health affects work role functioning and work ability). Examples of validated scales used to

measure functional health consequences are: *The International Classification of Functioning, Disability and Health (ICF)* (WHO, 2001), *The Work Role Functioning scheme* (Amick et al., 2004) or *The Finnish work-ability index* (Ilmarinen, 2001);
- Return to fulltime or part-time work (yes/no);
- Whether RTW was completed at the current employer (e.g., back to the same work environment as before the injury or illness) or completed in a job with a new employer.

Sustainability of return to work:

- Relapse to sickness absence in the follow-up period (e.g., the number of days until recurrence of work disability or duration of recurrent episodes of sickness absence and return to work).

3.2 SEARCH METHODS FOR IDENTIFICATION OF STUDIES

Relevant studies were identified through electronic searches of bibliographic databases, government policy databanks and internet search engines. No language or date restrictions were applied to the searches. The searches were conducted by Anne-Marie Klint Jørgensen.

Searches were run twice. The first search was conducted between June and October 2009. The initial search was rerun and updated in June and July 2010.

3.2.1 Electronic searches

The searches were run in the following databases:

Biomedical sciences databases

- MEDLINE
- Embase
- CINAHL
- The Cochrane Library

Social sciences and general references databases

- SocINDEX
- Social Services Abstracts
- Sociological Abstracts
- PsycINFO
- EconLit
- Business Source Elite
- Safety Science and Risk
- Dissertation Abstracts International (DAI)

Government policy sources

The websites of the following organizations were searched for relevant documents (December, 2010):

- World Health Organization (WHO)
- European Agency for Safety and Health (OSHA)
- European Agency for the Improvement of Living and Working Standards (Eurofond)
- International Labour Organization (ILO)
- Organization for Economic Co-operation and Development (OECD)
- The Danish National Centre for Social Research (SFI)
- The National Research Centre for the Working Environment (NFA)
- Institute for Work &Health (IWH)
- National Institute of Disability Management Research (NIDMAR)
- National Institute of Disability and Rehabilitation Research (NIDRR)
- National Institute for Occupational Safety and Health (NIOSH)
- Workers Compensation Research Institute (WCRI)

3.2.2 Search terms

The search strategy used for MEDLINE is reproduced below. It was modified, where necessary, for the other databases listed. See Appendix 3 section 17.3 for details of modifications. As non-randomized studies were included in this review, trial filters were not used.

1 (Disabil$ adj5 managemen$)
2 (disabil$ adj5 prevent$)
3 (health adj5 safety managemen$)
4 Safety Management/
5 (safet$ adj5 managemen$)
6 (industry$ adj5 managemen$)
7 (organi i#ation$ adj2 polic$)
8 (organi i#ation$ adj2 practice$)
9 (organi#ation$ adj2 strateg$)
10 (corporat$ adj2 program$)
11 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10
12 "back to work"
13 (rtw or "return to work")
14 ((ERSTW or Early) and Safe Return to Work)
15 rehabilitation/
16 (reemploy$ or re-employ$)
17 work retention
18 Occupational Diseases/rh, th [Rehabilitation, Therapy]
19 Rehabilitation, Vocational/

20 (industrial$ adj5 rehabili$)
21 ((occupation$ or vocation$) adj5 rehabil$)
22 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or20 or 21
23 (Transition$ adj1 work$)
24 ((modify$ adj1 duty) or (modify$ adj1 duties))
25 (injury adj1 managemen$)
26 (absence adj1 managemen$)
27 (Stay$ adj1 Work)
28 23 or 24 or 25 or 26 or 27
29 (workplace$ adj3 factor$)
30 (workplace$ adj3 cultur$)
31 (workplace$ adj3 climate$)
32 (workplace$ adj3 role$)
33 (occupational health and safet$)
34 (organi#ation$ adj3 factor$)
35 (organi#ation$ adj3 climate$)
36 (organi#ation$ adj3 cultur$)
37 (organi#ation$ adj3 role?)
38 (employer$ adj3 factor$)
39 (employer$ adj3 climate$)
40 (employer$ adj3 cultur$)
41 (employer$ adj3 role?)
42 (corporat$ adj3 factor$)
43 (corporat$ adj3 climate$)
44 (corporat$ adj3 cultur$)
45 (corporat$ adj3 role$)
46 exp Organizational Culture/
47 (employer adj3 intervent$)
48 (workplace$ adj3 base$)
49 (workplace$ adj3 level$)
50 (workplace$ adj3 intervent$)
51 ((worksite$ or work site) adj3 intervent$)
52 ((worksite$ or work site) adj3 base$)
53 (vocation$ adj3 intervent$)
54 (occupational$ adj3 intervent$)
55 on-the-job.
56 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55
57 11 or 22 or 28
58 53 and 54
59 limit 55 to humans

3.2.3 Searching other resources

Personal contacts

Personal contacts with international researchers, developers and independent investigators were made to identify unpublished reports and on-going studies in March 2011. These contacts included stakeholders at the Institute for Work & Health (IWH) in Canada and similar international organizations and institutes.

Cross-referencing of bibliographies

The references in reviews and primary studies were checked to identify new leads.

Grey Literature

Google was used to search the web to identify potential unpublished studies. Advance search options were used to refine the grey search strategy. OpenSIGLE was also used to search for European grey literature (http://opensigle.inist.fr/). Copies of relevant documents were made recording the exact URL and date of access. We found no studies that met the inclusion from the grey literature searches. Searchers were conducted December 2010.

Hand Searching

The following journals were hand searched:

- *International Journal of Disability Management*(Vol.1, 2006 – Vol.2, 2010)(May 2011)
- *Disability & Rehabilitation* (Vol.6/7, 1998 – Vol.2, 2011) (March 2011)
- *Journal of Occupational and Environmental Medicine* (Vol.1, 1972 – Vol.1, 2011) (March 2011)
- *Journal of Occupational Rehabilitation* (Vol.1, 1991 – Vol.20, 2010) (December 2010)
- *Work* (Vol.12, 1999 – Vol.38, 2011) (March 2011)

3.3 DATA COLLECTION AND ANALYSIS

3.3.1 Selection of studies

Three review authors (UG, MS, KK) independently reviewed titles and available abstracts of reports and articles and excluded reports that were clearly irrelevant. Citations considered relevant by at least one review author were retrieved in full text. When there was not enough information in the title and abstract to judge eligibility, the full text article was retrieved. At least two review authors (UG, MS, KK) read the full text versions to ascertain eligibility based on the selection criteria. In the first screening level (on the basis of title and abstract) a citation only moved on to the second screening level when the answer was affirmative or uncertain for

the following criteria: the study focus was on DM or RTW, and the study participants included employees on sick leave.

In the second level (on the basis of full text) eligibility inclusion criteria was extended to the following: the program was provided or initiated by the employer, the program was implemented (fully or partly) within the workplace and the study met the study design inclusion criteria (see section 3.1). The inclusion coding questions for level 1 and 2 were piloted and adjusted (see Appendix 1 & 2). It was not necessary to contact primary investigators to clarify study eligibility. At protocol stage we had planned that third review author and content specialist (ML) would be consulted in the event of disagreements; in the event, there were none, but ML was consulted regarding clarification of inclusion criteria. This was necessary for a few studies where the issue for adjudication revolved around the question of whether the intervention was initiated and/or provided by the employer (see section 15.1, regarding the conceptual model guiding inclusion). To be included, the study investigators had to state that the intervention was a WPDM program, in one form or another. Reasons for exclusion of studies that otherwise might be expected to be eligible were documented (see section 12.2). The overall search and screening process is illustrated in a flow-diagram. Kappa scores for inter-rater reliability were high (0,9) for both first and second level screening.

3.3.2 Data extraction and management

At least two review authors (UG, ML, MS, TL, and KK) independently coded and extracted data from the included studies. A data extraction sheet was piloted on several studies and revised accordingly (see Appendix 3). Extracted data was stored electronically. At protocol stage, we planned that disagreements would be resolved by consulting an independent review author with extensive content and methods expertise (TL or TF); in the event, there were no such disagreements. However, TF and/or TL were consulted on clarification issues regarding study design and risk of bias issues. Data and information were extracted on: types of employers and work settings; the characteristics of participants; intervention characteristics and control conditions; research design; risk of bias descriptive information and potential confounding factors; outcome measures; and outcome data. Where data were not available in the published studies, we contacted the investigators and asked them to supply the missing information.

3.3.3 Assessment of risk of bias in included studies

We assessed the methodological quality of the included studies (note that no RCTs were found) using the risk of bias model in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins, 2008). For non-randomized studies, the risk of bias model was adapted to accommodate confounding factors associated with non-randomized study designs. With non-randomized studies, particular attention was

paid to selection bias, such as baseline differences between groups, and the potential for selective outcome reporting (Higgins 2008, p. 395).

Risk of Bias dimensions:

The risk of bias assessment was based on the five dimensions described below. The assessment questions with a rating of low risk, high risk, and uncertain risk of bias were piloted and modified (see Appendix 2). Review authors (at least two, UG, KK, and TL) independently assessed the risk of bias for each included study. Disagreements were resolved by a third review author with content and statistical expertise (TF or TL). Risk of bias was reported for each included NRS study (see section 13.4).

Selection or sample bias

Selection bias is understood as systematic baseline differences between groups (i.e., observable factors that have not been adequately accounted for and can therefore compromise comparability between groups).

Performance bias

Performance bias refers to systematic bias and confounding related to intervention fidelity and/or exposure to factors other than the interventions and comparisons of interest that may confound outcome results. Blinding of participants and intervention delivery are generally not applicable due to the nature of the intervention; however, blinding of outcome assessors is possible.

Detection bias

Detection bias is concerned with systematic differences between groups in relation to how outcomes are determined, including blinding of outcome assessors. RTW is often measured with time-to-event data. Participants who do not experience RTW before the end of the study are censored from the outcome data and the absence of their data, if not adequately accounted for, has the potential for introducing bias. Therefore censoring of participants is a potential threat, both in relation to detection and attrition bias (see below).

Attrition bias

Attrition bias concerns the completeness of sample and follow up data. This bias refers to systematic differences between drop outs and completers from a study.

Reporting bias

Reporting bias refers to both publication bias (see 5.5.3 Assessment of publication bias) and selective reporting of outcomes data and results.

Other sources of bias

We examined other potential sources of bias once the actual designs and statistical analysis used within the included studies were in hand. We focused on whether

study authors reported other potential sources of bias and whether they dealt with these adequately.

3.3.4 Measures of treatment effect

The two NRSs that met the inclusion criteria did not yield enough data to calculate any effect sizes (Yassi et al., 1995; Skisak et al., 2006), nor was information obtainable from the study authors. Skisak et al., (2006) only reported percent changes in relation to average days of absence; we were unable to calculate standard deviations (SDs). Yassi et al. (1995) in relation to time loss due to injuries, only reported percentages for time loss injuries per 100,000 paid hours and therefore there were insufficient data to calculate an effect size[2].

Time-to-event data, in this case time to RTW and time to RTW reoccurrence, were not reported in the included studies. In future updates, provided data are available we will analyze such data as log hazard ratios following the plan as outlined in the protocol (Gensby et al., 2011).

We planned at protocol stage to analyze dichotomous outcomes, e.g., first RTW only (being full time or part time), using relative risks (RRs) ratio with 95%.confidence intervals. However, none of the included studies included dichotomous data.

Continuous data would have been converted to standardized mean differences (SMDs) with 95% confidence intervals. If means and standard deviations were not available, we would have employed methods suggested by Lipsey and Wilson (2001) to calculate SMDs from e.g. F ratios, t-values, chi-squared values and correlation coefficients. Hedges' g will be used to correct for small sample size. This information was not available in the published studies, nor was it obtainable from study investigators for the included NRSs.

Unit of analysis issues

We have taken into account the unit of analysis of the studies to determine, whether individuals may have undergone multiple interventions at once, whether results were reported at multiple time points, and whether there were multiple treatment groups. The two included NRSs had either business units (Skisak et al., 2006), or the wards in a hospital (Yassi et al., 1995) as the unit of allocation and the unit of analysis.

[2] The study investigator informed us via email correspondence that raw data for hours lost and workers compensation paid to each injured worker were not available (the study in question was conducted over 15 years ag0). Therefore it was not possible to calculate standard errors for average time loss.

Cluster randomization

In cluster randomization, statistical analysis errors can occur when the unit of allocation (e.g., workplace) is different from the unit of analysis (e.g., employees). We found no eligible RCT or cluster RCT studies.

When the review is updated and if any included studies are cluster randomized the plan as outlined in the protocol will apply (Gensby et al., 2011).

Multiple interventions groups and multiple interventions per individuals

Participants in the two included NRS did not receive multiple interventions and there were no multiple treatment groups.

Multiple time points

Multiple time points were not an issue in this review. The two included NRSs only had baseline and a single follow up for outcome.

3.3.5 Dealing with missing data and incomplete data

We were not able to assess missing data and attrition rates for the included NRSs or calculate effect sizes for relevant outcomes[3].

When future review updates yield additional included studies the plan as outlined in the protocol will apply (Gensby et al., 2011).

3.3.6 Assessment of heterogeneity

We found insufficient studies to undertake subgroup analyses. When future review updates yield additional included studies with adequate data the plan for the assessment of heterogeneity as outlined in the protocol will apply (Gensby et al., 2011).

3.3.7 Assessment of publication bias

We found insufficient studies to undertake meta-analysis and therefore assessment of publication bias. When future review updates yield additional included studies with adequate data the assessment plan for publication bias as outlined in the protocol will apply (Gensby et al., 2011).

[3] One author responded that drop outs were relatively few and were not adjusted for (but did not provide numbers) and the other author also was unable to provide this information.

3.4 DATA SYNTHESIS

There were two NRSs that met the inclusion criteria. We were unable to perform meta-analysis due to insufficient data (see 3.34 measures of treatment effects). When future review updates yield additional included studies with adequate data, the data synthesis plan as outlined in the protocol will apply (Gensby et al., 2011).

3.4.1 Subgroup analysis, moderator analysis and investigation of heterogeneity

We found insufficient studies to undertake subgroup analyses. When future review updates yield additional included studies with adequate data the plan for subgroup analysis, moderator analysis and investigation of heterogeneity as outlined in the protocol will apply (Gensby et al., 2011).

3.4.2 Sensitivity analysis

We found insufficient studies to undertake sensitivity analyses. When future review updates yield additional included studies with adequate data the plan for sensitivity analysis as outlined in the protocol will apply (Gensby et al., 2011).

3.4.3 Narrative presentation

To capture the major studies and give a sense of research in the field of WPDM, we included single group experimental before and after studies (B & As). For the sake of transparency we reported these studies in a separate narrative summary with a content analysis (Saini & Shlonsky 2011), focusing on intervention characteristics and contextual factors. The narrative summary contributes to our understanding of WPDM programs and specific program components included in the review, and also informs the discussion section.

4 Results of the search

4.1 RESULTS OF THE SEARCH

A total of 16932 potential records were identified through the overall search strategy.

13912 records were identified from the searches of the electronic data bases (minus duplicates filtered out in Reference Manager but not counting duplicates that were not filtered out in the software and excluded later manually). After the screening of titles and abstracts, 599 full text papers were obtained.

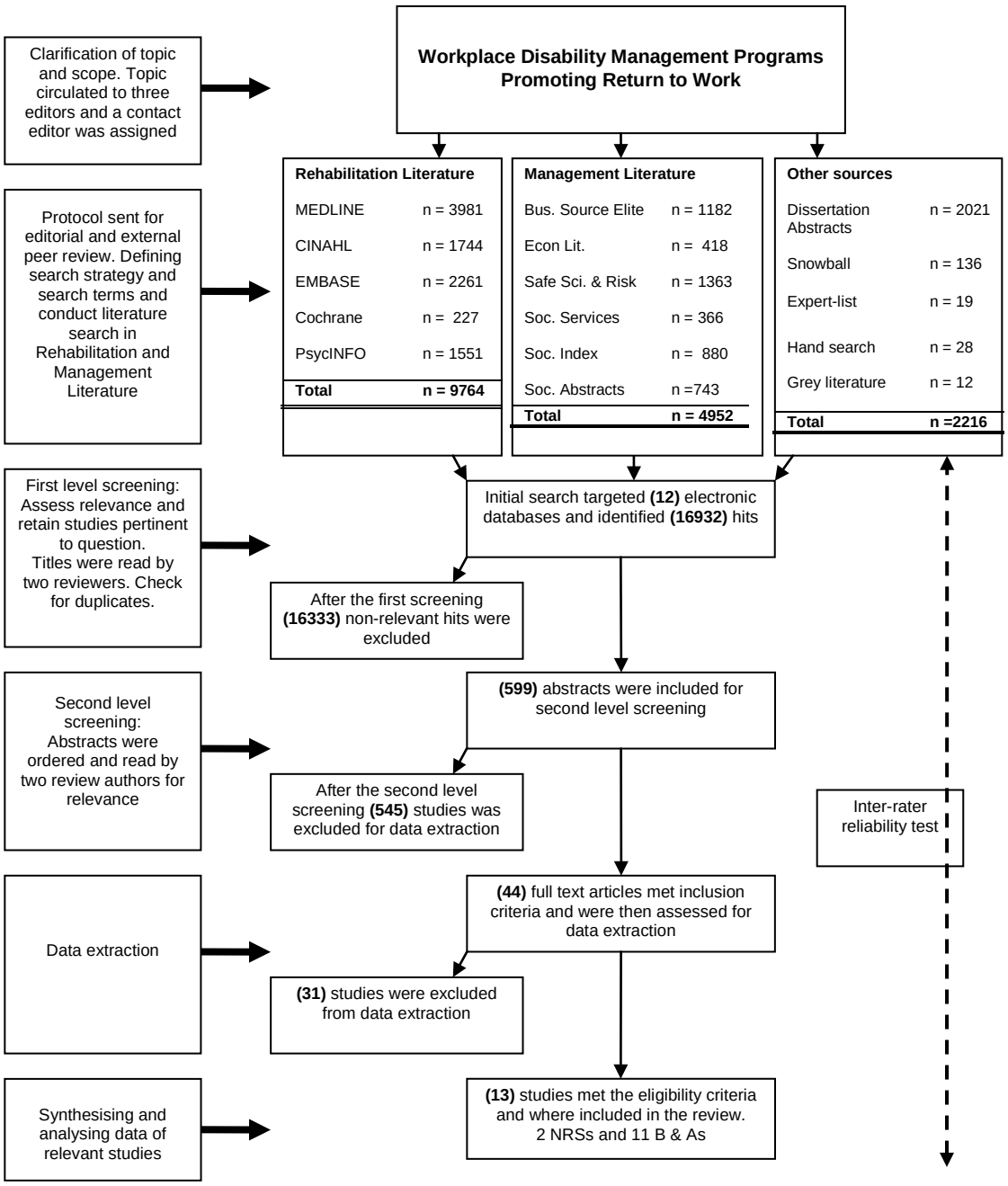
136 included studies were found through snowballing (that is, checking references lists of included studies and reviews).

E-mails were sent to a list of 20 selected experts within the field of WPDM and RTW. Nine experts responded resulting in a total of 19 potential studies. After assessment of these studies, responses from experts yielded one included study, however this study had already been identified in the literature search.

Grey literature results did not yield any included studies.
Hand searching was done in five journals (see 3.2.3 for journals and dates). No relevant un-identified articles through the electronic searches were found via hand searching.

13 unique studies cited in 25 papers met the inclusion criteria. The selection process is illustrated in the next section (a conceptual model for program assessment is provided in section 15.1).

4.2 FLOW DIAGRAM



4.3 BIBLIOMETRIC ANALYSIS

A bibliometric analysis of the literature was performed to illustrate the distribution of the identified literature by year of publication and at different levels of the review process.

From the figures it appears that hits within electronic literature search were predominantly recent publications (Figure A).

Meanwhile only a sparse number fulfilled the inclusion criteria for the review (Figure B).

Figure C illustrates how other resources than electronic searches (snowball literature search) retrieved additionally relevant publications – especially from the 1990's.

Figure A: Hits after 1st level within electronic database literature searches

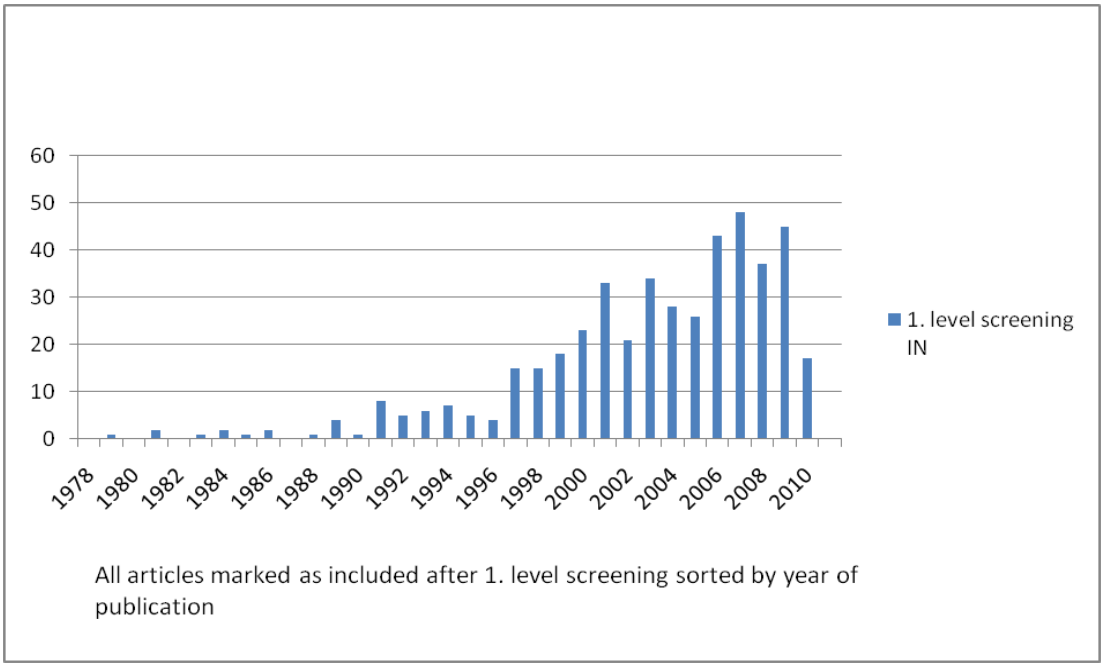
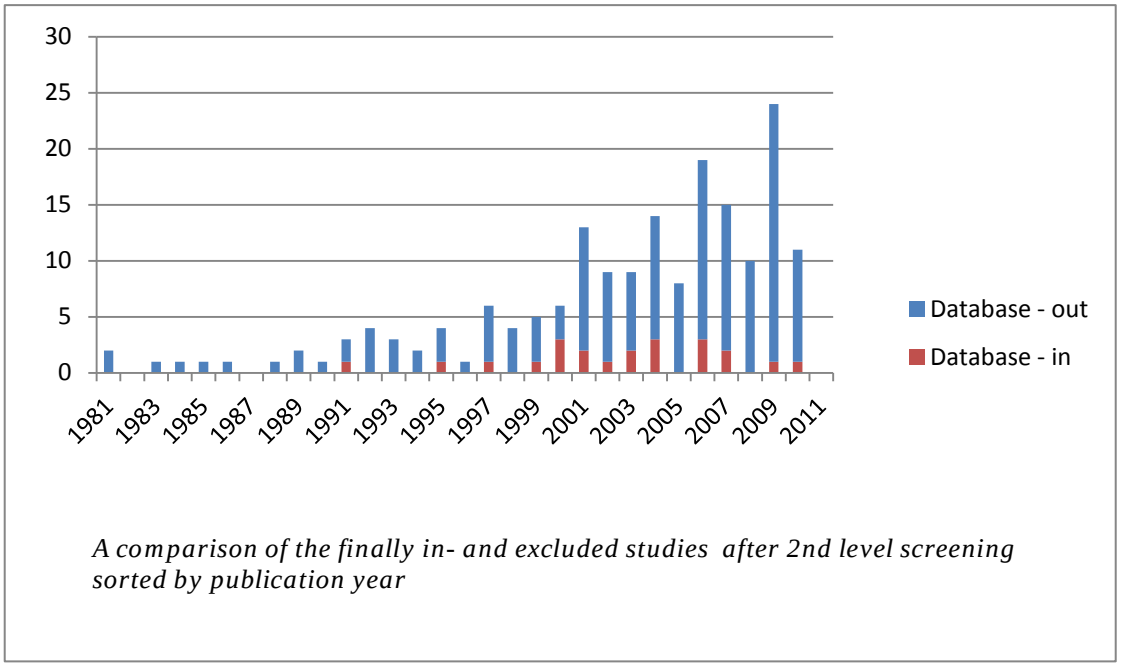
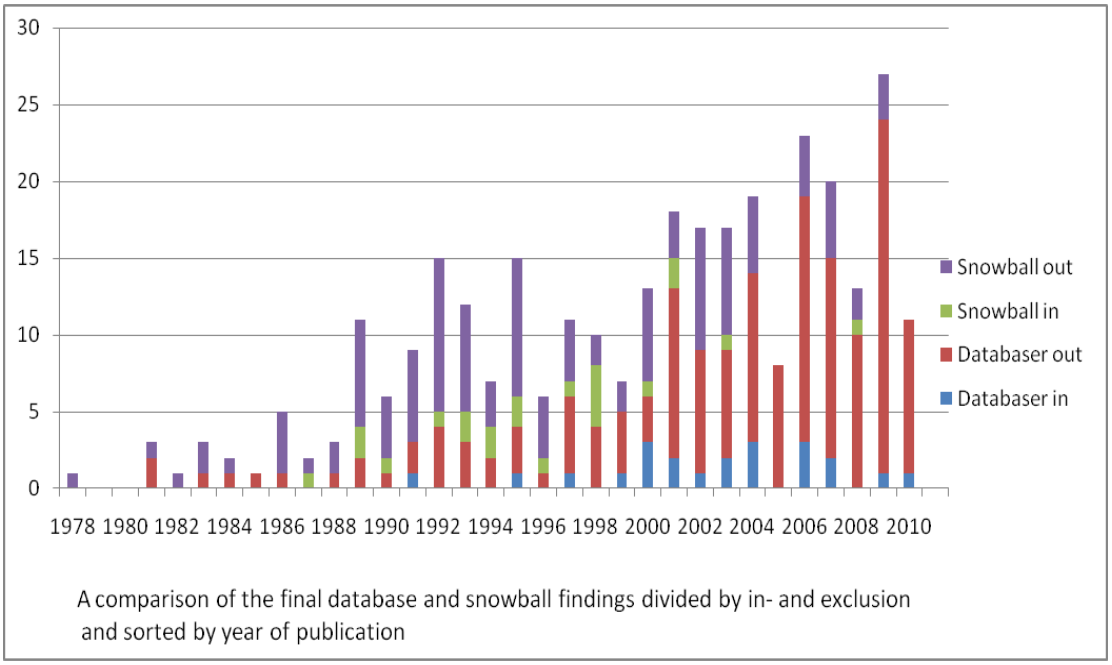


Figure B: Hits after 2nd level included and excluded studies



A comparison of the finally in- and excluded studies after 2nd level screening sorted by publication year

Figure C: Table of distribution of included studies by literature source



A comparison of the final database and snowball findings divided by in- and exclusion and sorted by year of publication

4.4 INCLUDED WPDM PROGRAM STUDIES

Thirteen studies met our inclusion criteria. These were published between 1987 and 2006.

None of the included studies were RCTs.

Two studies were non-randomized studies (NRSs) (Yassi et al., 1995; Skisak et al., 2006). Initially we also included three other studies as NRS designs (Lemstra & Olszynski, 2003; Gice & Tompkins, 1989; Allen & Ritzel, 1997). However, on further investigation it become apparent that these three studies were one to one comparisons, that is two firm/company or two hospital comparisons. With a one to one comparison it is not possible to separate treatment effects from company effects. The three studies were excluded as NRS and accordingly included and treated as single group before and after experimental studies.

Eleven included studies were single group before and after studies (B & As) (including the three studies mentioned above) (Wood, 1987; Tate et al., 1987; Gice & Tompkins, 1989; Breslin & Olsheski, 1996; Allen & Ritzel, 1997; Bernacki et al., 2000; Burton & Conti, 2000; Lemstra & Olszynski, 2003;Davis et al., 2004; Badii et al., 2006; Bunn et al., 2006).

For the two NRSs that met the inclusion criteria there were seven publications in total. Skisak et al. (2006) was the sole publication for this study. For the Yassi et al. (1995) study there were five secondary publications (Yassi el al. 1995b; Cooper et al., 1996; Cooper et al., 1997; Cooper et al., 1998; Tate et al., 1999).

The eleven B & As met the inclusion criteria and comprised 18 associated publications in total. In cases of multiple publications for B & A studies either the most recent publication or the publication with the richest descriptions of the WPDM program was chosen as the primary source.

Six of the included B & A studies were sole publications (Tate et al., 1987; Gice & Tompkins, 1989; Bunn et al., 2006; Allen & Ritzel, 1997; Breslin & Olsheski, 1996; Wood, 1987).

Two of the included B & A studies (Lemstra & Olszynski, 2004 and Burton & Conti, 2000) each had one secondary publication.

The studies by Davies et al. (2004) and Badii et al. (2006) were replications of the original pilot study by Yassi et al. (1995). For added transparency the two replication studies are discussed separately, even if some of the information may be repetitive. The study by Davies et al. (2004) and Badii et al. (2006) shared one secondary publication (Oulette et al., 2007).

One of the included B & A studies Bernacki et al.(2000) had four secondary publications (Bernacki et al., 1996; Bernacki et al., 1998; Green-McKenzie et al., 1998; Bernacki et al.,2003).

5 Description of WPDM program evaluations

The following section provides an in-depth narrative description of the included WPDM programs. WPDM programs are presented separately as NRSs and B & As. We first describe the WPDM programs evaluated (section 5.1, 5.2 and 5.3). Second, we provide a detailed description of the included program evaluations and their characteristics (section 5.4 and 5.5), and finally we provide a content analysis of WPDM program policies and practicescoded across studies (section 6.1, 6.2, 6.3, 6.4 and 6.5).

5.1 PRESENTATION OF THE INCLUDED WPDM PROGRAMS

All the included WPDM programs are provided by the employer or initiated by the employer in collaboration with key workplace players. The programs are managed and implemented at the workplace or through a company-wide department. Each consists of different sets of integrated features and components describing a clear linkage between planned research interventions and a program provided. Eleven different WPDM programs met this conceptualization of WPDM. Only one program (PEARS) was evaluated by multiple investigators.

1. Prevention and Early Active Return-to-Work Safely Program (PEARS) (Yassi et al., 1995, Davies et al., 2004; Badii et al., 2006)
2. DisAbility Management Program (Skisak et al., 2006)
3. Personnel Return-to-Work Program (Wood 1987)
4. Disability Management and Rehabilitation Program (Tate et al., 1987)
5. Workplace Return-to-Work Program (Gice & Tompkins, 1989)
6. Transitional Work Return Program (Breslin & Olsheski, 1996)
7. Return-to-Work Therapy and Light Duty Program (Allen & Ritzel, 1997)
8. Early Return-to-Work Program (Bernacki et al.,2000)
9. Short-Term Disability Management Program(Burton & Conti, 2000)
10. Occupational Management Program (Lemstra & Olszynski, 2003)
11. International MSI Disability Management Program (Bunn et al., 2006)

5.2 NON-RANDOMIZED STUDIES (NRS)

Prevention and Early Active Return-to-Work Program (PEARS) (Canada)

The study by Yassi and colleagues (1995) was based on an investigation of an integrated and multidisciplinary workplace-based early intervention program (PEARS). The program was delivered as an employer-provided disability management pilot program at a public teaching hospital and health science center in Manitoba. PEARS had a primary and secondary prevention approach, aimed at 1) reducing the incidence of MSI, 2) associated time loss, morbidity and costs among nurses in wards with a high risk for back injury 3) addressing issues of perceived pain and functional disability, 4) identifying critical factors for a safe prevention and early RTW program, 5) promoting a culture of safety within the workplace. This approach was derived from the theory that early assessment and timely rehabilitation using modified/alternative work would prevent further disability, restore optimal work capacity and reduce dependency on compensation benefits. PEARS was developed by a bipartite agency (Occupational Health and Safety Agency for Healthcare), jointly governed by employers and unions, and was established with extensive input from healthcare employers and healthcare unions. PEARS consisted of access to on-site physiotherapy and review of work tasks with advice and training given when appropriate, work environment assessment with modification and purchase of equipment as necessary, a graduated (modified) RTW program with reduced hours and/or a reduced range of duties and access to an onsite physician. The program was overseen by a bipartite steering committee that had representation from hospital management and union representatives during the intervention.

The Petrochemical DisAbility Management Program (US)

The study by Skisak and colleagues (2006) reported clinical and financial outcomes of a disability management program delivered as an employer provided disability management program in a private petrochemical company in Houston.
Non-refining staff, such as management and office employees and refining staff maintaining the refineries with non-occupational illnesses and injuries were eligible for program participation. The program was developed to identify and track employee lost time, quantify measures of disability and direct costs, decrease disability costs, apply company benefits consistently to all employees, ensure proper and prompt medical care, increase safe and timely RTW, motivate ownership of employee health, increase employee retention, morale, and job satisfaction. The program was implemented by the internal Health Service department and administrated by nine occupational nurses, each located at a petroleum refinery, and two full-time corporate-certified case-managers. Program results were communicated throughout the organization on a quarterly basis and periodic updates were communicated to senior management. In addition, a comprehensive year-end company health report was also developed and distributed to management.

Employee and case-management documentation were recorded and maintained in separate but linked databases. A case-management tool was purchased to manage all cases.

5.3 BEFORE AND AFTER, EXPERIMENTAL COMPARISONS (B & AS)

Prevention and Early Active Return-to-Work Program (PEARS) (Canada)

The studies of Davies et al. (2004) and Badii et al. (2006) were replications of the original PEARS pilot study (Yassi et al., 1995) in two hospitals in another jurisdiction (British Columbia).In the study by Davies et al. (2004) PEARS was implemented at a large urban acute and tertiary care hospital in Vancouver. The PEARS program was implemented as a hospital wide, voluntary program without targeting any specific occupational group or body part or mechanism of MSI. All employees with current diagnoses of MSI were supposed to be contacted by PEARS staff as soon as possible after injury through early follow up. Through PEARS injured employees were offered a range of onsite services such as access to onsite physiotherapy, review of work tasks, advice on training, appropriate work assessment, and modification of graded return to work with extensive evaluation. The Davies study reports on two of the five main objectives of the original PEARS program (Yassi et al 1995): 1) decrease of incidence of MSI that result in time loss 2) decrease in the typical duration of time loss of MSI by returning injured employees to their regular job more rapidly. The study by Badii et al (2006) was a follow up study to the pilot study by Davies et al (2004). In the Badii study, PEARS was implemented in an acute care hospital in New Westminster, British Columbia, offering the same program features as in Davies et al (2004). The Badii study reports on two of the five main objectives in PEARS, however adding: 1) incidence of all reported injuries, 2) mean duration of time loss and compensation costs. In both studies the program was overseen by a bipartite steering committee that had representation from hospital management and union representatives during the intervention.

The Personnel Return-to-Work Program (Canada)

The study by Wood (1987) evaluated a personnel program promoting RTW. The program was delivered as part of an employer provided two phase back injury prevention program at a public geriatric hospital in British Columbia. Employees experiencing work-related low back pain or injury were eligible for program participation. Program participants included hospital and health care workers such as nurses. The Personnel Program aim was to decrease the duration of wage loss claims by increasing the effectiveness of existing procedures used to process these claims. The components of the program were put into effect as soon as a wage loss claim was registered: (1) immediate contact was made with both the claimant and Workers' Compensation Board (WCB) (2) regular 10 day follow up calls were made

to ensure the smooth progression of the claim through the proper channels (3) extended claims were examined for the possibility of retraining (4) liaison with WCB and the manager was established if a gradual return to work was indicated (5) all communications regarding the final RTW-stage were documented (6) all communications were kept on file. What was strongly communicated to the employees was the message “Your work is important” and “Your job is waiting for you”.

Disability Management and Rehabilitation Program (US)

The study by Tate and colleagues (1987) evaluated in-house disability management and rehabilitation policies on the rate of RTW, disability payments and time off work. The policies and practices were part of an employer-provided disability management rehabilitation service in a large privately owned car manufacturer in Michigan. Employees with all types of injuries and illnesses were eligible for program participation. The major aims of the program regarding rehabilitation included (a) assisting individuals who were injured on the job or who became ill or disabled outside their jobs (b) facilitating a timely RTW through early identification and intervention (c) containing costs and medical benefit costs (d) increasing interdepartmental communication and cooperation through team meetings. In-house rehabilitation services consisted of special efforts to monitor and document costs savings, physical therapy, placement alternatives and transitional work opportunities for those employees who were willing to RTW, but were unable to be placed immediately in regular jobs. Furthermore, an in-house vocational specialist was assigned to coordinate the overall RTW process through biweekly team meetings with representatives from different departments. The team identified potential cases and supported appropriate services and made decisions on case-management and coordination of placement.

The Community Hospital Return-to-Work program (US)

The study by Gice & Tompkins (1989) evaluated a RTW-program on work modifications and time lost from work. The program was delivered as an employer-provided RTW program in a public community hospital in Minnesota. Employees with all types of MSI were eligible for program participation, whether the injury or illness was work-related or not. Program participants were hospital staff and health care workers such as nurse’s aides and delivery room assistants. The RTW program consisted of a job analysis and functional capacity evaluation outlining the physical abilities of the employee after an injury. Job modification was prescribed with regards to a work hardening process, with gradual resumption of hours, duties and expectations required of the employee. Internal transfers were used if modification was not possible in the employee’s former department.

Transitional Work Return Program (US)

The study by Breslin & Olsheski (1996) evaluated a transitional RTW program on time lost from work. The program was delivered as an employer-provided

rehabilitation service at a privately owned machine company in Cincinnati. Blue-collar workers such as welders, machinists, model makers, and maintenance employees, having work-related MSI's, were eligible for program participation. The program was a corporate rehabilitation model providing onsite clinical therapy and transitional work opportunities to encourage early RTW, in order to prevent chronic occupational disability and emphasize strategies that attempted to place employees in their pre-injury job. Placement in the program was based on a reasonable expectation by the treating physician that the employee will regain functional abilities required for the targeted job by completion of the program. The manager of employee relations was responsible for the operations and performance of the program in consultation with the joint labor-management committee. The joint labor-management committee met quarterly to review program satisfaction, data from employees and engage in individual rehabilitation planning. The company benefit administrator devoted ten hours per week to the administration of the program, which included internalized case-management duties.

Coal mining Return-to-Work program (US)

The study by Allen & Ritzel (1997) evaluated injury and cost data obtained from a RTW program in a private mining company in Illinois. The program was delivered as an employer provided work therapy and return to work – light duty – program, instituted to reduce lost time and costs and enhance rehabilitation of injured employees. Program participation was limited to employees having work-related MSIs. Program participants were coal miners working above and below ground. The program was designed to facilitate return to work in selected job-functions. Once an employee was approved for light-duty work by the treating staff physician, his/her muscle strength, range of motion, physical capacities and work tolerances were evaluated. This information, combined with restrictions set by the physician, was used to select appropriate job duties and therapy regimes. Participants were closely monitored by the therapist and re-evaluated on a regular basis. Activities were modified as work tolerances increased and/or as prescribed by a physician.

Early Managed Care Return-to-Work Program (US)

The study by Bernacki and colleagues (2000) evaluated an early RTW program containing a comprehensive cost-containment initiative and a job analytic process, which facilitates acceptance by employees and supervisors of restricted work activities. The program was delivered as an employer provided RTW program at a public medical center with associated schools of medicine, hygiene and nursing in Baltimore. Employees having work-related MSIs were eligible for program participation. Program participants were health science professionals and facility support services. The program was a component of a comprehensive managed care initiative, which included continuous education and training classes in program and RTW processes, early reporting of injuries, close follow up through team meetings, job accommodation with restricted duties, and evaluation and correction of potentially hazardous work environments. The process began with all employees

with work-related conditions reporting immediately after their injury for evaluation and treatment at an internal occupational health or injury clinic. The nursing staff evaluated the individual initially. After an injured employee was seen by a physician, a RTW duty restriction form was completed by the physician and then reviewed with the employee by an occupational health nurse. The supervisor then indicated whether the restrictions could be accommodated. If the supervisor indicated that he could not accommodate the restrictions, the nurse case manager or employee could request that a job analysis be performed. Administrative meetings were conducted every two weeks to share information on the status of all individuals who were on sick leave or had work restrictions.

Short-Term Disability Management Program (US)

The study by Burton & Conti (2000) evaluated a proactive disability management program for managing short-term disability (STD). The program was delivered as an employer provided in-house disability management program in a large bank in Chicago. Employees sick-listed for five consecutive days and up to six months were enrolled in the program. Program participants were office employees. The goals of the program were to: minimize personal and economic impact of disability by early intervention; evaluate the extent and duration of disability; coordinate medical service and provide guidance to managers and supervisors on modifications of work and the workplace. The program was managed and administered in the corporate medical department, and was conducted by an in-house medical disability coordinator and a specially trained occupational health nurse who reported directly to the corporate medical director. The company had an in-house data system, which included details of individual claims for health services and for disability and workers' compensation benefits, records on absenteeism, occupational nursing records, findings on periodic laboratory tests and utilization of prescribed medication. Compilations of data were analyzed by diagnosis, demographic elements, worksite location and shared as appropriate with management and departments to validate continued corporate support and cooperation.

Workplace Occupational Management Program (Canada)

The study by Lemstra & Olszynski (2003) investigated a workplace based occupational management program on workers compensation injury claims compared to early intervention and standard care. The program was delivered as an employer-provided DM program in a private meat manufacturing company in Saskatchewan. Employees were eligible for program participation if they had low back injuries or upper extremity disorders. Details on profession and job function were not reported. The program consisted of a) primary prevention strategies such as employee rotation schedules reduced lifting loads, ergonomic redesign of tasks and b) secondary prevention strategies such as independent on-site management with a physical therapist.

The International MSI Disability Management Program (US)

The study by Bunn and colleagues (2006) evaluated a DM program to reduce musculoskeletal related absenteeism. The program was delivered as an employer provided DM program in a privately owned truck and engine manufacturing company in Ohio. Employees filing a claim for MSI regardless of body region or mechanism were eligible for program participation. Program participants were blue-collar workers. The program was a three stage communication and educational intervention targeted at staff physicians and employees. The first stage required physicians to complete assessment forms for employees claiming disability because of MSI. The second stage added physician education focusing on current clinical guidelines. The third stage incorporated local physician education about the facilities' onsite physical therapy. The program was administrated by the Medical Services Department within the facility. Periodic updates were communicated to the plant management and to senior company management, which made the management aware of the need for continued adherence to the study interventions.

5.4 CHARACTERISTICS OF INCLUDED WPDM PROGRAM EVALUATIONS

The program evaluations have different characteristics in design, context, and content; basic characteristics are outlined in the Table found in section 5.5.

Design

NRSs

Two studies were non-randomized studies (NRSs), comparing business or ward units within a single company with pre-post measurements (Yassi et al., 1995; Skisak et al., 2006). The study conducted by Yassi et al. (1995) was of a parallel two group before and after design. It was undertaken at a Canadian tertiary care hospital, where hospital wards (n =10) with a high risk of back injury received an early intervention compared to low risk wards (n =45) acting as a simultaneous control. Skisak et al. (2006) conducted a study in a petrochemical corporation. Investigators compared company business units (n= 9 including primarily refining and non-refining employees) that participated in the DM program to business units (n= 10 including refining and non-refining employees) not using the DM program with pre- and post-measures.

B & As

Eleven studies were single group study designs with before and after measures (B & As).

Gice & Tompkins (1989) was a retrospective study "based on records that describe losses incurred during the years studied" (p. 239) at 'company A' that received the intervention, compared to 'company B' that did not. Lemstra & Olszynski (2003) compared 'company A' that received that an occupational management intervention

with ‘company B’ that did not. Allen & Ritzel 1997 described their own study as a “multiple time series design”, with an intervention group in ‘company A’ who received light duty work therapy program compared to ‘company B’ without a light duty work therapy program.

Seven studies used retrospective data to establish baselines before program implementation followed by a prospective analysis after program implementation or a pre-post comparison (Wood, 1987; Breslin & Olsheski, 1996;Bernacki et al., 2000; Burton & Conti, 2000; Davies et al., 2004; Bunn et al.,, 2006; Badii et al., 2006). One study compared differences between five cases of subgroups receiving different combinations of RTW policies and practices in a corporate DM program (Tate et al., 1987).

Duration of the studies

NRSs

Duration is defined as period in which the program ran and was investigated from baseline to post measurement. The study by Yassi and colleagues (1995) was a pilot study, baseline was calculated on two years of retrospective data, and the intervention was studied over a one-year period with a post measurement at the end of that year (Yassi et al., 1995). In the study by Skisak and colleagues the WPDM program was studied for a one year period from 2002 to 2003 ending with data collection during 2003 after program implementation (Skisak et al., 2006).

B & As

The duration of study period in the included B & A studies varied between one and six years and baselines were calculated from one to four years of retrospective data (Wood, 1987; Tate et al., 1987; Gice & Tompkins, 1989; Breslin & Olsheski, 1996; Allen & Ritzel, 1997; Burton & Conti, 2000; Lemstra & Olszynski, 2003; Davies et al., 2004; Badii et al., 2006; Bunn et al., 2006).The longest study period was six years (1993-1999) in the study by Bernacki and colleagues (2000).

Outcomes

NRSs

Skisak et al. (2006) measured sickness absence as percent changes in average days of absence per employee in managed and non-managed business units from 2002 to 2003. Only employees with absences of four days or more received the intervention compared to employees in the control group with absences of four or more. The average days of absence per employee in the intervention group decreased from 2002 to 2003, while there was an increase in days absent amongst control participants (Skisak et al., 2006, p. 499).Yassi et al. (1995) measured the outcome time loss in total hours lost and time loss per 100,000 paid hours. Yassi et al. reported that total time lost per 100,000 paid hours decreased in the intervention

group during the early RTW program and increased in the control group (1995, p.211). We were unable to calculate an effect size for either trial, as we could not obtain sufficient data.

B & As

Investigators who conducted the B & As included within this review primarily based their program evaluation on rate until return to work (Tate et al., 1987; Badii et al., 2006) or periods of sickness absence and duration of lost days from work, measured by duration of time off work due to injury (Tate et al., 1987; Gice & Tompkins, 1989; Lemstra & Olsynski,2003; Davies et al., 2004; Badii et al., 2006), days or average days lost per work related injury (Breslin & Olsheski, 1996; Burton & Conti, 2000; Bunn et al., 2006), total days lost from work (Bernacki et al., 2000), and proportion of injury claims (Wood 1987). Only two studies based their program evaluation on some of the secondary outcome measures outlined in the protocol measured by modification or change of job function (Bernacki et al.,2000) and short term recidivism for different chronic diseases (Burton & Conti, 2000).

Apart from three studies (Bernacki et al 2000,Breslin & Olsheski 1996, Wood 1987), the included program evaluations reported some form of cost related outcome assessment through an economic analysis. Costs were measured as: total or mean compensation expenses and cost savings (Breslin & Olsheski, 1996; Lemstra & Olszynski, 2003; Davies et al., 2004; Badii et al., 2006; Skisak et al., 2006), rate of disability payments and benefits (Tate et al., 1987 Burton & Conti, 2000), associated costs (Yassi et al.,1995), indemnity and medical costs (Bunn et al., 2006), premium charged to insured (Gice & Tompkins, 1989), gross benefit and compensable injury rate (Allen & Ritzel, 1997).

Sample size

NRSs

Yassi et al.(1995) included 250 nurses employed in ten intervention wards with a high risk of back injury and 1395 nurses in 45 control wards with a low risk of back injury. Of these, 60 nurses gave their consent to participate in the study in the intervention wards and 158 nurses consented in the control wards.

In Skisak et al. midyear population numbers for both 2002 and 2003 were reported in the intervention and control business units[4]. In 2002 the intervention business units consisted of 6,205 employees and in 2003 the number was 6,098. In 2002 the control business units consisted of 14,093 employees and in 2003 the number was 12,671 (2006).

[4] One of the study investigator authors informed via email correspondence that there were nine business units in the intervention group and ten business units in the control group.

B & As

The included B & As were overall lacking in information on sample size. Some studies only reported participants referred to program participation or numbers of employees consenting to program participation, with no reports on sample characteristics, baseline measures or numbers of employees completing the program (Wood, 1987; Tate et al., 1987; Gice & Tompkins, 1989; Breslin & Olsheski, 1996; Allen & Ritzel, 1997; Burton & Conti, 2000; Lemstra & Olszynski, 2003). Three studies reported sample characteristics and number of participants before and after program implementation (Bernacki et al., 2000; Davies et al., 2004; Badii et al., 2006; Bunn et al., 2006).

Context

Data on location and setting

All studies were conducted in North America. Five studies were conducted in Canada (Wood, 1987; Yassi et al., 1995; Lemstra & Olszynski, 2003; Davies et al, 2004; Badii et al., 2006). Eight studies were conducted in the USA (Tate et al., 1987; Gice & Tompkins, 1989; Breslin & Olsheski, 1996; Allen & Ritzel, 1997; Bernacki et al., 2000; Burton & Conti, 2000; Bunn et al., 2006; Skisak et al., 2006). Five studies reported on programs implemented in the public sector. All these studies were within the health care sector with hospitals (Wood, 1987; Gice & Tompkins, 1989; Yassi et al., 1995; Bernacki et al., 2000; Badii et al., 2006; Davies et al., 2004). Seven studies reported on WPDM programs implemented in the private sector. Four studies within the manufacturing industry (Tate et al., 1987; Breslin & Olsheski, 1996, Lemstra &Olszynski, 2003; Bunn et al., 2006). The other studies within the industrial (Allen & Ritzel, 1997), financial (Burton & Conti, 2000), and petrochemical industry (Skisak et al., 2006).

Data on company size

Two studies evaluated WPDM programs in medium sized workplace settings employing less than 1000 workers; a mine company employing a total of 478 workers (Allen & Ritzel 1997), and a hospital employing app. 700 employees (Wood 1989).

Five studies evaluated WPDM programs in large workplace settings employing between 1000-6000 workers. One manufacturing facility employing 3417 workers (Bunn et al 2000), and four hospitals; a 352 bed acute care hospital (Badii et al 2006), a 489 bed hospital facility with 1500 employees (Gice & Tompkins 1989), a 1100 bed acute care hospital (Yassi et al 1995), and an acute care hospital with 5995 employees (Davis et al 2004).Three studies evaluated WPDM programs in very large workplace settings employing more than 6000 workers. Settings comprised one very large teaching hospital (including schools of medicine associated with it) with a population average of 21175 employees during program evaluation (Bernacki et al

2000); one petrochemical company employing 23000 workers (Skisak et al 2006); and a financial facility with 35000 employees (Burton & Conti 2006).
Three studies did not report on numbers of employees to determine company size, as part of their WPDM program evaluation (Tate et al 1987, Breslin & Olsheski 1996, Lemstra & Olszynski 2003).
One study did not report data to determine company size (Breslin & Olsheski 1996).

Participants

Data on work disability
Ten studies evaluated WPDM programs with participants sick-listed due to work-related or not work-related musculoskeletal disorders, either as specific conditions or various conditions regardless of body region or mechanism (Wood, 1987; Gice & Tompkins, 1989; Yassi et al., 1995; Breslin & Olsheski, 1996; Allen & Ritzel, 1997; Bernacki et al., 2000; Lemstra & Olszynski, 2003; Davies et al., 2004;Badii et al., 2006; Bunn et al., 2006). Two studies included employees with non-occupational illnesses and injuries, including mental health conditions such as hypertension, depression and chronic depression (Burton & Conti, 2000; Skisak et al., 2006).

Data on profession and job function
Ten program evaluations reported data on profession and job function. In six studies, program participants were hospital and health care workers such as nurses (Wood, 1987; Yassi et al 1995), nurse's aides and delivery room assistants (Gice & Tompkins, 1989), and health science professionals (Bernacki et al., 2000; Davies et al., 2004; Badii et al.,, 2006). In two studies, program participants were blue-collar workers (Breslin & Olsheski, 1996; Bunn et al., 2006). One study enrolled office employees from a bank (Burton & Conti, 2000).One study took place in the meat industry, but details on profession and job-function were not reported (Lemstra & Olszynski, 2003). One study took place in a coal mine and had coal miners above and below ground participating in the program (Allen & Ritzel, 1997). Another study included employees at a petrochemical refinery. Both non-refining staff such as management and office employees and refining staff maintaining the refineries were eligible to participate (Skisak et al., 2006). One study took place in a large manufacturing car company and included service team employees, mainly assembly line workers, drivers, machine operators, inspectors, cleaners and conveyor attendants (Tate et al., 1987).

5.5 TABLE OF INCLUDED WPDM PROGRAM EVALUATIONS

1st Author Pub year	Location	Sector/ Industry	Design	Study duration	Participants	Outcome evaluation	Results	Study author's main conclusions
Allen & Ritzel (1997)	US, Illinois	Private, Industrial, mining company, 478 employees	B & A	The study collected retrospective data 22 month before program implementation, followed by a 22 months intervention period with a prospective data collection during program implementation	Coal miners above and below ground: 478 employed in mine, no information on referral to intervention group, 29 employees completed intervention	Primary outcomes - Compensable injury rate:	Int: 16.79 – 11.53 (∇31.3%) vs. Cont: 18.90 – 20.97 (Δ11%)	The RTW program produced economic benefits for the company and significantly reduced the compensable injury rate. The program did not significantly reduce average days away from work due to mining-related injury per employee per month.
						Costs savings - Gross benefit during 6 month f/u:	$ 173,208	
Badii (2006)	Canada, British Columbia	Public, Health care, Acute care hospital, 352 bed facility	B & A	The study had 3 years retrospective data collection, and a 1 year intervention period, following the implementation of a pilot program	All employees who experienced work related MSI or MSI affecting the ability to perform job demands were eligible. 348 health care workers started intervention	Primary outcomes - time loss due to MSI:	Int. = 111.8 - 88.9 days/100,000 hours worked (∇20.5%)	The PEARS program was effective in returning injured employees back to work in a shorter time. More research is needed to identify the components that contributed to this reduction.
						Cost savings - Mean compensation:	Int. = ∇ 31.5% vs. Cont. ∇ 11.4%	
						- Mean healthcare cost:	Int. = ∇ 55.2% vs. Cont. ∇38.2%	
Bernacki (2000)	US, Maryland	Public, Health care, Medical centre and	B & A	The study retrospectively collected data 4 years	Health science professionals and facility support	Primary outcomes - lost		A well structured early RTW program is an integral part of a comprehensive effort to

1st Author Pub year	Location	Sector/ Industry	Design	Study duration	Participants	Outcome evaluation	Results	Study author's main conclusions
		associated schools of medicine, Population average of 21175 employees		before initiation of a program from 1989 through 1992, followed by prospective data collection over a 6 year period from 1993-1999	services: 17136 employees referred to intervention group. During program period the population increased to 28518	workdays/case:	13.3-12.0 (∇ 9.7%)	control workers comp disability. The number of lost work days decreased, and there was a twentyfold increase in the number of restricted duty days. To be effective participation of care providers, safety professionals, employees and supervisors is essential.
						Secondary outcomes - restricted duty days/100 employees:	0.6 - 13 (Δ 2027.0%)	
Breslin & Olsheski (1996)	US, Ohio	Private, Manufacturing industry, Machine company, Not reported	B & A	The study had a 3 year study period from implementation of the program in 1992 onwards to 1995	Welders, machinists, model makers, maintenance employees: 58 employees consented to program participation	Primary outcomes - average days lost:	87-47/injury claim (∇ 6.0%)	The analysis indicates that the transitional work return program has substantially reduced the total amount of lost time and the average duration of lost time claim at the company.
Bunn (2006)	US, Ohio	Private, Manufacturing industry, Truck and engine company, 3417 employees	B & A	The study collected baseline data 1 year before implementation of a program, followed by a 4 year intervention period after implementation of the program	Blue-collar workers: (3417) employees of these 1927 started program participation. 1366 employees completed program participation	Primary outcomes - days lost::	35.1-27.6/work-related injury (∇21.4%)	The DM program was associated with reduced musculoskeletal disability-related absenteeism and increased productivity. The program reduced medical costs per work-related injury and improved the company's communications and relationship with local physicians
						- days lost:	2.4-1.2/full-time employed (∇ 50.0%)	
						Secondary outcomes - work-related injuries (n):	216-54 (∇ 5.0%)	
						- work-related		

1st Author Pub year	Location	Sector/ Industry	Design	Study duration	Participants	Outcome evaluation	Results	Study author's main conclusions
						injuries:	6.3-4.0/full-time employed (∇ 36.5%)	
						light-duty days:	6.1-11.1/work-related injury (Δ 82.0%)	
						Costs savings - mean ann. indemnity cost:	$590-178/full-time empl. (∇ 69.8%)	
						- mean ann. indemnity cost:	$9327-4493/work-rel. injury (∇ 52.0%)	
						- mean ann. medical cost:	$307-106/full-time empl. (∇ 65.5%)	
						- mean ann. medical cost:	$4848-2679/work-rel. injury (∇ 44.7%)	
Burton & Conti (2000)	US, Illinois	Private, Financial, Bank, 35000 employees	B & A	The study had a 1 ½ year prospective study period from program implementation after merging of two companies	Office employees: No information on participants in intervention and control group	Primary outcomes - mean disability duration, all cause:	29.3-23.2 days/event (∇ 20.8%)	The study documents the average decline in short term disability event duration (days per event) following implementation of a disability management program after a corporate merger of two corporations. Overall the mean short term disability duration declined
						- mean disability duration, pregnancy:	34.4-28.2 days/event	

1st Author Pub year	Location	Sector/ Industry	Design	Study duration	Participants	Outcome evaluation	Results	Study author's main conclusions
							(∇ 18.0%)	approx. 20 % from the baseline for former locations of the merging company without a disability management program in place.
						- mean disability duration, mental health:	42.8-24.9 days/event (∇ 41.8%)	
						Secondary outcomes - 12-month relapse rate; - depression:	26%-22% (∇ 15.4%)	
						- diabetes mellitus:	26%-8.3% (∇ 68.1%)	
						- hypertension:	11%-8.8% (∇ 20.0%)	
						Costs savings - disability benefits	$15mill-12mill (∇ 20.0%)	
Davis (2004)	Canada, British Columbia	Public, Health care, Acute care hospital, 5995 employees	B & A	The study had 3 years retrospective data collection, and a 1 year intervention period, following the implementation of a pilot program	No specific occupational group of health care workers were targeted: 343 health care workers started intervention	Primary outcomes - median time-loss per claim: - registered nurses:	Int. = ∇ 49.2% vs. Cont. ∇ 94.3%	The PEARS program appears to have been successful in reducing the time-loss and associated costs related to injuries for registered nurses and health science professionals at Vancouver general hospital. These findings need to be verified in future research studies.
						- health science profs:	Int. = ∇ 73.9% vs. Cont. ∇ 35.1%	

1st Author Pub year	Location	Sector/ Industry	Design	Study duration	Participants	Outcome evaluation	Results	Study author's main conclusions
						- facility support staff:	Int. = Δ4.2% vs. Cont. ∇ 18.4%	
						Costs savings - median compensation per claim: - registered nurses:	Int. = ∇ 52.3% vs. Cont. ∇ 87.3%	
						- health science profs:	Int. = ∇ 66.1% vs. Cont. ∇ 52.0%	
						- facility support staff:	Int. = Δ 14.5% vs. Cont. ∇ 1.2%	
Gice & Tompkins (1989)	US, Minnesota	Public, Health care, Community hospital, 489 bed facility with 1500 employees	B & A	3 year study period from implementation of the program in 1980 onwards to 1983	Hospital staff and health care workers such as nurse's aide and delivery room assistants: 1500 referred to intervention group and 1410 referred to control group	Primary outcomes - Frequency of injuries:	Int: 103 – 48 (∇53.4%)vs. Cont: 120 -141 (Δ17,5%)	Results predicted better performance on frequency of injury, severity of injuries and experience modification at the hospital utilizing a formal RTW program.
						- Working days off work:	Int: 13.5 vs. Cont: 18.5	
						Costs savings - Premium charged to insured:	Int: ∇ 49% vs. Cont: Δ45%	

1st Author Pub year	Location	Sector/ Industry	Design	Study duration	Participants	Outcome evaluation	Results	Study author's main conclusions
Lemstra & Olzynski (2003)	Canada, Saskat-chewan	Private, Manufacturing, Meat company, Not reported	B & A	The study is comprised of two sub-studies, and had a study period of 1 year and 3 month for the before and after with control, and 2 year and 3 months for the before and after without control.	Employees in the meat industry: No information on participants in intervention and control group	Primary outcomes - injury occurrence rate, u. extremity time-loss claims:	RR=0.28 (95% CI 0.07-1.09) int1 vs cont.	It is recommended that an occupational management program approach, in comparison with early intervention or standard care, be considered for management of occupational injuries.
						- injury occurrence rate, back time-loss claims:	RR=0.25 (95% CI 0.07-0.93) int1 vs cont.	
						- rate of days lost, u. extremity time-loss claims:	RR=0.09 (95% CI 0.07-0.12) int1 vs cont.	
						- rate of days lost, back time-loss claims:	RR 0.02 (95% CI 0.01-0.04) int1 vs cont.	
						Costs savings U. extrem. time-loss costs:	$15,777-$597/100,000 hrs (∇ 96.2%)	
						Back time-loss costs:	$8,713-$287/100,000 hrs (∇ 96.7%)	

1st Author Pub year	Location	Sector/ Industry	Design	Study duration	Participants	Outcome evaluation	Results	Study author's main conclusions
Skisak (2006)	US, Texas	Private, industrial, Petro-chemical company, 23000 employees	NRS 9 intervention business units (including refining and non-refining employees) Intervention 1 = In-house disability management program, workplace 1 Intervention 2 = In-house disability management program, workplace 2 10 non-managed control business units (non-refining employee)	The study launched a program in 2002 followed by a 1 year prospective data collection during 2003 after program implementation	Non-refining staff such as management and office employees and refining staff. 6205 in intervention business units and 14093 in control business units	**Primary outcomes** - Days of absence 1-3 days: - Days of absence 4+ days: - Total absence:	Int 1: 2.33 - 2.93 (Δ 25.7%) Int2: 1.10 - 1.06 (∇ 3.6%) Int 1+2: 1.64 – 1.96 (Δ 19.5%) vs. Cont: 1.46 – 1.65 (Δ 13.0%) Int1: 7.33 - 5.99 (∇ 18.3%) Int2: 3.70 - 2.65 (∇ 28.4%) Int1+2: 5.30 - 4.26 (∇ 19.6%) vs. Cont: 4.04 – 4.28 (Δ 5.9%) Int 1: 9.66 - 8.92 (∇ 8.7%) Int2: 4.80 - 3.71 (∇ 22.7%) Int 1+2: 6.94 – 6.22 (∇ 10.4%) vs.	The DM program was successful by absence duration, employee satisfaction, and return on investment criteria.

1st Author Pub year	Location	Sector/ Industry	Design	Study duration	Participants	Outcome evaluation	Results	Study author's main conclusions
							Cont: 5.50 – 5.93 (Δ 7.8%)	
						Costs savings - Total cost savings:	A 4-1 return of investment based on direct expenditures and direct cost savings	
Tate (1987)	US, Michigan	Private, Manufacturing, Car company, Not reported	B & A Intervention 1 = Rehabilitation Intervention 2 = Case coordination by in-house rehabilitation specialist Control = no intervention	The study is part of a larger research project studying disability management policies and practice from a 2 year an 4 months study period from 1984-1987.	Service team employees, mainly assembly line workers, drivers, machine operators, inspectors, cleaners and conveyor attendants: 250 cases divided in five subgroups	Primary outcomes -RTW rate within 20 weeks: -RTW rate 20-39 weeks: -RTW rate 40+ weeks: -RTW rate within 20 weeks: -RTW rate 20-39 weeks: -RTW rate 40+ weeks:	 Int. 1 = 48% vs. Cont. = 96% Int. 1 = 20% vs. Cont. = 4% Int. 1 = 32% vs. Cont. = 0% Int. 2 = 96% vs. Cont. = 96% Int. 2 = 2% vs. Cont. = 4% Int. 2 = 2% vs. Cont. = 0%	The greater the lapse of time between the occurrence of the illness/injury and referral to rehabilitation services, the less likely was the employee to return to work, and vice-versa.
						Secondary outcomes - Time between		

1st Author Pub year	Location	Sector/ Industry	Design	Study duration	Participants	Outcome evaluation	Results	Study author's main conclusions
						injury and referral to intervention 1: - less than 20 weeks: - 20-39 weeks: - 40+ weeks: - Time between injury and referral to intervention 2: - less than 20 weeks: - 20-39 weeks: - 40+ weeks:	 RTW = 56% vs. non-RTW = 32% RTW = 12% vs. non-RTW = 24% RTW = 32% vs. non-RTW = 44% RTW = 98% RTW = 2% RTW = 0%	
Wood (1987)	Canada, British Columbia	Public, Health care, Geriatric hospital, 700 employees	B & A	The study had a 3 year study period from implementation of the program in 1980 onwards to 1983	Health care workers: Approximately 700 workers started intervention	Primary outcomes - proportion of injury claims 1000+ vs < 1000 hrs:	Int. = 1.7% vs. Cont. 7.1%	The proportion of high-hour claims initiated 8 months prior to the Personnel RTW program was significantly higher than the proportion of high-hour claims initiated 4 months after program participation.
Yassi (1995)	Canada, Manitoba	Public, Health care, Teaching and health care science center, 1100 bed facility	NRS Intervention wards at high risk of back injury vs. control wards	A pilot study with 2 years retrospective data collection preceding program implementation, followed by a one year pilot study period with prospective data	Nurses: (250) in ten intervention wards. 60 consented to intervention group (1395) in 45 control wards. 158 consented to control group	Primary outcomes - No. of injuries/100.000 hrs paid:	Int: 17.2 - 13.3 (∇ 22.7%) vs.	The PEARS program reduced the incidence and time lost due to back injuries and was cost-beneficial.

1st Author Pub year	Location	Sector/ Industry	Design	Study duration	Participants	Outcome evaluation	Results	Study author's main conclusions
			at low risk of back injury who did not receive the intervention.	collection during the program intervention period			Cont: 4.5 - 6.4 (Δ 44.2%)	
						- No. of lost time injuries/100.000 hrs paid:	Int: 4.4 - 2.5 (∇ 43.2%) vs. Cont: 0.9 – 1.5 (Δ 66.7%)	
						- Total hours lost/100.000 hrs paid:	Int: 1425.1 - 1016.6 (∇ 44.4%) vs. Cont: 489.6 - 740.2 (Δ 51.2%)	
						Secondary outcomes - Working 6 months after RTW:	Int: 100% vs. Cont: 91.2%	
						Costs savings - Compensation + medical costs/100.000 hrs. paid:	Int: 13,553 - 12,870 (∇ 5%) vs. Cont: 4,992 – 7, 437 (Δ 49%)	

6 Coding of WPDM programs across studies

The following sections provide an overview of program features coded across studies. The included programs are coded according to: type of program, scope of program, program components and human resources involved; central features are outlined in the table found in section 6.5.

6.1 TYPE OF WPDM PROGRAM

Musculoskeletal disorders (MSDs)

Six of the 11 included WPDM programs were tailored to manage work-related musculoskeletal injuries (MSIs). One program focused on strained spine and shoulder injuries (Gice & Tompkins, 1989), one on back and knee injuries (Allen & Ritzel, 1997), one on back, hand, shoulder and wrist injuries (Bunn et al., 2006), one on low back and upper extremity disorders (Lemstra & Olszynski, 2003), one on low back injuries (Wood, 1987), and in one case the program did not target any specific occupational group, body part or mechanism of MSI (Yassi et al., 1995; Davies et al., 2004; Badii et al., 2006).

Non-specific condition

Three of the 11 included WPDM programs did not target any specific condition, but focused on all types of work related and occupational injuries and illnesses (Tate et al., 1987; Breslin & Olsheski, 1996; Bernacki et al., 2000).

Mental health conditions

Two programs were tailored to manage RTW due to mental health conditions such as depression and hypertension (Burton & Conti, 2000; Skisak et al., 2006).

6.2 SCOPE OF WPDM PROGRAMS

The scope of the eleven WPDM programs assessed within this review is described below in relation to the phases of the RTW process (Young et al., 2005b; Tjulin et al., 2010). In general the included WPDM programs were designed to manage the first three phases of the RTW process. (i.e., situations in which employees were sick-listed (off-work); minimizing the duration of time loss and time until first RTW (pre-

return), and actions taken to accommodate the re-entering employee at work (post-return). The overall scope of programs reflected different emphases on these three phases.

Off-work phase

One program only focused on the off-work phase, and was designed to decrease the duration of wage loss claims in existing procedures used to process these claims (Wood 1987).

Off-work/Pre-return phase

Five programs incorporated a focus on both the off-work and pre-return phase of the RTW-process in their overall scope, but reflected different emphases on the two phases in practice (Tate et al., 1987; Burton & Conti, 2000; Bernacki et al., 2000; Bunn et al., 2006; Skisak et al., 2006).

One program targeted the extent and duration of short term disability and facilitated early intervention (Burton & Conti, 2000); the second was designed to identify and track employee lost time, apply company benefits consistently to all employees, ensure proper and prompt medical care and increase safe and timely RTW (Skisak et al., 2006); and a third was designed to enhance early and close follow up and treatment, together with comprehensive administrative meetings evaluating work restrictions and work status of the sick-listed employee (Bernacki et al., 2000). The fourth program featured different combinations of policies and practices, offering in-house rehabilitation or private vendor rehabilitation to reduce time off work, length of time between the occurrence of injury and referral to rehabilitation and proper accommodation (Tate et al., 1987). Finally, the fifth program (Bunn et al 2006) was designed as a three-stage process optimizing communication and practice of staff physicians to reduce absenteeism, improve care, and identify positions wherein the employee could RTW.

Pre-return/Post-return phase

Five programs were designed to manage both the pre-return phase and the post-return phase. These programs also weighted the pre-and post-return phase differently.

One such program included awareness of and initiatives to keep the employee on the job, through gradual resumptions in working hours, duties, and expectations required of the employee (Gice & Tompkins, 1989); another emphasized strategies to protect the employability of the injured employees by attempts to place employees in their pre-injury job (Breslin & Olsheski, 1996). The third was designed to facilitate return to work in selected job-functions evaluated on a regular basis (Allen & Ritzel, 1997), whilst the fourth assessed the effect of management onsite looking at prognosis and recommendation to resume work as soon as safely possible in full duties or modified light duties (Lemstra & Olszynski, 2003). Finally one program

(PEARS) was designed to support training and work environment assessment with purchase of equipment and graduated RTW options (Yassi et al., 1995; Davies et al., 2004; Badii et al., 2006).

Sustained job retention

The majority of WPDM programs were not designed to manage the sustainability of RTW, such as efforts to monitor the long-term impact of specific program components on satisfaction and productive work role functioning or sustained job retention. The included programs had limited or no post intervention follow-up. Yassi et al. (1995) reported on work status six months after initial RTW, and Burton and Conti (2000) reported on short term recidivism for different chronic diseases.

6.3 CONSTITUENT PROGRAM COMPONENTS

Overall the studies gave detailed descriptions of WPDM program components. In most cases programs were multi-component with a mix of policies and practices. The distribution of components across studies is outlined in Table 6.5; a necessarily 'overlapping' summary is provided narratively below.

RTW-policy

Eleven programs reported on specific RTW policies guiding program management, collaboration and procedures. The RTW policies outlined RTW principles and goals (Yassi et al., 1995; Davies et al., 2004, Badii et al., 2006), issues on program eligibility, time limits, and methods to create proper accommodation (Breslin & Olsheski, 1996; Lemstra & Olszynski, 2003). RTW policies also guided process flow-charts, defining roles and responsibilities during the RTW-process (Wood, 1987; Skisak et al., 2006; Bunn et al., 2006), early and comprehensive policies to support supervisors to make job accommodation decisions (Bernacki et al., 2000), and in-house rehabilitation via a rehabilitation specialist or rehabilitation via outside contracted vendors (Tate et al., 1987). Other programs consisted of RTW policies eliminating prior "all or nothing at all" policies, to secure transitional, modified and gradual RTW (Gice & Tompkins, 1989; Allen & Ritzel, 1997), and full time pay for returning employees as they recover to their full capacity (Burton & Conti, 2000).

Workplace accommodation

Ten programs targeted suitable workplace accommodation. Decisions on the type of accommodation made typically were based on a comparison between the results of a functional capacity evaluation or medical certification exam with the results of a job analysis or workplace assessment (Gice & Tompkins, 1989; Breslin & Olsheski, 1996; Skisak et al., 2006), and the awareness of onsite capabilities and available workplace arrangements (Wood, 1987; Tate et al., 1987; Allen & Ritzel, 1997; Bernacki et al., 2000; Lemstra & Olszynski, 2003; Bunn et al., 2006). The accommodation positions could be time limited as in PEARS (Yassi et al., 1995; Davies et al., 2004; Badii et al., 2006).

Multidisciplinary rehabilitation service

Nine programs used some form of multidisciplinary rehabilitation service, effectuated as some form of physical rehabilitation services, such as functional capacity evaluation (Breslin & Olsheski, 1996; Yassi et al., 1995; Davies et al., 2004; Badii et al., 2006); work hardening (Gice & Tompkins, 1989); and onsite physical therapy (Tate et al., 1987; Allen & Ritzel, 1997; Bernacki et al., 2000; Lemstra & Olszynski, 2003; Bunn et al., 2006; Skisak et al., 2006).

Workplace assessment

Eight programs targeted workplace assessment. Procedures involved job analysis prior to prescription of modified job-duties (Gice & Tompkins, 1989; Breslin & Olsheski, 1996; Bernacki et al., 2000), review of job-description and work tasks to classify light-duty jobs (Allen & Ritzel, 1997) or identify conditions wherein the employee could return to work on a restricted basis (Tate et al., 1987; Lemstra & Olszynski, 2003; Bunn et al., 2006). One program instituted weekly work environment reassessments following review of work task (Yassi et al., 1995; Davies et al., 2004, Badii et al., 2006).

Modified work

Eight programs targeted modifications in either work environment or work tasks. Modifications were typically identified through ergonomic evaluation as offers just before returning to regular job functions (Burton & Conti, 2000; Yassi et al., 1995; Davies et al., 2004; Badii et al., 2006). Offers of job-modifications could be temporary and time-limited (Lemstra & Olszynski, 2003; Yassi et al., 1995; Davies et al., 2004; Badii et al., 2006). Modifications were made in job duties, hours and expectations of the job (Tate et al., 1987; Gice & Tompkins, 1989; Allen & Ritzel, 1997; Bernacki et al., 2000; Bunn et al., 2006).

RTW-coordination/Case management

Seven programs used some form of in-house RTW-coordination/case management to support administration and bridging of internal and external collaboration. One program made coordinating efforts to locate employees and coordinate program participation (Yassi et al., 1995; Davies et al., 2004; Badii et al., 2006). Two programs used a case-manager to coordinate care and track cases through an in-house provider network (Bernacki et al., 2000; Skisak et al., 2006). Three programs installed a specially trained corporate disability coordinator to serve various internal case-management duties (Tate et al., 1987; Breslin & Olsheski, 1996; Burton & Conti, 2000; Bunn et al., 2006).

Disability case information and monitoring system

Seven programs reported on internal disability case information systems. One program used a medicine and nursing information system, where data for each case was entered and reviewed weekly (Burton & Conti, 2000). Other programs made efforts to record absence data, track cases and provide ongoing reporting and

monitoring (Tate et al., 1987; Breslin & Olsheski, 1996; Bernacki et al., 2000; Skisak et al., 2006), and gather data from standardized forms and enter these into linked databases (Wood, 1987; Yassi et al., 1995; Davies et al., 2004; Badii et al., 2006).

Early contact and intervention

Six programs targeted early contact and intervention, which were often initiated immediately after a participant's injury or as a wage loss was registered for internal assessment and treatment (Wood, 1987; Bernacki et al., 2000; Yassi et al., 1995; Davies et al., 2004; Badii et al., 2006). Early contact was also taken through an information package sent home to employees absent for more than five consecutive days with information about the program and various administrative forms (Burton & Conti, 2000). Two programs targeted early and close contact between supervisors and sick-listed employees during the first days of absence (Skisak et al., 2006), and referral to in-house rehabilitation (Tate et al., 1987).

Joint labor-management commitment

Six programs reported on the efforts made to ensure joint labor-management commitment. Joint labor-management collaboration was ensured at a strategic level through the joint management committee, which served as vehicle for developing consensus among key decision makers (Yassi et al., 1995; Davies et al., 2004; Badii et al., 2006) regarding program goals and objectives, and internal implementation and operation (Breslin & Olsheski, 1996; Bernacki et al., 2000; Lemstra &Olszynski, 2003). Joint labor-management commitment was also ensured at the operational level, through the collaboration between local union representatives and supervisors in the daily problem-solving regarding accommodation and clinical services (Tate et al., 1987; Breslin & Olsheski, 1996; Bernacki et al., 2000).

Active employee participation

Six programs reported on some form of employee participation of sick-listed or injured employees. However, active employee participation in program procedures and decision making processes was not always a pre-defined focus of the programs, and direct participatory possibilities were often hard to separate from more passive employee involvement in practice. In practice, sick-listed employees were actively involved in requesting a job-analysis and the performance of job analysis (Gice & Tompkins, 1989; Bernacki et al., 2000; Yassi et al., 1995; Davies et al., 2004; Badii et al., 2006), or in assessment of individual capabilities and work tolerances (Allen & Ritzel, 1997; Lemstra &Olszynski, 2003), or in training and educational information about the program (Skisak et al., 2006).

Transitional work opportunities

Five programs targeted transitional work opportunities. Three programs developed individual transitional work plans (Tate et al.,1987; Breslin & Olsheski, 1996; Skisak et al., 2006), two with support from the case-manager (Tate et al., 1987; Skisak et al., 2006). Three programs made efforts to offer transitional light duty stations or

pre-selected jobs to support gradual recovery (Tate et al., 1987; Gice & Tompkins, 1989; Allen & Ritzel, 1997).

Education of workplace staff

Four programs targeted education of workplace staff or case-managers. One program educated local physicians to improve care and flow in the RTW-process (Bunn et al., 2006).Two programs developed educational materials and continuously educated employees, timekeepers, human resource staff, and supervisors. Education focused on program benefits, and on encouraging RTW as soon as medical and safety conditions would allow (Bernacki et al., 2000; Skisak et al., 2006). Two programs provided educational training to supervisors emphasizing frequent communications with employees during the RTW process (Wood 1987; Bernacki et al 2000).

Alternative placements

Four programs targeted alternative placements. Alternative placements were offered through internal transfers if job-modification was not possible in the employee's former department (Gice & Tompkins, 1989), and through placement of employees in an "in-house" treatment area (Tate et al., 1987; Allen & Ritzel, 1997), or as a way to accommodate special restrictions or limitations (Bernacki et al., 2000).

Preventive strategies

Three programs included preventive strategies to avoid disability occurrence, through the adoption of a primary prevention module. One program (Yassi et al., 1995) described these features in a study protocol with information on lifts and internal transfers (Cooper et al., 1996). Other programs included strategies of employee rotation schedules (Lemstra, 2003), and one study included a back program (Wood, 1987).

Revision of workplace roles

One program targeted revision of workplace roles in RTW processes, through redefinition of internal tasks and responsibilities of safety representatives, working with supervisors to modify tasks to alternate workplace assignments (Bernacki et al 2000).

6.1 TABLE OF WPDM PROGRAMS AND CONSTITUENT COMPONENTS

1st Author Pub year	Tailored condition	Scope	Human resources and their affiliation	Revision of workplace roles	Preventative strategies to avoid disability occurrence	Access to alternative placements	Education of workplace staff or case managers	Transitional work opportunities	Active employee participation	Joint labor -management commitment	Early contact & intervention	Disability case information and monitoring system	RTW coordinator or case management	Modified/tailored work	Workplace assessment	Physical rehabilitation services	Workplace accommodation	RTW policies	
Burton & Conti (2000)	Depression, hypertension; other illnesses such as diabetes, mellitus, asthma and ulcer	Off work and pre-return	The Onsite Medical Disability Coordinator, Occupational Health Nurse, who supervised case management, Line Supervisors								☑	☑	☑	☑				☑	5
Wood (1987)	Low back injuries	Primary prevention and off work	Management and supervisors		☑		☑				☑	☑					☑	☑	6
Breslin & Olsheski (1996)	Work-related injuries and illnesses	Pre-return and post return	Corporate Joint Labor-Management Committee. An onsite rehabilitation team including the Occupational Physician, Occupational Therapist, Supervisors, and various Labor-Management Representatives					☑		☑		☑	☑		☑	☑	☑	☑	8

Bunn (2006)	MSI (back, hand, shoulder and wrist injuries)	Off work and pre-return	Corporate Medical Service Department, Onsite Physicians and Physical Therapist				☑					☑	☑	☑	☑	☑	☑	☑	8
Gice & Tompkins (1989)	MSI (strained spine or shoulder)	Pre-return and post return	Onsite Physical Therapist and Supervisors			☑		☑	☑					☑	☑	☑	☑	☑	8
Lemstra & Olszynski (2003)	MSD (low back and upper extremity disorders)	Primary prevention , off work and pre-return	Corporate Physical Therapist and Supervisors		☑				☑	☑				☑	☑	☑	☑	☑	8
Allen & Ritzel (1997)	MSI (back and knee injuries)	Pre-return and post return	A registered Occupational Therapist, Treating Staff Physician, and Supervisors			☑		☑	☑			☑		☑	☑	☑	☑	☑	9
Skisak (2006)	Non occupational illness or injury such as uncontrolled diabetes, hypertension, pregnancy, low back conditions and chronic depression	Off work and pre-return	Corporate Health Services, and Human Resources, Benefit and Legal Department, Onsite Certified Case-Managers, Departmental Corporate Physicians, Local Occupational Nurses, and Supervisors				☑	☑	☑		☑	☑	☑			☑	☑	☑	9
Tate (1987)	Non-specific injury or illness	Off work and pre-return	Onsite disability management coordinator, labor-management representatives, supervisor			☑		☑		☑	☑	☑	☑	☑	☑	☑	☑	☑	11

*Davis (Badii) 2004, ('06)	MSI. Program did not target any specific occupational group, body part, or mechanism of MSI	Primary prevention, off work, pre-return and post return	An interdisciplinary team comprised of a program leader, a full time occupational therapist, a full time physical therapist, a part time physician and a part time program administrator/data clerk		☑				☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	11
*Yassi (1995)	MSI (soft tissue back injuries)	Primary prevention, off work, pre return and post return	Multidisciplinary team consisting primarily of a nurse coordinator, physiotherapist and occupational therapist/ergonomist working under direction of a rehabilitation physician.		☑				☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	11
Bernacki (2000)	Work-related injuries and illnesses	Off work and pre-return and post return	Corporate Joint Committee on Health, Safety and Environment and Health, Safety, and Environment Department. Internal Occupational Health Nurse, Occupational Physician, Nurse Case-Manager, Environmental Health Officer (Safety Representative), Industrial Hygienist and Supervisors	☑		☑	☑		☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	13
* PEARS only counts as one program (same program components in the Yassi et al. pilot study, and the two reproduction studies by Davies et al. and Badii et al.)				1	3	4	4	5	6	6	6	7	7	8	8	9	10	11		

6.4 KEY PARTIES IN WPDM PROGRAMS

Most of the studies provided detailed descriptions of various human resources involved in the implementation, operation, and evaluation of the WPDM programs. WPDM programs were typically administrated in various corporate departments such as: the medical service department (Bunn et al., 2006), the human resources, benefit and legal department (Skisak et al., 2006), and the health, safety, and environment department (Bernacki et al., 2000). The joint labor-management committee served as a vehicle for developing consensus among key decision makers within the company regarding the program goals and objectives (Yassi et al., 1995; Breslin & Olsheski, 1996; Bernacki et al., 2000; Lemstra & Olszynski, 2003; Davies et al., 2004, Badii et al., 2006). Senior management was involved in the design, implementation and evaluation of each component and helped to secure corporate social responsibility for the program (Bunn et al., 2006), and validate corporate support (Burton & Conti, 2000; Skisak et al. 2006).

Several of the included programs incorporated a broad range of skills and knowledge in an interdisciplinary team to promote internal collaboration to optimize coordination of the RTW process. The teams referred to a team leader. Depending on the corporate setup the interdisciplinary team consisted of some or all of the following key players: occupational therapists/ergonomists, physical therapists and physicians, case-manager or RTW-coordinator, the immediate supervisor, various labor-management representatives, the injured employee and a program administrator/data clerk leader (Tate et al., 1987; Yassi et al., 1995; Breslin & Olsheski, 1996; Bernacki et al., 2000; Davies et al., 2004; Badii et al., 2006; Skisak et al., 2006).

Usually in-house physiotherapists performed a primary functional capacity evaluation to outline employee physical ability after injury and to select appropriate job duties and therapy, whereas physicians were involved in treatment and training (Allen & Ritzel, 1987; Gice & Tompkins, 1989; Bernacki et al.,2000; Lemstra & Olszynski, 2003; Skisak et al., 2006; Yassi et al. 1995; Davies et al. 2004; Badii et al., 2006; Bunn et al., 2006). The onsite occupational therapist performed a job-analysis and classified jobs to develop an individualized transitional work plan to assist the supervisor in determining what tasks may or may not be performed (Allen & Ritzel, 1987; Breslin & Olsheski, 1996; Bernacki et al., 2000).Certified in-house case-managers (RTW-coordinators, disability case-managers, benefit administrators) served a critical role by assisting employees to assume personal ownership for their health, bridging communication with the local bureau of workers compensation and other service providers, and to understand the medical and recovery aspects of their illness or injury and the implied expectations of company policies (Tate et al., 1987; Breslin & Olsheski, 1996; Burton & Conti, 2000; Bernacki et al., 2000; Yassi et al., 1995; Davies et al., 2004, Badii et al., 2006; Skisak et al., 2006).Union representatives were either involved at a company strategic level via the joint labor-

management committee, influencing the development and monitoring of program procedures (Lemstra & Olszynski, 2003; Yassi et al., 1995; Davies et al., 2004; Badii et al., 2006), or at the operational level regarding accommodation and clinical services (Tate et al., 1987; Breslin & Olsheski, 1996). Only one program used a safety representative to facilitate an agreement on appropriate accommodations (Bernacki et al., 2000).Supervisors monitored the progress employee program participation and co-employee relations (Breslin & Olsheski, 1996). Supervisors also provided information on the specific job tasks, costs and activities required for the essential elements of the job (Allen & Ritzel, 1987; Bernacki et al., 2000), and coordinated contact to sick-listed employee and notice of absence to the medical or personnel department (Wood, 1987; Burton & Conti, 2000).

6.5 TABLE OF HUMAN RESOURCES AND PROGRAM FLOW PROCESS

Looking across programs, a common in-house program flow process targeting sick-listed employees with musculoskeletal disorders, during the off-work and pre-return phase of the RTW process, involves the following key parties and procedures presented in the table below.

RTW phase	Action	Key parties	Main concerns
Off-work	1) Initial contact directed at the sick-listed employee immediate after injury illness reporting	Supervisor or corporate located case managers or RTW coordinator	Early identification, response and reporting
Off-work	2) As soon as contact could be established, early intervention was initiated	Occupational physician and physiotherapist.	Individual assessment of functional capacity, treatment and counseling outlining the work tolerance of the injured employee
Off-work / Pre-return	3) Next a secondary workplace assessment with a job analysis was performed	Occupational therapist	Identification of job opportunities, light duty or modifications of work tasks to ensure gradual recovery.

Pre-return	4) At the same time information were continuously provided to coordination staff	Disability case-manager or RTW coordinator, Human resources officer	Ensure administrative flow, monitoring and internal collaboration
Pre-return	5) The results of the individual and workplace assessment were then discussed in an interdisciplinary team to guide further actions	Supervisor, occupational physician, physiotherapist, the case manager/RTW coordinator, union members and the returning employee (depending on the corporate setup).	Assess job-accommodation options such as tailored job-modifications for gradual RTW and if necessary prescribe onsite multidisciplinary physical therapy

6.6 RISK OF BIAS IN INCLUDED STUDIES

See also Risk of Bias Tables and Risk of Bias Tables for the included NRSs in section 13.1.

6.6.1 Selection/sample bias

Allocation

In relation to allocation concealment in the included NRSs, Yassi et al. 1995 is assessed as having a high risk bias due to investigators' knowledge of allocation. Skisak et al. 2006 is assessed as having an unclear risk of bias due to lack of information.

Randomization

The two included NRSs are both automatically assigned a high risk of bias in the category of selection bias due to lack of random assignment (Skisak et al., 2006; Yassi et al., 1995).

Equivalent groups at baseline (confounding and adjustment)

The included NRSs did not adequately control for confounding on possible baseline differences between the intervention and control groups and are therefore assessed as having a high risk of bias (Skisak et al., 2006; Yassi et al., 1995).

Skisak et al. (2006) reported that baseline characteristics were similar but did not report statistical tests undertaken to justify this assertion. Nor were differences between the control group (which included non- refining employees only) and the intervention group (which included both refining and non-refining employees)

controlled for. Yassi et al. (1995) state that the groups were not significantly different; however, neither baseline data nor statistical tests to assess comparability were reported.

6.6.2 Detection Bias

Blinding of outcome assessors: Return to work outcome
Studies, where outcome data for time loss were originally collected by a third party not involved in the study, were assessed as having adequate blinding of outcome assessors. Yassi et al. (1995) is assessed as having a low risk of bias in that time loss data was obtained from the Workers' Compensation Board (WCB). Skisak et al. (2006) is assessed as 'low risk' for this criterion as data were obtained from company personnel and payroll records.

Statistical analysis: Return to work outcome
Censoring is a confounding factor with time to event outcomes such as return to work. The two included NRSs did not report censored data and/or did not adjust for censoring in the data. If there was systematic censoring that was not accounted for this could underestimate positive effects and overestimate negative effects.

The following assessment on censoring is based on correspondence with the study investigators. Yassi et al.(1995)is assessed as having an unclear risk with regard to statistical analysis in relation to detection bias due to lack of information[5]. Likewise the Skisak et al. study (2006) is also assessed as having an unclear risk of bias[6].

6.6.3 Attrition Bias

Incomplete outcome data
None of the included study publications reported drop outs or how missing data were handled. Both included NRSs are therefore assessed as having an unclear of bias for this criteria (Skisak et al., 2006[7]; Yassi et al., 1995)[8].

[5] The study investigators wrote that the outcome is "based on cost incurred *up to* one year post-injury". If they had followed up for a minimum of one year post-injury, then the assessment would have been a low risk of bias regarding censoring. However, as an injury could have occurred near the end of the two year back program this individual could be censored from the data. Accordingly, the risk of bias for this study remains unclear.
[6] One of the study investigators informed via email correspondence that censoring was not adjusted in the analysis. However, it remains s unclear and we have no way of knowing whether censoring actually occurred or not.
[7] The study authors through correspondence reported that 'drop outs were relatively few'. As the numbers are not specified, the risk of bias remains as unclear due to lack of information.
[8] Correspondence with study investigators did not lead to clarification and therefore we judge attrition bias as unclear.

6.6.4 Performance Bias

Implementation integrity / treatment fidelity
Yassi et al. (1995) reported that the interventions were standardized and monitored and therefore are rated with a low risk of bias. The Skisak et al. (2006) study is assessed with a low risk of bias as the program was routinely reviewed by management.

6.6.5 Reporting bias

Both included NRSs are subject to incomplete reporting bias. Outcome data were not fully reported or only averages were reported. None of the included studies reported sufficient data to facilitate meta-analysis. Both Skisak et al. (2006) and Yassi et al. (1995) are assessed with a high risk of bias on reporting bias.[9]

6.6.6 Other potential sources of bias

It is always difficult to ascertain if a study is subject to other sources of bias. We deemed a low risk of bias on this parameter if and when the study authors considered and reported study limitations and these limitations were adequately dealt with. Both included NRSs were assessed as having a high risk of bias. Yassi et al. (1995) did not report any limitations, while Skisak et al. (2006) reported limitations in relation to differences for blue and white-collar workers they did not dealt with these differences adequately. Skisak et al. did split results for refining and non-refining employees who received the intervention, but they did not do this with employees in the control condition (2006).

6.7 ANALYSIS OF EFFECT SIZES

There were insufficient data to calculate effect sizes and perform meta-analysis. Only two studies provide data such that an effect size could be calculated (Lemstra & Olszynski 2003, Badii et al 2006). The remaining studies either provide no relevant outcomes or provide some time loss numbers (average or total days lost) or some cost measures, but no standard deviations or test statistics. In only one was it stated that the difference between conditions was significant, but no p-value was reported (Bernacki et al 2000). We were unable to calculate standard deviations for all studies to illustrate the span between effect sizes, as we could not obtain sufficient data.

[9]Raw data were requested for both of the included studies but was not obtainable.

7 Results

7.1 QUALITY OF THE EVIDENCE / RISK OF BIAS

The overall quality of the evidence for the two included NRSs, which is based on the risk of bias categories, is assessed as low due to the high risk of sample and reporting bias. NRSs, due to their lack of randomization, are more susceptible to selection bias. Well conducted NRSs should deal with this and other sources of bias as carefully as possible.

7.2 IMPACT WPDM PROGRAM LESSONS

Due to insufficient data we were unable to calculate effects sizes. Therefore, it was not possible to conduct a meta-analysis. Due to lack of evidence, it is not possible to draw unambiguous conclusions on the effectiveness of WPDM programs on RTW. Viewing the extracted components as an integrated part of an employer provided WPDM program, it is still unclear which components drive effectiveness, or if one constellation of the above components might be more effective than another. It is conceivable that the answer will differ depending on the type and etiology of the injury.

7.3 SUMMARY OF MAIN NARRATIVE FINDINGS

This review sought to synthesize the evidence on the effectiveness of employer provided WPDM programs. Due to insufficient information to enable calculation of effects sizes and the high risk of bias in the two included NRSs we were not able to make any conclusive judgments either in favor or against the effectiveness of employer provided WPDM programs. However, based on the included single group B & As, to give a better sense of what is going on in the field, our narrative presentation provides valuable insights into the nature of WPDM programs offered, that may be considered in future design and evaluation of DM in organizations.

On the whole, the WPDM program descriptions in the included studies, were rich in detailing program components, procedures and human resources involved. However, some WPDM program descriptions could have elaborated more on the frequency and duration of specific program components.

The included WPDM programs were based in companies in North America (Canada and the USA), and were primarily conducted in the public health care sector. A variety of health care workers were included. Public employers and funding of WPDM programs, within the health care sector, therefore function as a form of innovative arena for impact evaluations of WPDM programs, especially in a North American context.

Overall programs were tailored to manage various musculoskeletal conditions, with only two programs tailored to manage mental health conditions. Overall, programs focus on the off-work and pre return phases of the RTW process with limited focus on the post return phase and no focus on the sustainability at work.

We found employer provided WPDM programs to be multi-component, offering a suite of policies and practices for injured/ill employees. Based on the distribution and prevalence of components (see table 6.4) we were able to extract 15 constituent components most often used in the included programs. Common constituent components in WPDM programs are presented below in hierarchical order.

Table of common constituent components in WPDM programs

Frequency of use	WPDM Programs (N=11)	Type of component
9-11	11	Organizational RTW policy
	10	Offer of suitable work accommodation
	9	Onsite physical rehabilitation services
6-8	8	Tailored job modifications
	8	Workplace assessment with job analysis
	7	Corporate located RTW coordinators or disability case managers
	7	Internal disability claim information system
	6	Early contact and intervention
	6	Joint labor and management commitment
	6	Active employee participation

1-5	5	Transitional work opportunities
	4	Education of workplace staff or case managers
	4	Access to alternative placements
	3	Preventive strategies to avoid disability occurrence
	1	Revision of workplace roles

Employer provided WPDM programs typically involved an inter-disciplinary team of competences from several corporate located key parties such as: occupational physicians and physiotherapists, occupational therapist/ergonomists, case-managers/RTW coordinators, union representatives, supervisors, and managerial HR staff. Programs were administrated in internal medical, benefits, health and safety or human resource departments, and supported by senior management and the joint labor-management committee.

Program outcome measures were primarily related to costs savings, time lost from work, and duration until RTW, with limited or no focus on work role functioning, job satisfaction, well-being and follow up measures on sustained job retention. The included WPDM programs in the single group B & As had very limited information on sample sizes and sample characteristics.

8 Discussion

8.1 AGREEMENTS AND DISAGREEMENTS WITH OTHER STUDIES OR REVIEWS

Provider and setting involved in disability management

Existing reviews suggest an employer's organizational response to RTW requires interactions with outside providers, creating the basis for mutual understanding of components involved in multi-sector DM interventions (Frank et al 1998; Franche & Krause 2002; Franche et al 2005; Brewer et al., 2007; Van Oostrom et al 2009). In order to focus on the role of the workplace, this review applies a systematic company approach to the nature and effects of WPDM programs as implemented and practiced by employers. Supporting this approach is what Shrey (1998) called a shift in focus from community or health care-based treatment programs to accommodating workplaces with evolving disability management models and RTW programs coordinated by in-house company key parties. The present review includes only employer provided DM/RTW programs managed and implemented at the workplace or through a company-wide department, describing a clear linkage between planned research interventions and program offered.

The Cochrane systematic review by van Oostrom et al. (2009) included studies where the provider in some cases was outside the workplace. Eligible studies were in some cases clinical or community interventions with a close tie to the workplace, focusing on work adaptations or the involvement of stakeholders from the work environment. This review also restricted to RCTs, (none of which) are eligible for inclusion in the current review due to these differences in definition of provider and setting.

A review by Franche and colleagues (2005) applied design criteria similar to those used in the present review, but applied a broader provider criteria, including RTW or DM programs specific to the company level, alongside programs/ or single component interventions provided by the insurance company or health care provider. Two WPDM programs (Bernacki et al 2000) and PEARS (Yassi et al 1995; Davis et al 2005; Badii et al 2006) met inclusion criteria for both the Franche et al 2005 and the present review.

Tailored program health conditions

This review shows that existing evaluations carried out in the context of WPDM programs have primarily been tailored to musculoskeletal conditions or claimants. In line with Goldner (2004), our findings reveal the rather scarce knowledge on DM programs tailored to promote RTW of employees absent because of mental health conditions. The same conclusion was reached in a review by Gallie and colleagues (2010), suggesting that employer driven workplace interventions addressing RTW due to mental health conditions are in the early stages of development and implementation. Other researchers have reached similar conclusions (Franche et al 2005; Brewer et al 2007; Briand et al 2007).

Constituent program components

Existing research has analyzed which structural elements of WPDM programs that work best, however previous reviews have encountered the same difficulties, determining the essential program components responsible for overall program effectiveness, as encountered in this review. Krause & Lund (2004) reported that no attempts were made to evaluate the specific contribution of any components, using a systematic quantitative approach in any of the included RTW programs. Using a quality rating appraisal approach based on five methodological criteria, the authors found evaluations of employer based RTW programs including some form of modified work showed positive RTW rates. The authors did not find other studies eligible for inclusion in this review (Krause & Lund 2004). In congruence with this review's findings, Franche and colleagues (2005) describe how workplace based RTW interventions consist of several components, and how the mix of component varied across studies, making it difficult to provide definitive answers, regarding the effects of any one specific program component. Franche and colleagues (2005) used nine methodological criteria for quality assessment. The authors assessed two WPDM programs included in this review (Bernacki et al 2000) and (Yassi et al 1995; Davis et al 2005; Badii et al 2006) as high quality studies with the study by Yassi et al (1995), contributing to their conclusion, that work accommodation offer and contact between healthcare provider and workplace can reduce work disability duration (Yassi et al 1995; Davis et al 2005; Badii et al 2006).

Comparing the frequency of components used in the included WPDM programs with recommendations from the existing WPDM knowledge base shows considerable variation. Most noticeable amongst common factors is the use of RTW policies found in all the included WPDM programs, which Akabas (1992) describe as the linchpin in every DM program. Several studies suggest the provision of rehabilitative support by employers through the establishment and implementation of organizational policy frameworks (Habeck et al., 1991; Shoemaker et al., 1992; Hunt & Habeck et al., 1993; Habeck, 1998ab; Amick et al 2000; Brooker et al 2000; Salkeveer et al., 2000; Salkeveer et al., 2001; Wallis 2010). Also, the use of workplace assessment with job analysis supported by onsite physical rehabilitation services, the offer of suitable work accommodation, and the provision of tailored job modifications, has

had a rather consistent focus in WPDM (Shrey 1995, 1998; Habeck & Kirhner 1994, Habeck & Hunt 1999, Williams & Westmorland 2002; France et al 2005; Briand et al 2007, Brewer et al 2007). Corporate located disability case managers is also confirmed by other review authors, identifying the presence of a RTW coordinator in those larger companies seeking to manage the complexity of RTW processes (Franche et al 2005; Shaw et al 2008).

Despite a rather consistent focus on essential components of WPDM, which was expected to push the inclusion of programs components in favor of being in line with the existing research literature, our narrative descriptions indicate some degree of disconnect between what the employers are doing or what they report they are doing, and the recommendations from the available WPDM knowledge. Here, prior research put forward education and training of key personnel as an important component for WPDM (Akabas 1992; Shrey 1998). However, only four of the WPDM programs reported on educational activities of workplace staff or case managers in relation to RTW and job accommodation issues. Another example of heterogeneity is the active focus on consistent participatory possibilities for re-entering employees in RTW decision making processes throughout the RTW process (Williams & Westmorland 2002). In fact, only six studies reported on some form of efforts to support active employee involvement in WPDM procedures and RTW practices. Although joint labor and management committees figure as important for joint commitment on DM programs (Brooker et al 2000; Shrey et al 2006) only half of the included programs reported on this component. Further, only half of the programs incorporated a component focusing on early contact and intervention despite the current focus on effective RTW interventions to include early contact by the workplace with the employees, and contact between healthcare provider and workplace (Franche et al 2005).

Given the same use of terminology, companies may define and implement program components differently according to practical needs, even though included WPDM programs are restricted North America jurisdictions. The conceptuality and context of component adaptation therefore ought to be considered. Examples of this may be illustrated with RTW policies found in all included WPDM programs. Here, the reported policy formulation and objective varied across institutional and organizational settings.

Another example is the provision of modified duties found in eight programs. Here, modifications could be made in either work environment or work tasks. Modifications were typically identified through ergonomic evaluation as offers just before returning to regular job functions. However, in practice temporality and time-limits of specific modifications varied across programs, according to employee needs, job duties, hours and expectations of the job.

Outcome measures and progression of RTW

This review found that WPDM program scope was mainly directed at the off work and pre return phase of the RTW process. Only five programs targeted some form of post return in their program scope, with no programs targeting sustainability at work / stay at work. Only one program reported on work status with a six month follow up (Yassi et al 1995). To our knowledge, no other review has evaluated WPDM program scope to see how well components support the progression of RTW (categorized by the phases in the RTW process). The majority of the included WPDM program evaluations had some form of cost related outcome assessment through an economic analysis. As businesses tend to focus on return of their investments, this is a useful and relevant measure (Tompa et al., 2010). Thus, as an employer provided intervention, employers and third parties who represent or insure them, have typically looked to see how lost work day rates and costs have decreased as a result of implementing a WPDM program(Shrey 1995, 1998). By, initially not including costs as an outcome measure in this review, future updates and evaluations could develop this area further, taking program associated costs into consideration.

While acknowledging the business rationale in DM, only a few included studies based their program evaluation on measures related to modification or change of job function and sustained job retention. Researchers have offered a number of recommendations supporting a focus on sustained job retention. Brooker et al (2000) concluded that future programs ought to consider the inclusion of employee-centered outcomes, whilst Williams and Westmorland (2002) concluded that more work is needed to evaluate long-term health related outcomes (e.g. employee's functional status and job satisfaction). Krause and Lund (2004) found that outcome definitions and measures associated to employer based RTW programs varied widely among the reviewed studies. They state that "time to first RTW" have limited value in itself, and ought to be complemented by measures more inclusive of functional limitations and recurrences. Franche et al (2005) identified only one DM program which examined RTW outcomes through follow up (Bernacki et al 200o). Thus, the authors conclude that sustainability is a primary concern when examining the impact of work disability on employees (Franche et al 2005).

Obtaining both economic and functional outcome information addresses the immediate concerns of employers regarding lost time from work, and addresses the impact of the accommodations offered on employee health and well-being (Krause & Lund 2004). Incorporating sustainability and health related measures therefore still needs to be addressed as important areas to develop in WPDM (Amick et al., 2000b; Pransky et al., 2005).

8.2 OVERALL COMPLETENESS AND APPLICABILITY OF EVIDENCE

This review gives an overview of the extent to which employers and researchers are evaluating WPDM programs promoting RTW. Reflecting on the review process and the limited amount of systematic WPDM program outcome evaluations, more work on robust WPDM program evaluations that may impact sustained job retention still remains.

In order to benefit businesses in providing sustainable services for injured/ill employees decision makers ought to encourage more research to develop ways to include sustained RTW in WPDM, and support such evaluations. Research also ought to consider ways to increase the number of companies participating in future WPDM evaluations.

Another issue relates to the outcomes obtained by programs in relation to the number and combination of components, which may affect program effects. Program evaluations depend on solid outcomes measures to assess whether single components or groups of components are effective. The included programs do in many ways apply relevant RTW outcomes, but based on the reporting of effect sizes one can ask whether single or multi component programs differ in success rate. The majority of programs appear to be beneficial; however outlining superior program composition is difficult. Thus, based on the current review, the question of optimal program composition according to intended outcomes is needed.

Since there is no uniform WPDM-program "setup", companies and decision makers may use the knowledge from the narrative descriptions within this review, to refine existing WPDM programs and their evaluation. By pulling constituent WPDM program components out of the existing literature we have tried to open up the 'black box' of WPDM interventions, describing the most common policies and practices inherent in WPDM programs, highlighting not only how WPDM programs have been designed so far, but also opening up a discussion on how existing WPDM programs at the company level have been evaluated, and how to analyze different program setups. This may inspire workplace parties, policy makers and disability management professionals, who are interested not only in questions regarding the impact of WPDM programs, but also their scope, tailored conditions and components, to discuss future directions for DM in organizations.

Factors such as organizational cultures, and social relations may influence WPDM program implementation (MacEachen et al., 2006), and therefore generalizability of findings. As an organization-level workplace intervention, WPDM programs involve multiple, context specific components. Understanding how implementation affects program outcomes may help researchers avoid misinterpreting negative outcomes that result from poor implementation as evidence that programs are inherently

ineffective. However, implementation must be adequately reported if it is to be taken into account (Egan et al 2009). Also, institutional and regulative frameworks in other institutional settings than North America are of importance when applying a presumably effective WPDM program, as institutional and other contexts may have important bearing on success and failure.

Although many companies recognize the importance of WPDM and are adopting program policies and practices to promote RTW, existing systematic outcome evaluations leave space for more rigorous methodological studies to develop the existing knowledge base. Researchers and decision makers may consider pursuing the unexplored research potentials specific to company based and employer provided disability management.

8.3 POTENTIAL BIASES IN THE REVIEW PROCESS

Stand alone or orchestrated setting

Conducting systematic assessments of the available WPDM program evaluations has introduced a number of challenges and potential biases. The first challenge was to distinguish various approaches to program settings from each other. The review team had to make difficult judgments to determine whether the setting of the program applied to our definition of an “on-site” WPDM program provided by the employer. Interventions were divided into three broad categories; 1) “outsourced” provider-based programs, with some form of tie in to the workplace, 2) “hybrid” programs, offering a mix of in-house and outsourced rehabilitation-services, and 3) “in-house” employer-integrated programs (see model in section 15).We are aware that a consequence of our demarcation, could lead to inclusion of studies in which only the very largest companies have developed and reported on a WPDM program that is entirely employer integrated. There is a trend towards using contracted services to provide in-house functions (e.g., provider-based clinical treatment, occupational health service or disability management consultants) (Habeck et al 1994). We acknowledge this feature of WPDM programs and also the important body of knowledge within this field, but our understanding of "in-house" leads us to a focus on an employer integrated approach, that highlights the impact of multi-component company offered DM programs on RTW.

Single or multi-components interventions

The second challenge was to distinguish between different approaches within workplace based RTW interventions, in particular the linkage between interventions and programs provided. The review team had several discussions on whether RTW interventions were stand-alone (single components) or figured as components in a DM or RTW program offered. Another discussion point related to the exclusion of research analyzing RTW related organizational policies and practices (OPPs), not reported as part of a WPDM program. The definition of WPDM used in this review incorporated RTW related OPPs as long as the studies provided a clear linkage

between OPPs and a program offered, and the OPPs were measured in relation to the employees participating in the program. Although focusing on RTW-related OPPs, study emphasis (on the company) was on either company responses analyzing which DM-policies were in place (Habeck et al., 1991; Hunt & Habeck et al., 1993; Habeck et al., 1998a; Shoemaker et al., 1992; Salkeveer et al., 2000; Salkeveer et al., 2001; Cullen et al., 2005; Williams et al., 2005; Williams et al., 2007), or internal stakeholder perceptions of RTW-related policies offered (Habeck et al., 1998ab; Ossmann et al., 2005). Furthermore participants were recruited from clinical settings exposed to many different company RTW-related OPP's making it difficult to relate OPP's to specific WPDM programs (Amick et al., 2000). We are aware that this line of research has considerable importance to the area of WPDM policy and practice, and ought to be recognized and pursued further.

Type of comparison

A third challenge was type of comparison. Following the classification of the included studies into B & As and NRSs, the review team discussed the type of comparison group needed for inclusion as an NRS. Consensus was reached that some 'one to one' comparisons were treated as single group B & As, which can be debated. Seen in retrospect, different grouping of the studies in question would not have altered results or conclusions in the current version of the review. In spite of this, future updates of the review, one to one comparisons should be distinguished from internal and external comparisons. Thus, the ideal comparison group in a one to one study would be a workplace in the same geographical area and business sector as the intervention workplace, with similar size, gender composition, etc., as the intervention workplace. Given the nature of the type of intervention under study, namely programs implemented at the organizational level, comparisons between units within the same workplace would, in most cases, be against the nature of the intervention, unless one includes the (less ideal) B & A comparisons.

Time span

Attention to whether it is feasible to combine evidence from very different time periods is an issue of concern. The large time span between the included WPDM program evaluations (1987 vs. 2006), could have introduced changes in legislation and organisational structures. Researchers ought to recognize this and find ways to take account of these issues in their work.

Identifying research based company evaluations

Given the lack of WPDM programs evaluated in peer-reviewed publications, more attention ought to be given to locate and evaluate efforts from company studies that may still exist in the grey literature. Still, researchers following this track ought to consider if these studies, when identified(and this may be difficult if company studies remain within the company), have adequate study designs, and make efforts to strengthen future study designs and evaluations.

9 Conclusions

9.1 IMPLICATIONS FOR PRACTICE

Company resources and size

The present review provides an overview of potential constructions and contents for organizations large enough to encompass an in-house approach and model for managing RTW following work disability. Overall, DM consists of highly fragmented service systems incorporating many stakeholders from a variety of sectors (Loisel, 2001; Loisel, 2005a). In large corporations the management of work disability is often fragmented with resources used to navigate in the complexity of poorly integrated policies and practices. Resources can be optimized by developing internal systems and hiring in-house professionals, which may be cost-prohibitive and give employers access to elements in the physical, interpersonal and administrative work environment.

Conversely, smaller companies may have better access to elements in the interpersonal and administrative work environment, but lack the capacity and resources to provide in-house arrangements throughout the RTW process (Drury, 1996; MacEachen et al., 2008). Besides providing inspiration to organizations similar in size to those included in the review, the narrative descriptions regarding contents of WPDM may be useful for smaller organizations that aim to build a WPDM program, relying on external suppliers of for example disability counselors, onsite rehabilitation services or case management.

Program setup and configuration

Policy makers may use this review to further analyze whether and how employers should, take responsibility to integrate WPDM interventions in their own policies and practices. It is conceivable that the formation of legislative frameworks will impact and alter the attitudes and behaviors of employers in these matters, depending on the nature of the particular incentives and disincentives they create (Habeck et al., 1994).

Based on the program characteristics in the narrative presentation of this review, program responsiveness and configuration criteria are determined by areas such as company setting and industry, the type of jobs performed and workforce employed, type of health problems encountered, in-house resources and work accommodation

possibilities, internal and external monitoring and coordination needs, return of investment, and the employer-employee interactions emphasizing the progression in change behavior and recovery (categorization of phases in RTW) from the individual employees' point of view and the human resources involved. This review suggests that employers recognize that WPDM programs should be responsive to changing needs and circumstances of individual psychological and/or physical factors, organizational environmental factors and factors related to the involvement of various system stakeholders.

Human resources and collaboration

When setting up a program, employers may concentrate their attention on type of solution and resources needed, but internal consensus is needed regarding the program goals and objectives. The narrative descriptions of this review suggest that the inclusion of the joint labor-management committee may serve as a vehicle for developing consensus among key decision makers in the design, implementation and evaluation of each component, and inclusion of senior management may drive corporate support and commitment.

Secondly, incorporation of a WPDM program into existing policies and practices needs considerable integrative and administrative efforts typically provided by the medical service department, human resource and benefit and legal department, or the health, safety, and environment department, as practiced in many of the included WPDM programs.

Thirdly, the narrative descriptions suggest that expertise and internal actions may be coordinated through the use of company based interdisciplinary teams. Depending on the corporate setup, the interdisciplinary team could consist of occupational therapists/ergonomists, physical therapists and physicians, case-manager or RTW-coordinator, the immediate supervisor, various labor-management representatives, the injured employee and a program administrator/data clerk leader. This team may ensure sufficient knowledge transfer processes between local departments and levels of management. The role of certified in-house case-managers (RTW-coordinators, disability case-managers, benefit administrators), constitute a particular interesting feature in the narrative program descriptions. Employers may utilize local RTW coordinators, assisting employees to assume personal ownership for their health, bridging communication with the local bureau of workers compensation and other service providers to help employees understand the medical and recovery aspects of their illness or injury, and the implied expectations of WPDM program policies and practices.

Fourth, WPDM programs create new opportunities and needs for union representatives to serve the reciprocal needs of employers, co-workers and re-entering employees. Based on the narrative descriptions union representatives may be involved at company strategic level via the joint labor-management committee,

influencing the development and monitoring of program procedures, or at the operational level regarding job accommodation, onsite clinical services and follow up according to the work group.

Fifth, narrative descriptions reflect how supervisor roles modify employee program participation and co-worker relations, while at the same time ensuring information on the specific job tasks, costs and activities required, taking action to contact employees while subsequently coordinating information to the medical or HRM department. Practitioners ought to consider ways that WPDM policy and practice can support supervisors in harmonizing WPDM program goals with production and well being of employees.

Lastly, the review uncovers the comprehensive use of staff physical therapist and occupational physicians, which plays a large role in the majority of programs through onsite physical rehabilitation services. In practice, these clinical competences were needed as the majority of WPDM programs targeted health problems specific to musculoskeletal conditions. The roles of physiotherapists and physicians were overlapping, but where employers supported primary functional capacity evaluations by including physiotherapists to select appropriate job duties and therapy, occupational physicians were involved in treatment and training. The presence of onsite occupational therapist performing job-analysis and individualized transitional work plans, assisting supervisors in determining what tasks that may or may not be performed also reflect the variety of expertise included to assist program, policy and practice.

Systematic consideration of the above issues may inform RTW process flow at the company level. However, the above human resources and procedures are predominantly described within the context of WPDM programs targeting musculoskeletal disorders, during the off-work and pre-return phase of the RTW process, with little focus on mental health conditions and stay at work.

9.2 IMPLICATIONS FOR RESEARCH

The literature within Disability Management has developed rapidly (see bibliometric analysis section 4.4). Various forms of DM policies and practices are implemented within different sectors and industries in many countries, making the need for robust WPDM program evaluations wanting. The review identified a number of gaps in the existing research on post injury disability management. These gaps leave lots of room for research on the organizational impact of WPDM programs to promote RTW and prevent pro-longed disability and marginalization.

Systematic outcome evaluations

Future research should consider the existing evaluations and program components and test multi-component interventions that also involve multiple levels (the

individual, the work unit and the organization). Furthermore, research ought to examine the independent and synergistic effects of WPDM program components to identify the most effective component combination. Research is still needed to identify the specific program components, that taken together, or in different constellations contributes to safe and timely RTW. Isolating the "active ingredient" of interacting components in organizational-level interventions, such as WPDM programs is a challenging task, which needs consideration of moderating factors across studies and chosen subgroups. Future reviews and updates could advance our understanding of the context of program components, and the frequency of program components described. This would allow a more complementary synthesis to help link components to outcomes through program theory, explaining constituent logical sequences and action mechanism at play (Durand et al 2003; Saini & Shlonsky 2011).

Complex interventions and organizational complexity

The scarcity of impact studies on employer provided WPDM programs may relate to the difficulty in carrying out research under the very complex conditions in organizational contexts. A WPDM program is by nature multi-faceted (broad in its use of components), and inter-disciplinary (involving a range of stakeholders from different professions), and is bound to conditions internal (organizational factors and cultures) and external (institutional and regulative frameworks) to the workplace, all of which can be difficult to control and measure. Given the complex nature of DM in organizations and challenges designing RCTs, critical methodological discussions still need to inform future evaluations on how to measure employer provided WPDM efforts to promote RTW. WPDM researchers therefore ought to reflect on ways to meet the challenge of designing experimental studies. Moving to a more comprehensive focus on robust controlled longitudinal quasi experimental designs alongside observational studies, describing the social and cultural context of programs in order to improve interventions could be a possibility.

New theoretical avenues

Based on the existing research, ways to design WPDM programs are very rich and well described, but lacking substantiated theoretical foundation. Theory driven and organizational approaches to WPDM have been put forward by Akabas (1992), Habeck and colleagues (1998ab), and James and colleagues (2010). However, there is a need to further develop frameworks of program theory, describing the logical sequence of action by which WPDM programs intend to increase the probability of RTW and staying at work. Lack of an explicit program impact theory may jeopardize workplace OHS or HR professionals in implementing effective WPDM programs (Durand et al 2003). Future WPDM program research could go beyond the traditional "black box" impact evaluation in order to explain how the program hopes to achieve its effects, and if and how it did achieve them (or not).

Building on these assumptions, questions arise on how well existing WPDM research capture established conceptual models in work disability prevention research. Inspired by the work of Young (2005) and Tjulin (2010), the review contributes with new angles to the existing literature on employer-provided WPDM, by analyzing the scope of programs in relation to phases of the RTW process. However, studies from Frank (1998), Loisel (2001), and Franche & Krause (2002) reflect how important timing of RTW interventions are according to stages of disability, and how interpersonal coordination between systems may impact knowledge transfer processes and employee decisional balance to RTW.

Given the multifaceted nature of work disability prevention, further research is needed to develop the focus of WPDM, and investigate how WPDM programs may target such multisystem interactions, incorporating interventions at the individual, organizational and system level. Researchers following this line could focus on ways to develop WPDM through trans-disciplinary collaboration, acknowledging that DM in organizations needs attention beyond the lens of any one discipline (Albrect et al 1998).

WPDM program measures

Future studies evaluating the effects of specific WPDM programs on RTW ought to encompass state-of-the-art definitions and measures of RTW outcomes. Most of the reviewed studies which featured a quantitative assessment of program effects on RTW used administratively collected data on for example workers compensation. Limiting a research agenda to traditional RTW outcomes, as for example time-to-first RTW, is bound to underestimate the duration of disability and the associated total burden (Krause & Lund, 2004). The majority of the studies did not feature outcome measures that enable estimating the sustainability of RTW, as they used RTW definitions that do not capture relapses associated with the initial disability period. This ought to be given priority in future evaluations of WPDM programs, broadening focus of WPDM beyond initial RTW.

Another characteristic of the included program evaluations are the dominant business orientation in WPDM. By nature, when establishing WPDM programs, companies need to balance efforts with the return of their investments. Still, challenging the business side of WPDM, inclusion of measures related to work role functioning, job satisfaction and sustainability at work, might in practice show evenly effective with regards to return of investments. A research agenda that acknowledges the value of sustainable work environments in RTW processes, while simultaneously incorporating the reciprocal economic and human needs of employers and employees, could be feasible. Based on this review, sustained RTW and stay at work are issues of concern, and therefore ought to become part of WPDM.

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11 Contributions of authors

Ulrik Gensby, Thomas Lund & Merete Labriola designed the review question and wrote the background of the protocol with assistance from Krystyna Kowalski and Madina Saidj.

Ulrik Gensby & Krystyna Kowalski wrote the methods sections with assistance from Trine Filges and Thomas Lund.

Searches were run by Anne-Marie Klint Jørgensen with assistance from Pia Vang. Studies were assessed for eligibility and data was extracted in pairs by Ulrik Gensby, Thomas Lund, Merete Labriola, Madina Saidj and Krystyna Kowalski.

The final review was written by Ulrik Gensby, Thomas Lund, Krystyna Kowalski and Merete Labriola. Benjamin C. Amick III and Emma Irvin commented and provided insightful editing on the protocol versions and the final version of the review.

12 Characteristics of studies

12.1 CHARACTERISTICS OF INCLUDED STUDIES

NON-RANDOMISED STUDIES (NRSs)

PEARS (1) PILOT STUDY: Yassi et al. 1995 (secondary references for this study include: Yassi et al. 1995a, Cooper et al. 1996, Cooper et al. 1997, Cooper et al. 1998, Tate et al. 1999)

Objective	The objective of the study was to evaluate a 2-year multidisciplinary early intervention pilot program for back-injured nurses with the aim to determine whether the program could (1) decrease the number of back injuries, (2) decrease the total time lost, and (3) be cost-beneficial
Country	Canada, Manitoba
Participants	All registered nurses on high-risk wards who sustained compostable soft-tissue back injuries were eligible to participate in the program. Nurses with planned departure from the workplace or pregnancy or previously identified concomitant medical or chiropractic intervention were ineligible to participate in the modified work.
Job function	Nursing
Industry/Sector/Setting	Public/Health care/ A teaching hospital and health sciences center
Study design	The study is a pilot study of the Prevention and Early active Return-to-Work Safely Program (PEARS) The study was designed as a pre/post intervention study with a control group. Pre versus post program analysis was made between the intervention group (study wards) and the control group (control wards) The study had 2 years retrospective data collecting preceding the PEARS – program implementation followed by a one year pilot intervention period
Intervention/WPDM-program	A workplace-based disability management pilot program (PEARS), targeting the nurses who are at highest risk for back injury based on their work task. This approach was derived from the theory that early assessment and timely rehabilitation using modified/alternative work would prevent further disability, restore optimal work capacity and reduce dependency on compensation benefits. The Prevention and Early active Return-to-Work Safely Program (PEARS) aims to prevent injuries and disability in health care employees. PEARS is developed by a bipartite agency (OHSAH), jointly governed by employers and unions, and was established with extensive input from healthcare employers and healthcare unions. Primary prevention, early intervention (prompt follow up of injured employees, targeted workplace modifications,

	and clinical treatment when required) and extensive evaluation form the cornerstones of the PEARS intervention philosophy. Access to on-site physiotherapy, review of work tasks with advice and training given when appropriate, work environment assessment with modification and purchase of equipment as necessary, a graduated (modified) RTW program with reduced hours and/or a reduced range of duties and access to on-site physician. The program was overseen by a bipartite steering committee that had representation from hospital management and union representatives during the intervention
Comparison	Wards with the highest risk for back injury were identified by ergonomic evaluation and by reviewing statistics for the previous two years. The control group consisted of all registered nurses who sustained similar occupational back injuries but worked on wards other than the targeted study wards. The control wards were advised to seek care through their routine caregivers.
Sample size	250 nurses employed in 10 target wards 1395 nurses employed in 45 control wards (Yassi et al. 1995b)
Relevant outcomes	Number of back injuries Duration of total time loss Associated costs
Data sources	PEARS-program data
Notes	Insufficient data to calculate effect sizes

DMP STUDY: Skisak et al. 2006

Objective	The study reports the development, clinical and financial aspects of a in-house Disability Management Program (DMP) at a large petrochemical company after 12 months of full program implementation
Country	US, Houston
Participants	Hourly paid refining employees and non-refining staff employees with non-occupational absence. 54 % of the total managed population was blue-collar refining workers and 46 % were white collar non-refining employees. 79 % of the total managed population was men and 21 % were women. 70 % of the total managed population was between 40-59 years. Managed-refining employees constituted 47 % of the total managed population and managed non-refining employees constituted 53 %. When looking at the managed-refining employees 87 % were men. 71 % were blue-collar workers. 61 % were hourly paid. 73 % were between 40-59 years old. When looking at the managed non-refining employees, 73 % were men. 61 % were white collar employees. 80 % were regular employed staff. 68 % were between 40-59 years old
Job function	Refining operations and maintenance of the refineries and non-refining functions such as management and office work
Industry/Sector/Setting	Private/ Petrochemical industry/Petroleum refinery One major business unit consisting of nine local refinery sites and diffusely distributed sites throughout the country
Study design	The study was designed as a non-randomized trial with a control group. Company business units that participated in the DM program were compared with business units not using the DM program pre- and post-program implementation

	The DM program was launched in the third quarter of 2002 and fully implemented in January 2003. Data were collected in 2002 and 12 months after implementation in 2003
Intervention/WPDM-program	The DM program was develop to identify and track employee lost time, quantify measures of disability and direct costs, decrease disability costs, apply company benefits consistently to all employees, ensure proper and prompt medical care, increase safe and timely RTW, motivate ownership of employee health, increase employee retention, morale and job satisfaction. The DM program was provided and implemented by the internal Health Service department and administrated by nine occupational nurses, each located at a petroleum refinery, and two full-time corporate-certified case-managers. DM program results were communicated throughout the organization on a quarterly basis and periodic updates were communicated to senior management to secure continued adherence and commitment. In addition a comprehensive year-end company health report is also developed and distributed to management. Employee and case management documentation were recorded and maintained in separate but linked databases. A case-management tool was purchased to manage all cases.
Comparison	The intervention group was comprised of managed refining and managed non refining employees. The comparison group was comprised of non-managed employees The managed refining employees were offered the DM program through an occupational nurse. The amount of time that each nurse had to devote to the DM-program varied given other medical support responsibilities. The managed non-refining employees were offered the DM program through corporate case managers The non-managed population was similar to the managed non-refining employee population with respect to age distribution, gender, job category and employee status
Sample size	23714 employees were referred to the study (14093 in the intervention groups and 9621 in the comparison group) 22879 employees completed baseline measures (13153 in the intervention groups and 9726 in the comparison group) Non-random-allocation was made between 6166 managed refining employees and 6987 non-managed refining employees. 9726 employees were non randomly allocated to a non-managed control group 22879 employees started the intervention; 22581 employees completed the intervention (12671 in the intervention groups and 9910 in the control group)
Relevant outcomes	Days of absence: Change in average days of absence per employee was observed as a result of 1-3 days' events and 4 + days' events Cost savings: The direct cost savings attributable to the DM-program was determined using an average daily wage for the entire workforce accumulated with the difference in absence days between 2002-2003
Data sources	Company records on employee demographics, absence entry and case management entry, and employee wage
Notes	Insufficient data to calculate effect sizes

BEFORE & AFTER STUDIES (Single group or without an adequate comparison)

PP STUDY: Wood 1987

Objective	The objective of the study was to evaluate the effectiveness of a back injury prevention program conducted in two phases.
Country	Canada, British Columbia
Participants	All employees experiencing work-related low back pain or injury
Job function	Nurses
Industry/Sector/Setting	Public/Health care/Geriatric hospital consisting of five units
Study design	The study is designed as a pre/post intervention with a prospective measure of number of injury claims before and after implementation of a two phased back injury prevention program. Phase 1: consisted of an in-house Personnel Program promoting RTW Phase 2: consisted of an Educational and Training Program to lower incidence of back injuries. The duration of the study was from 1980-1983.
Intervention/WPDM-program	Phase 1: The Personnel Program promoting RTW was designed to decrease the duration of wage loss claims by increasing the effectiveness of existing procedures used to process these claims. The components of the PPRTW-program are put into effect as soon as a wage loss claim is registered: (1) immediate contact is made with both the claimant and WCB (2) regular 10 day follow up calls are made to ensure the smooth progression of the claim through the proper channels (3) extended claims are examined for the possibility of retraining (4) liaison with WCB and the manager is established if a gradual return to work is indicated (5) all communications regarding the final RTW-stage are documented (6) all communications are kept on file.
Comparison	Not relevant – single group before and after study
Sample size	Approximately 700 staff members
Relevant outcomes	Number of injury claims Duration of wage loss
Data sources	Workers' compensation data Company records on claim and injury data

DRP STUDY: Tate et al. 1987

Objective	The objective of the study was to analyze the impact of the disability and rehabilitation policies (DRP) at a car manufacturer in Michigan. The aim is to identify specific employee or job-related characteristics or factors that seem to be directly associated with RTW.
Country	US, Michigan
Participants	250 employees divided into 5 subgroups participated. Results related to 3 of the subgroups (n=150) are included in this review.
Job function	Service team employees, mainly assembly line employees, drivers, machine operators, inspectors, cleaners and conveyor attendants.

Industry/Sector/Setting	The study is part of a larger research project including three major Michigan employers from different industries. The study included in this review reports the findings from one of the participating employers; a privately owned car manufacturer.
Study design	The study is designed as a non-randomized study with concurrent control groups and examines differences between 5 subgroups: 1 = (Rehab/RTW), 2 = (Rehab/NoRTW), 3 = (No Rehab/RTW), 4 = (No Rehab/NoRTW), 5 = (Inhouse rehab/RTW). Comparisons between subgroups 1, 2, 3, and 5 are included in this review. All subgroups were formed based on rehabilitation participation status (y/n) and RTW outcome (RTW y/n). Cases in the samples were selected randomly from the company's computerized list of 1985-86 active cases The duration of the study was 2 years and 4 months in the period 1984-1987,studying company specific disability management policies and practices
Intervention/WPDM-program	Any employer policies and practices regarding rehabilitation specifically, and other policies and practices that could have an impact on the quality of work life for their disabled/injured employees The disability policies are based on rehabilitation and in-house case-coordination by a rehab specialist.
Comparison	Comparison groups were formed with regard to rehabilitation participation and RTW outcome (NB: retrospective allocation) Cases for inclusion in the 5 sub-groups were selected randomly from the company's computerized list of 1985-86 active cases
Sample size	A total of 250 cases (divided into 5 subgroups) are sampled for this study (criteria not described), and results for 150 are reported in this review.
Relevant outcomes	Time to first RTW following injury
Data sources	Workers' compensation files and company personnel files
Notes	The study is an organizational analysis of components in an employer-based disability policy. There is however, no intervention or evaluation over time, but an analysis of time until return-to-work for three of the five sub-groups. The study compares different variations of rehab in a WPDM program between these three sub-groups, but there is no evaluation of the WPDM program overarching these program components.

RTWP STUDY: Gice & Tompkins 1989

Objective	The purpose of the study was to evaluate the success of a corporate Return-to-Work-program (RTWP) in a workplace setting
Country	US, Minnesota
Participants	All injured employees with musculoskeletal injuries
Job function	Nurse's aides, delivery-room assistants
Industry/Sector/Setting	Public/Health Care/Hospital
Study design	The study is designed as a case-control study using a multiple time series design. One hospital that used a RTW-program was compared to a hospital that did not use a RTW program. The duration of the study was 3 years: from implementation of the program in 1980-1981, 1981-1982 and 1982-1983

Intervention/WPDM-program	The RTW program consisted of a job analysis and functional capacity evaluation outlining the physical abilities of the employee after an injury. A job modification is prescribed with regards to a work hardening process, with gradual resumption of hours, duties and expectations required of the employee. Internal transfers are used if modification is not possible in the employees former department
Comparison	The two hospitals were almost identical in the size of the labor force, subject to injury and were located in similar size communities
Sample size	N/A
Relevant outcomes	Frequency of injuries Time loss from work Average working days lost from work Experience modification (i.e. premium charged to an insured)
Data sources	N/A
Notes	This is a 'company to company' comparison rather than a 2 group comparison. Treatment effects cannot be separated from company effects

TWRP STUDY: Breslin & Olsheski 1996

Objective	The study presents an employer-based Transitional Work Return Program (TWRP) and evaluates the effectiveness and the program in reducing time lost from work
Country	US, Cincinnati
Participants	Blue-collar workers with an injury
Job function	Welders, machinists, model makers, maintenance employees
Industry/Sector/Setting	Private/ Manufacturing/Machine company and associated foundry, weld shop, assembly area, shipping and receiving areas, model making shop, machine shop
Study design	The study is designed as a pre/post intervention study with a prospective analysis of lost time data after implementation of the TWR program The duration of the study was 3 years with a intervention period from 1992-1994
Intervention/WPDM-program	The Transitional Work Return Program (TWRP) is a corporate rehabilitation model which provides onsite clinical therapy and transitional work opportunities to encourage early RTW, prevent chronic occupational disability and emphasize strategies that attempt to place employees in their pre-injury job. Placement in the program is based on a reasonable expectation by the treating physician that the employee will regain functional abilities required for the targeted job by completion of the program. The policies and procedures address such issues as eligibility, program time limits, identification of program goals, program evaluation methods, methods of creating transitional work opportunities, wage and roles and responsibilities of all involved parties. The transitional return-to-work program is managed by the manager of employee relations. The program manager is ultimately responsible for the operations and performance of the program and manages program operations in accordance with established procedures and in consultation with the joint labor-management committee. The joint labor-management committee meets quarterly to review program satisfaction data from employees and supervisors and engage in

	rehabilitation planning to individual cases. A benefit administrator who is responsible for workers compensation at the company devotes ten hours per week to the administration of the program, which include internalized case-management duties.
Comparison	Not relevant – single group before and after study
Sample size	58 injured employees consented and completed 1st follow up
Relevant outcomes	Lost time claim data Average day away per lost time claim Reduction in rehab, medical, and compensation costs
Data sources	Administrative data

RTWP STUDY: Allen & Ritzel 1997

Objective	The objective of the study was to evaluate injury and cost data obtained from a Return-to-Work-program (RTWP) implemented in a coal mine
Country	US, Illinois
Participants	Employees with work-related musculoskeletal illnesses and injured
Job function	Coal miners working above and below ground
Industry/Sector/Setting	Private/Industrial industry/Mining company
Study design	The study is a non-randomized trial with a comparison group using a multiple time series design Data were collected 22 months before program implementation and 22 months after
Intervention/WPDM-program	An employer provided and company based work therapy and return to work - light duty - program instituted to reduce lost time and costs and enhance rehabilitation of injured employees. The program was designed to facilitate return to work in selected job-functions evaluated on a regular basis.
Comparison	The comparison group was comprised of employees at another company-owned mine located in the same general area using the same type of miners and extraction methods that had no RTW program. The comparison received usual treatment. Both groups were controlled for years on the job, miner age, nature of work and underground mining (no significant difference existed between the treatment and comparison group during the period before the RTW-program was implemented)
Sample size	29 miners started intervention and completed baseline measures 29 miners completed intervention and first follow up
Relevant outcomes	Comparison of monthly injury rate at treatment mine and comparison mine Costs and benefits attributable to the program Compensable injury rate
Data sources	Company records from the mining companies
Notes	This is a 'company to company' comparison, rather than a 2 group comparison. Treatment effects cannot be separated from company effects

ERTWP STUDY: Bernacki et al.2000 (secondary publications for this study include: Bernacki et al.1996, Green-McKenzie et al. 1998, Bernacki et al. 1998, Bernacki et al. 2003)

Objective	The study presents an Early Return-to-Work-program (ERTWP) containing a comprehensive cost-containment initiative and quantifies the effect of the job analytic process in facilitating acceptance by employees and supervisors of restricted work activities
Country	US, Baltimore
Participants	Employees with work-related injuries or illness
Job function	Health care employees and employees within the medical centre
Industry/Sector/Setting	Public/Health care/Hospital medical center and associated schools of medicine, hygiene and nursing
Study design	The study is designed as a pre/post intervention study and compared the number of lost workday cases, lost workdays, and restricted duty days before and after the initiation of the ERTW program The study compared data before initiation of the RTW-program from 1989 through 1992, with data during implementation of the program from 1993 to 1999
Intervention/WPDM-program	The facilitated early RTW program (ERTWP) is a component of a comprehensive managed care initiative, which includes early reporting of injuries, close follow up, and evaluation and correction of potentially hazardous work environments. The process begins with all employees with work-related conditions reporting immediately after their injury for evaluation and treatment at an internal occupational health or injury clinics. The nursing staff evaluates the individual initially. Cases that need physician input are referred to the occupational physician. After an injured employee is seen by a physician, a RTW-duty restriction form is completed by the physician and then reviewed with the employee by an occupational health nurse. The supervisor then indicates whether the restrictions can be accommodated. If the supervisor indicates that he cannot accommodate the restrictions, the nurse case manager requests that a job analysis be performed. Administrative meetings are conducted every 2 weeks to share information on the status of all individuals who are out of work or have work restrictions during these sessions, each employee who has job restrictions is discussed and his or her work status is monitored
Comparison	Not relevant – single group before and after study
Sample size	Before RTW-program implementation: 1989: 16.212 1992: 17.136 After RTW-program implementation: 1993: 17.771 1999: 28.518
Relevant outcomes	Lost workday cases Lost workdays Restricted duty days
Data sources	Administrative data and company records from OHS-department, HR-department and Occupational injury clinic

STDMP STUDY: Burton & Conti 2000 (follow up to Conti & Burton 1994)

Objective	The study describes a proactive in-house program for managing short term disability (STD) in the workforce of a very large company
Country	US, Chicago
Participants	Employees sick-listed for 5 consecutive days and up to 6 months are enrolled in the STDM-program
Job function	Office work
Industry/Sector/Setting	Private/Financial/Bank and associated departments
Study design	The study was designed as a pre/post intervention study where the effect of a workplace disability management program on duration of short term disability was compared after merging two companies and measured after implementation of the program. The merging corporation received a satellite disability management unit and short term disability management program, which neither was in place before merging the two corporations. Study duration was 18 months
Intervention/WPDM-program	The disability management program is a proactive in-house program to manage short term disability (STDMP). The goals of the program is to minimize the personal and economic impact of disability by early intervention, validate extent and duration of disability, coordinate medical service and provide guidance to managers and supervisors on modifications of work and the workplace. The STDM-program is managed administered in the corporate medical department. And is conducted by an in-house Medical Disability Coordinator and a specially trained occupational health nurse who reports directly to the Corporate Medical Director. The company has a in-house data system, which includes details of individual claims for inpatient and outpatient health services and for disability and workers compensation benefits, personnel information services, records on absenteeism, occupational nursing records, findings on periodic laboratory tests and utilization of the prescription and medicine. The Corporate Health Department operates the system and ensures confidentiality of the individual employee's personnel and medical information. Compilations of data are analyzed by diagnosis, demographic elements, worksite location are shared as appropriate with management and departments to validate continued corporate support and cooperation.
Comparison	Not relevant – single group before and after study
Sample size	N/A
Relevant outcomes	Average decline in short term disability (STD) event duration STD disability benefits STD recidivism for different chronic diseases
Data sources	In-house data system (OMNI=Occupational Medicine and Nursing Information System)

WOMP PILOT STUDY: Lemstra & Olszynski 2003 (this study has one secondary publication: Lemstra & Olszynski 2004)

Objective	The objective of the study was to compare the effectiveness of and Workplace Occupational Management Program (WOMP), early intervention and standard care in the management of workers' compensation injury claims.
Country	Canada, Saskatchewan

Participants	Employees with musculoskeletal injuries such as low back and upper extremity disorders
Job function	N/A
Industry/Sector/Setting	Private/Meat Industry
Study design	NRS: This part of the study features a cross sectional cohort and analyses the effect of one company using WOMP in comparison with a control workplace receiving Early Intervention. B & A: This part of the study features a prospective cohort design comparing transition from standard care to WOMP at the same workplace. NRS: Duration of study was 1 year and 3 months B & A: Duration of study was 2 years and 3 months
Intervention/WPDM-program	The Occupational Management Program consisted of: Primary prevention strategies such as employee rotation schedules reduced lifting loads, ergonomic redesign of tasks and secondary prevention strategies such as independent on-site management with a physical therapist
Comparison	Only relevant to the part of the study comparing the effect of WOMP to Early intervention alone. The comparison group received "Early Intervention", where injured employees are required to immediately participate in expanded physical therapy and work-hardening programs. If not at work at 6 weeks, broader secondary or tertiary treatment protocols are initiated that last up to 4 hours a day and include psychosocial intervention.
Sample size	NRS: 285 in intervention group and 232 in control in 2000 B & A: 185 in 1999 and 285 in 2000
Relevant outcomes	Reduction of time loss injury claims Total days lost Total compensation costs
Data sources	N/A
Notes	The researchers introduce no intervention as such, but follow "natural interventions" induced by law and/or (change in) company policies. The similarities/differences are based upon the researcher's appraisal, not measurements. This is a 'company to company' comparison, rather than a 2 group comparison. Treatment effects cannot be separated from company effects

PEARS (2) STUDY: Davies et al. 2004 (further data published in the secondary publication Oulette et al. 2007)

Objective	The objective of the study was to report on the first two objectives of the PEARS program (1) to decrease incidence of musculoskeletal injuries (MSI's) and (2) associated time loss among hospital employees.
Country	Canada, British Columbia
Participants	Healthcare workers (HCW)
Job function	Registered nurses, health science professionals (i.e., paramedic professionals, medical laboratory and radiation technologists, physiotherapists, occupational therapists, pharmacists), facility support services (i.e., clerical staff, housekeeping, laundry, supply and distribution, trades, orderlies, licensed practical nurses and security)
Industry/ Sector/Setting	Public/ Health Care/Two acute care hospitals
Study design	This study is a replication of a smaller scale PEARS pilot study in another jurisdiction (see Yassi et al., 1995ab).

	The study is the first of two studies (Davies et al., 2004; Badii et al., 2006) reporting on a pilot intervention program (PEARS) in two hospitals. This study reports on the results of the first year pilot in one of the hospitals. The study is a pre/post intervention with concurrent control design The study had 1 year intervention period and 3 years retrospective data collection
Intervention/WPDM-program	The intervention refers to The Prevention and Early active Return-to-Work Safely Program (PEARS). The study describes 3 components of the (PEARS) program; (1) Primary prevention (2) Early intervention (prompt follow up of injured employees, targeted workplace modifications, and clinical treatment when required) and (3) Extensive evaluation. Access to on-site physiotherapy, review of work tasks with advice and training given when appropriate, work environment assessment with modification and purchase of equipment as necessary, a graduated (modified) RTW program with reduced hours and/or a reduced range of duties and access to on-site physician.
Comparison	The comparison site received usual treatment from MS injury prevention team
Sample size	343 completed baseline and started the intervention
Relevant outcomes	Duration of time loss Time loss due to MSIs Compensation payments
Data sources	Company records
Notes	The study is apparently a comparison between 2 hospitals (intervention and control) in same region, but no between group differences is analyzed. In real, this is a B & A study of return-to-work after intervention at one workplace. There is apparently no control of who leaves/joins the worksites before and after onset of intervention. Also, censoring sick leave exceeding 6 months could affect conclusions, as (differences in) their incidence B & A intervention is unaccounted for within the analysis.

PEARS (2) STUDY: Badii et al. 2006

Objective	The objective of the study was to investigate the effectiveness of an integrated RWT-program (PEARS) to reduce musculoskeletal injuries (MSIs). More specific to ascertain how the PEARS program influenced: incidence of all reported injuries; incidence of reported MSI; incidence of time loss due to MSIs; mean duration of time loss and compensation costs
Country	Canada, British Columbia
Participants	All employees who experienced work-related MSI or those employees with MSI not caused by work duties but affecting the ability to perform job demands were eligible to participate in the intervention. Participation was entirely voluntary.
Job function	Healthcare workers (HCW) with MSI regardless of body region or mechanism
Industry/Sector/Setting	Public/ Health Care/Two acute care hospitals and associated trauma referral centers
Study design	This study is a replication of a smaller scale PEARS pilot study in another

	jurisdiction (see Yassi et al., 1995ab). The study is the follow up to (Davies et al., 2004) reporting on a pilot intervention program (PEARS) in two hospitals. This study reports on the results of the second year in one of the hospitals. The study is a pre/post intervention with control design. The study had 1 year intervention period and 3 years retrospective data collection
Intervention/WPDM-program	The intervention refers to the Prevention and Early active Return-to-Work Safely Program (PEARS) (see Yassi et al., 1995ab; Davies et al., 2004). The study describes 3 components of the (PEARS) program; (1) Primary prevention (2) Early intervention (prompt follow up of injured employees, targeted workplace modifications, and clinical treatment when required) and (3) Extensive evaluation. Access to on-site physiotherapy, review of work tasks with advice and training given when appropriate, work environment assessment with modification and purchase of equipment as necessary, a graduated (modified) RTW program with reduced hours and/or a reduced range of duties and access to on-site physician
Comparison	The comparison site operated under the same OHS management team with the traditional OHS policies and procedures, and had the same range of injury prevention
Sample size	348 health care employees were referred to the study of these 216 consented and started the intervention
Relevant outcomes	Time-Loss MSI rates Time to Return to Work Total days lost and related compensation costs
Data sources	Workers compensation board data, Injury data, Health authority payroll data, and PEARS data

IMDM STUDY: Bunn et al. 2006

Objective	The objective of the study was to evaluate a Workplace Disability Management-program (IMDM) to reduce musculoskeletal disability related absenteeism at a manufacturing facility
Country	US, Ohio
Participants	All employees filling a claim for a musculoskeletal disability were eligible for the program
Job function	Mostly blue-collar, hourly workers in manufacturing operations
Industry/Sector/Setting	Private/Manufacturing/Truck and Engine Corporation manufacturing medium and heavy duty trucks, school busses and diesel engines
Study design	The study was designed prospective pre/post intervention study. The clinical and financial outcome measures were compared before and after IMDM program implementation Duration of the study was 5 years: Baseline data were obtained from 2000-2001 before implementation of the IMDM program followed by a 4 years intervention period after implementation of the IMDM program from 2001-2005.
Intervention/WPDM-program	The International Disability Management (IMDM) program is a three stage communication and educational intervention targeted at community and staff physicians and employees. The first stage required physicians to complete

	assessment forms for employees claiming disability because of MSI. The second stage added physician education focusing on current clinical guidelines. The third stage incorporated local physician education about the facilities' onsite physical therapy. The DM program was administrated by the Medical Services Department within the facility. Periodic updates were communicated to the plant management and to senior company management, which made the management aware of the need for continued adherence to the study interventions
Comparison	Not relevant – single group before and after study
Sample size	3417 employees were referred to the study and completed baseline of these 1927 started the intervention. 1366 employees completed the intervention
Relevant outcomes	Days lost per work-related injury Days lost per scheduled Full-Time-Equivalent employee Indemnity costs Medical costs
Data sources	Company records

12.2 CHARACTERISTICS OF EXCLUDED STUDIES

Annett 2008

Reason for exclusion	No clear linkage to a specific employer-provided/corporate WPDM program manager responses to organizational policy and practice

Amick et al. 2000

Reason for exclusion	Participants recruited from clinical settings from many different workplaces Responses to organizational policy and practice

Boseman 2001

Reason for exclusion	Case study

Brooker et al. 2001

Reason for exclusion	Stand-alone modified work intervention No clear linkage to a specific employer-provided/corporate WPDM program

Chen et al. 2009

Reason for exclusion	No clear linkage to a specific employer-provided/corporate WPDM program

Cheng & Hung 2002

Reason for exclusion	No clear linkage to a specific employer-provided/corporate WPDM program

Cohen 1990

Reason for exclusion	Case study

Crook et al. 1997

Reason for exclusion	No clear linkage to a specific employer-provided/corporate WPDM program Participants recruited from many different workplaces

D'Amato et al. 2010

Reason for exclusion	No clear linkage to a specific employer-provided/corporate WPDM program

Dunning et al. 2008

Reason for exclusion	Unit of analysis is company organizational policy and practices (OPPs)

Fiztler & Berger 1982, 1983

Reason for exclusion	Case study

Grossi & Santell 2009

Reason for exclusion	No clear linkage or indication of whether the intervention is part of a specific employer-provided/corporate WPDM program The intervention is a stand-alone stress management program

Goine et al. 2004

Reason for exclusion	No clear linkage or indication of whether the intervention is part of a specific employer-provided/corporate WPDM program

Hanson et al. 2001

Reason for exclusion	No clear linkage to a specific employer-provided/corporate WPDM program Stand-alone intervention

Habeck et al 1998

Reason for exclusion	Unit of analysis is company responses to organizational policy and practice (OPPs)

Hollingworth 1995

Reason for exclusion	Case study

Hunt & Habeck 1993

Reason for exclusion	Unit of analysis is company responses organizational policy and practice (OPPs)

Kalina 1998

Reason for exclusion	Case study

Linton et al. 1991

Reason for exclusion	No clear linkage to a specific employer-provided/corporate WPDM program The intervention is a stand-alone supervisor training program with no evaluation of RTW

Nordstrøm et al. 1998

Reason for exclusion	No clear linkage to a specific employer-provided/corporate WPDM program The intervention is an offsite clinical intervention with a workplace component

Mosley 2003

Reason for exclusion	No comparison and only a post intervention measure

Ryan 1995

Reason for exclusion	The intervention is a stand-alone back program

Salkeveer et al. 2000

Reason for exclusion	No clear linkage to a specific employer-provided/corporate WPDM program Company responses to DM policy

Salkeveer et al. 2001

Reason for exclusion	No clear linkage to a specific employer-provided/corporate WPDM program Company responses to DM policy

Shoemacher et al. 1992

Reason for exclusion	No clear linkage to a specific employer-provided/corporate WPDM program Company responses to DM policy

Sampaio et al. 2003

Reason for exclusion	No clear linkage to a specific employer-provided/corporate WPDM program

Serxner et al. 2001

Reason for exclusion	No clear linkage to a specific employer-provided/corporate WPDM program The intervention is a stand-alone health promotion program

Steenstra et al. 2006

Reason for exclusion	No clear linkage to a specific employer-provided/corporate WPDM program Participants recruited from clinical settings from many different workplaces

Strautins & Hall 1989

Reason for exclusion	No clear linkage to a specific employer-provided/corporate WPDM-program

Wiesel et al. 1994

Reason for exclusion	No clear linkage or to a specific employer-provided/corporate WPDM program

12.3 CHARACTERISTICS OF STUDIES AWAITING CLASSIFICATION

LDP: Ryden et al. 1988

Objective	To evaluate the benefits of a light duty RTW program in a hospital setting
Country	
Participants	-
Job function	-
Industry/Sector/Setting	-
Study design	.
Intervention/WPDM-program	
Comparison	-
Sample size	-
Relevant outcomes	
Data sources	-

DCM: Mobley et al. 2000

Objective	To evaluate a multifaceted DM program in an automotive manufacturing organization
Country	US
Participants	-
Job function	-
Industry/Sector/Setting	Private/Manufacturing
Study design	.
Intervention/WPDM-program	-
Comparison	-
Sample size	-
Relevant outcomes	Workers compensation costs Total disability leave rates
Data sources	-

DPP: Dowd et al. 2010

Objective	To evaluate the effect of an employer- and clinic based DM program
Country	US
Participants	-

Job function	-
Industry/Sector/Setting	-
Study design	The research design is a quasi-experimental comparison of expenditures in treatment and control employers and clinics, controlling for differences in baseline expenditures and other characteristics of the subjects.
Intervention/WPDM-program	The DM program was designed to improve communication and coordination of employer and physician efforts to help employees with work-related injuries to RTW.
Comparison	-
Sample size	-
Relevant outcomes	Indemnity costs Medical costs Workers compensation costs
Data sources	-

Shell DMP: Wendt et al. 2010

Objective	To evaluate the impact of the Shell Disability Management Program (DMP) on employee absenteeism and return-on-investment
Country	US
Participants	Manufacturing employees
Job function	-
Industry/Sector/Setting	Private/Petrochemical industry
Study design	The study is a pre- post intervention The study had a 2 year pre-program data collection followed by 4 year prospective data collection after program implementation
Intervention/WPDM-program	-
Comparison	-
Sample size	-
Relevant outcomes	Absence episodes Days lost per employee Productivity gains from transitional duty Costs savings
Data sources	-

13 Additional tables

13.1 RISK OF BIAS TABLES

Quality assessment tables

	Skisak et al., 2006	Yassi et al.,1995
SELECTION/SAMPLE BIAS Adequate sequence generation	High Risk	High Risk
SELECTION/SAMPLE BIAS Allocation concealment	Unclear Risk	High Risk
SELECTION /SAMPLE BIAS Equivalent groups at baseline	High Risk	High Risk
PERFORMANCE BIAS Fidelity of intervention	Low Risk	Low Risk
DETECTION BIAS Blinding of outcome assessors	Low Risk	Low Risk
DETECTION BIAS Analysis	Unclear Risk	Unclear Risk
ATTRITION BIAS Incomplete outcome data	Unclear Risk	Unclear Risk
REPORTING BIAS Selective outcome reporting	High Risk	High Risk
FREE OF OTHER SOURCES OF BIAS	High Risk	High Risk

13.2 RISK OF BIAS TABLES (PER STUDY)

	Skisak et al. 2006		
DIMENSION	ITEM	JUDGEMENT	DESCRIPTION
SELECTIONS /SAMPLE BIAS	Adequate sequence generation	No	Non-random study design automatically scores high risk of bias features
	Allocation concealment	Unclear	Allocation procedures not reported
	Equivalent groups at baseline (and differences controlled for if present)	No	Baseline reported "The characteristics of these approximately 9800 non margined employees [control group] were similar to the managed non refining employee population with respect to are distribution, gender, job category, and employee status" pg. 499. The authors do report data but no statistical tests. Table 1 pg. 498.
PERFORMANCE BIAS	Fidelity of intervention	Yes	Not reported in the study. Study investigator response from correspondence: "This program is routinely reviewed by management to assure the completeness and timely process of all illness absence cases"
DETECTION BIAS OUTCOME: Time loss	Blinding of outcome assessors	Yes	The outcome measure 'days of absence' is an objective measure. Study investigator response from correspondence: 'All illness absence data was recorded in the company personnel and payroll system ..'.from company
	Analysis Was censored data reported and adequately accounted for? (For cluster RCT/NRSs were appropriate methods used to account for clustering?)	Unclear	Censored data were not reported in the publication. Study investigator response from correspondence: "Censored data were not adjusted in the analysis". However there is not information to judge whether censoring actually occurred or not.
ATTRITION BIAS OUTCOME: Time loss	Incomplete outcome data adequately accounted for	Unclear	Drop outs and missing data were not reported in the publication. Study investigator response from correspondence: "Mid-year employee count was used as the denominator; drop outs were relatively few

			and were not adjusted in the analysis". 'As relatively few' is not specific the judgment is unclear.
REPORTING BIAS OUTCOME: Time loss	Free of selective and/or incomplete outcome reporting	No	Results of data were not fully reported
OTHER SOURCES OF BIAS	Free of other sources of bias	No	One limitations is reported, but is not adequately accounted for.

	Yassi et al.1995, Cooper et al. 1997, Tate et al. 1999		
DIMENSION	ITEM	JUDGEMENT	DESCRIPTION
SELECTIONS /SAMPLE BIAS	Adequate sequence generation	No	Non-random study design automatically scores high risk of bias features
	Allocation concealment	No	High risk ward recruited for the intervention and low risk wards were recruited based on the review of "injury statistics for the previous two years" pg. 210
	Equivalent groups at baseline (and differences controlled for if present)	No	Ward differences were not controlled for. Tate et al.. 1999, pg. 1932. Authors write that age, nursing experience, ward experience were "not significantly different" between groups, however no data or p values were reported.
PERFORMANCE BIAS	Fidelity of intervention	Yes	"The intervention was a "standardized comprehensive program ..." (Cooper et al., 1997, pg.151)
DETECTION BIAS OUTCOME: Time loss	Blinding of outcome assessors	Yes	"Time loss and cost data were obtained directly from the WCB [Workers compensation board] monthly statements" pg. 211
	Analysis. Was censored data reported and adequately accounted for? (For cluster RCT/NRSs were appropriate methods used to account for clustering?)	Unclear	Censored data was not reported in the publication. Study author response regarding missing data missing and drop outs via email correspondence:"... this was not issue in our study. The analysis is based on compensated lost time. An employee leaving 'the company', i.e. choosing not to return to work when s/he was able to, would no longer be receiving compensation" "

ATTRITION BIAS OUTCOME: Time loss	Incomplete outcome data adequately accounted for	Unclear	Drop outs and missing data were not mentioned.
REPORTING BIAS OUTCOME: Time loss	Free of selective and/or incomplete outcome reporting	No	Time loss reported as organizational total and not per individual. Data not reported for NS results pg. 212.
OTHER SOURCES OF BIAS	Free of other sources of bias	No	The authors do not report any limitations or concerns regarding possible confounding of results.

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14.4 ONGOING STUDIES

None known

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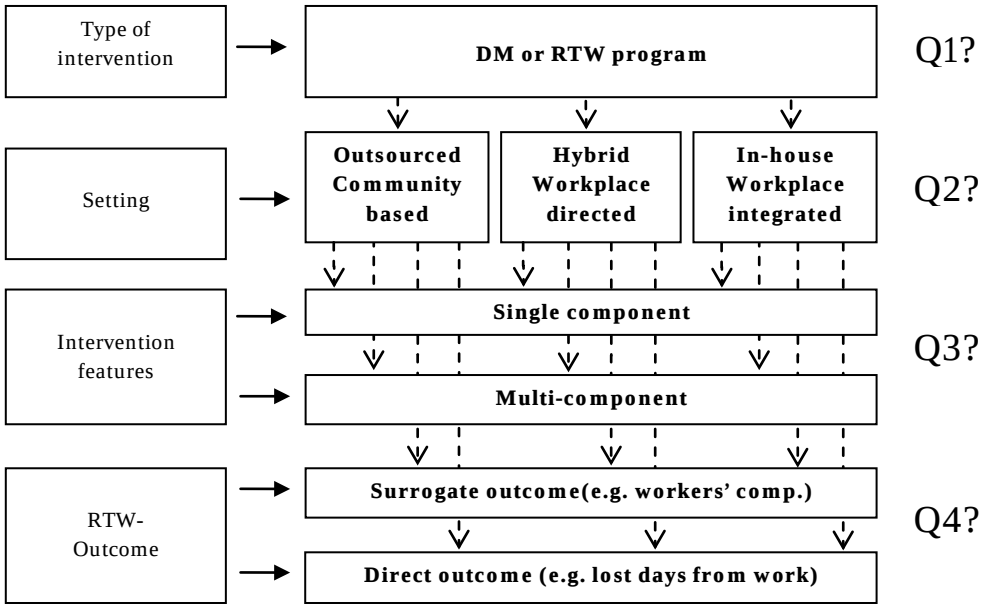
15 Figures

15.1 WPDM PROGRAM ELIGIBILITY CRITERIA

Conceptual model guiding WPDM program inclusion



The first question concerns type of intervention (Q1). Is the intervention a DM-or RTW program? The second question concerns the setting (Q2). Is the program an in-house workplace integrated initiative, a hybrid workplace directed initiative or an outsourced community based initiative? The third question concerns intervention features (Q3). Is the intervention singular or multi-component with a clear linkage between component(s) and a program offered? The fourth question concerns outcome evaluation (Q4). Does the program evaluation focus on direct RTW-outcome or a surrogate outcome measure for RTW?

16 Sources of support

16.1 INTERNAL SOURCES

- SFI Campbell (Copenhagen, Denmark)
- Department of Environmental, Social and Spatial Change, Roskilde University (Roskilde, Denmark)
- PreSenter, The International Research Institute in Stavanger (Stavanger, Norway)

17 Appendices

17.1 APPENDIX 1 - FIRST & SECOND LEVEL SCREENING

First level screening on the basis of titles and abstracts
Second level on the basis of full text

Reference ID. no.:
Study ID. no.:
Reviewer's initials:
Source:

Year of publication:
Duration of study:
Country of origin:
Author:

First Level Screening Questions (Titles and Abstracts)

1. Does the study focus on some form of Disability Management (DM) or Return to Work (RTW) program?
   Yes
   No
   Uncertain

Q1 Guidance:
In the context of this review a WPDM program may have at least one of the following components:

Elaboration of the potential program components in DM/RTW programs inclusion criteria (see protocol, p. 9).

1. Early contact and intervention
Early contact and intervention relates to communication and coordination of the RTW process between the sick-listed employee and the employer.

2. Workplace assessment

Workplace assessments are conducted before first return to work and are a walk through the workplace to identify possible obstacles and barriers that may hinder the sick-listed employee from re-entering the workplace

3. Workplace accommodation

Workplace accommodation relates to whether it is practical/ possible for the employer to accommodate the sick-listed employee and organize work according to the employee's health situation and work condition

4. Transitional work opportunities

Transitional work opportunities relates to specific job functions or work tasks that, in a transitional period, can support the employee in gradual recovery, improvement and full working proficiency

5. Access to alternative placements

Access to alternative placements relates to the provision of special or light duty job functions, whereby employees with functional limitations or work disabilities can be included at the workplace.

6. Modified/tailored work

Modified or tailored work relates to either adaption of schedules or work duties to the employee's health situation and functioning

7. RTW-coordination or case-management

RTW-coordination or case-management relates to situations where employers have established a coordinator function to support the RTW-process by coordinating administration and information, bridging interventions and communication among health-care providers, job-consultants, employer and the sick-listed employee

8. RTW-policies

RTW-policies relates to specific personnel policies that sets out the principles and procedures for dealing with sickness absence, inclusion and return-to-work

9. Active employee participation

Active employee participation includes activities involving the sick-listed and co-workers in relation to decision making processes, and the actions set in motion to promote RTW in the workplace

10. Revision of workplace roles

Revision of corporate workplace roles relates to redefinition of internal tasks and re-delegation of responsibilities in relation to sickness absence and return to work among e.g. supervisors or employee representatives

11. Joint labor-management commitment

Joint labor-management commitment relates to the collaboration between management and employees, which is often a core element for development, implementation and execution of actions and initiatives towards RTW

12. Education of workplace staff or case managers
Education and training can be directed towards all or parts of a work-group and covers a wide range of initiatives within leadership and skills development (e.g. training in sick-leave conversations, handling of return to work process, collaboration with external providers)

13. Preventive strategies to avoid disability occurrence
Preventive strategies are implemented to reduce the proportion of work hazards that can contribute to work-related injury and disabilities and covers the general occupational health and safety work (e.g. accidents, safety and well-being)

14. Information system that enhances accountability, ongoing monitoring of disability cases and program evaluation
Internal information systems can help companies to record, monitor and follow up on individual illness and secure and ongoing evaluation of the RTW-practices in the workplace

15. Multidisciplinary rehabilitation services
Multi-disciplinary interventions consist of different intervention components that are offered as a comprehensive course in the return to work process. Interventions can be vocational (e.g. job-replacement, job sharing and job training/retraining) or clinical (either *psychological* ((e.g. cognitive or behavioral therapy, motivation or control exercise physical)) or *physical* ((e.g. graded activity, participatory ergonomics or pain management/work hardening)).

2. Does the study population include employee on sick leave/ work absence?
   Yes
   No
   Uncertain

Q2. Guidance
This includes all types of work disabilities and all types of illness and injury excepting a pre-existing permanent or total impairment disability.

The report is excluded if one or more of questions from 1 to 5 are NO.
If the answers to questions 1 to 5 are yes or uncertain the full report is retrieved for second level eligibility screening. All uncertain questions need to be posed again on

the basis of the full text. If not enough information is available or it the report is unclear, report authors will be contacted to clarify eligibility.

Second Level Screening Questions (Full text)

3. Is the program provided or initiated by the employer?
   Yes
   No
   Uncertain

Q3. Guidance Employer provided or initiated is defined as a program that has an in-house/onsite component, and where the intervention components (e.g. workplace RTW-coordination) have a clear linkage to a company program offered.

4. Is the program implemented within the work place setting?
   Yes
   No
   Uncertain

Q4 Guidance The interventions implemented within the workplace setting or in combination with other settings are included. Interventions that only occur outside of the workplace (such as community or clinical based settings) are excluded.

5. Does the report use one of the following study designs (listed below a, b, or c):
   Yes
   No
   Uncertain

   a. Is the study a RCT (with a control group that is TAU, alternative intervention, or no intervention)?
      Yes
      No
      Uncertain

   b. Is study a non-randomized controlled study (with a control group that is TAU, alternative intervention, or no intervention)?
      Yes

No
Uncertain

c. Is the study a single group before and after design?
Yes
No
Uncertain

17.2 APPENDIX 2 - DATA EXTRACTION

Study design questions (cited pg. #):

6. **How were comparison / control groups formed?**

   a. Random assignment
   b. Quasi-random assignment
   c. Other (describe and cite pg.#)

7. **If random assignment, specify design?**

   a. Individual
   b. Stratified/Blocked
   c. Matched pairs
   d. Cluster randomization
   e. Other (describe)
   f. Not clear

8. **How was random assignment performed?**
   a. Computer generate
   b. Random numbers table
   c. Coin or dice
   d. Other
   e. Description unclear
   f. Not report

9. **How many separate sites were included in the study?**

10. **Was random assignment performed in the same way in all sites?**
    a. Yes
    b. No (explain)
    c. Not clear

11. **How many intervention groups were there?**

a. State number and describe

12. **How many interventions group are relevant for this review?**
    a. One
    b. More than one (state number and specify)

13. **How many different control/comparison groups were there?**
    a. State number and describe

14. **How many control/comparison groups are relevant for this review?**
    a. One
    b. More than one (state number and specify)

15. **Study sample size**

N's	WPDM 1*	COMPARISON 1*	TOTAL	Pg. # & NOTES
Referred to study				
Consented				
Completed base line measures				
Randomly assigned Or non randomly allocated				
Started treatment				
Completed treatment				
Completed first measure after baseline				
Completed 1st follow up				
Completed 2nd follow up(add rows for as required for additional follow ups)				

* add columns for additional intervention and control/comparison groups.

Participant/sample characteristics (cited pg. #):

16. Was participant inclusion criteria mentioned?
    a. No
    b. Yes (describe & cite pg#)

17. Was participant exclusion criteria mentioned?
    a. No
    b. Yes (describe & cite pg#)

18. **Participant characteristics**

	WPDM*	CONTROL*	TOTAL	Pg. # & NOTES
Gender (e.g. % male)				
Age (e.g. mean)				
Socioeconomic status				
Educational background				
Profession				
Job function				
Other characteristics				

* add columns for additional intervention and control/comparison groups.

19. **Specify and describe the work disability**
    a. Injury
    b. Mental illness (e.g. Stress, anxiety, depression)
    c. Musculoskeletal (e.g. Lower, shoulder, neck pain)
    d. Illness (specify pg. # e.g. Autoimmune, cardio vascular, neurological)
    e. Combination
    f. Not reported

20. **Were there any differences between intervention and comparison groups at baseline?**
    a. No
    b. Yes (describe differences & cite pg#)
    c. Unclear

21. **Was there any analysis of differences between completers and dropouts in the intervention group?**
    a. No
    b. Yes (describe differences & cite pg#)
    c. Unclear

22. **Was there any analysis of differences between completers and dropouts in the intervention group?**
    a. No
    b. Yes (describe & cite pg. #)

23. **Was intention to treat analysis used?**
    a. No
    b. Yes (describe & cite pg. #)

Employer characteristics (cited pg. #):

24. **Is the employer/ public or private?**

25. **Specify work sector/industry? (e.g. transport, health care, manufacturing, financial)**

26. **Specify company type? (e.g. bank, hospital)**

27. **Employer size**
    a. Large (> 400)
    b. Medium (≥100- 400 <)
    c. Small (< 100)
    d. Not reported

WPDM program characteristics (cited pg. #):

28. **Specify type of WPDM program. Is the program tailored to deal with:**
    a. Musculoskeletal disorders (MSD) (list specific condition(s))
    b. Mental health disorders (list specific condition(s))
    c. Other illness (list specific condition(s))

29. **List and describe WPDM program characteristics including all components in the intervention group (if more than one describe each group separately)**
    (See guidance question 1 box for more details regarding DM components)
    a. Early contact and intervention

b. Workplace assessment
c. Workplace accommodation
d. Transitional work opportunities
e. Access to alternative placements
f. Modified/tailored work
g. RTW-coordination or case-management
h. RTW-policies
i. Active employee participation
j. Revision of workplace roles
k. Joint labor-management commitment
l. Education of workplace staff or case managers
m. Preventive strategies to avoid disability occurrence
n. Information system that enhances accountability, ongoing monitoring of disability cases and program evaluation
o. Multidisciplinary rehabilitation services; vocational (e.g. job-replacement, job sharing and job training), clinical (either *psychological* ((e.g. cognitive or behavioral therapy, motivation or control exercise)) or *physical* ((e.g. graded activity, participatory ergonomics or work hardening)).
p. Other components (specify)

30. **Describe the scope of each program component in the study in relation to the phases of the RTW-process. i.e. is the program component directed at the employee while the employee is**
    a. Off work (sick-listed)
    b. Pre-return (employee's first return to work)
    c. Post-return (sustainability of work ability)
    d. Combination of more phases (describe & cite pg. #)

31. **Record level of focus in the WPDM. Is the WPDM program intervention**
    a. Individual based
    b. Group based
    c. Combination of both
    d. Other (describe & cite pg. #)
    e. Not mentioned

32. **Record exact details of the duration of the WPDM intervention in hours, days, weeks**
    a. Total number of hours
    b. Total number of days
    c. Total number of weeks
    d. Total number of months

33. **Record exact details of the intensity of the WPDM intervention (i.e. contact hours, meetings, training sessions) for participants per day, week and month**
    a. Describe activity, Per day
    b. Describe activity, Per week
    c. Describe activity, Per month

34. **If any, describe methods used to ensure the quality/fidelity of the WPDM intervention**
    a. None mentioned
    b. Description

35. **Participant compliance (i.e. did the participants do what they were were supposed to do?)**
    a. Not mentioned
    b. Mentioned (specify & cite pg.#)

36. **List key parties involved in the WPDM-program/intervention and their affiliation.**
    a. Supervisors (line management)
    b. Senior Management
    c. Union representative
    d. Internal staff / technical staff
    e. Occupational therapist
    f. Physiotherapist
    g. Medical doctor
    h. Nurse
    i. RTW-coordinator/ Case-manager
    j. Other (specify)

37. **List (and give short description) types of different work-sites (i.e. specific departments) that the WPDM intervention took place in.**

38. **List (and give short description) types of different workplace settings that the WPDM programme component took place in.**
39. **For intervention groups at different sites were there any implementation differences between sites?**
    a. Yes (describe & cite pg.#)
    b. No
    c. Can't tell

40. **For the intervention group were there any co-interventions not related to WPDM?**
    a. Yes (describe & cite pg#)

b. No
c. Can't tell

Control/comparison group

41. **Type of control/comparison group**
    a. Usual services / Treatment as usual (pg. # & describe)
    b. Alternative service intervention (pg. # & describe)
    c. No intervention

Outcome measures

42. **When were data collected?**
    a. Baseline
    b. First measurement after baseline (when ? e.g. 12 weeks after baseline)
    c. 1st follow up (when?)
    2st follow up (when?)
    3st follow up (when?)
    4st follow up (when?)
    Other (specify)

43. **Who collected outcome data?**
    a. Research staff
    b. Programme/intervention staff
    c. Both
    d. Other (specify & pg #)
    e. Not reported

44. **Were all data collected in the same manner for WPDM program and comparison group?**
    a. Yes
    b. No (specify differences & pg. #)
    c. Were they blinded?
    d. Can't tell

OUTCOME MEASURES

Outcome (input from protocol)	Outcome measurement	Reliability & Validity (specify)	Format	Direction	Source (specify)	Blinding (outcome assessors)	Pg. # & notes
	Describe measurement		Dichotomous Continuous	Event OR High score is Positive Negative Can't tell		Yes No Can't tell	

OUT COME DATA

DICHOTOMOUS OUTCOME DATA

Enter exact p value if available

OUTCOME	TIME POINT (record exact time taken from baseline	SOURCE (specify)	VALID Ns	N W/ EVENT	% WITH EVENT	STATISTICS	Pg. # & NOTES
	•1st measure after baseline •1st follow-up • 2nd follow-up • 3rd follow-up •4th follow-up • Other		WPDM Comparison	WPDM Comparison	WPDM Comparison	Log hazard ratio Log rank ration Risk ratio OR 95% CI DF P- value Mantel-Haenszel Chi^2 Other Covariates (control variables)	

Repeat as needed

CONTINUOUS OUTCOME DATA

Enter change and gain scores under Statistics (Other)

OUTCOME	TIME POINT (record exact time taken from baseline	SOURCE (specify)	VALID Ns	Means	SDs	STATISTICS	Pg. # & NOTES
	•1st measure after baseline •1st follow-up • 2nd follow-up • 3rd follow-up •4th follow-up • other		WPDM	WPDM	WPDM	P t F Df ES Other Covariates	
			Comparison	Comparison	Comparison		

RISK OF BIAS TABLE

Dimensions	Domains	Description	Reviewer author's decision
Selection Sample bias	Sequence generation	Describe the method used to generate the allocation sequence in sufficient detail to allow an assessment of whether it should produce comparable groups.	Was the random sequence generation adequate? (In the case of cluster randomized studies with small numbers, was stratified or pair matched randomization used to generate cluster randomization?) Yes No Unclear
	Allocation concealment	Describe the method used to conceal the allocation sequence in sufficient detail to determine whether intervention allocations could have been foreseen in advance of, or during, enrolment.	Was allocation adequately concealed? (For cluster RCTs were individuals recruited prior to cluster randomization (and if not, was the cluster adequately concealed prior concealment))? Yes No Unclear
	Equivalent groups	Describe baselines differences between intervention and comparison groups,	Were baselines reported, checked and cases of imbalances adequately controlled for? Yes No Unclear

Performance bias	Intervention fidelity and/or exposure to other confounding factors	Describe measures taken to secure intervention fidelity and/or exposure to other factors beside the intervention and comparison that may confound the results (or that a control comparison received the intervention).	Do the study reports deal with intervention fidelity or account for other confounding factors? Yes No Unclear
Detection bias	Blinding of outcome assessors *(Assessments for each main outcome or class of outcomes).*	Describe if outcome assessors were blinded and/or if outcome assessor had vested interests.	Was knowledge of the allocated intervention adequately prevented during the study? Outcome assessors were not blinded but the review authors judge that the outcome was not likely to be influenced by lack of blinding Yes No Unclear
	Statistical analysis *(Assessment for outcomes using time to event data)*	Censoring (also related to attrition bias). Describes measures taken to account for censoring in time-to-event data. Cluster and unit of analysis issues	Censored data reported and adequately accounted for (i.e. censoring unlikely to introduce bias?) For cluster RCTs were appropriate methods used to account for clustering? Yes No Unclear
Attrition bias	Incomplete outcome	Describe the completeness of the	Were incomplete outcome data adequately

	data *(Assessments for each main outcome or class of outcomes).*	sample and follow data for each main outcome including, whether attrition and exclusions were reported /and reasons given), and if any re-inclusions in analyses performed by the review authors, including the use of ITT.	accounted for? For cluster RCTs - were all clusters included in the outcome data and analysis? Yes No Unclear
Reporting bias	Selective reporting of outcome and results *(Assessments for each main outcome or class of outcomes).*	If possible check that pre-specified primary outcomes have been reported.	Are reports of the study free of suggestion of selective outcome reporting? Yes No Unclear
Other sources of bias	Other potential sources of bias	Describe whether study authors have reported additional concerns regarding other potential sources of bias and whether they were adequately accounted for.	Was the study apparently free of other problems that could put it at high risk of bias? Yes No Unclear

17.3 APPENDIX 3 – SEARCH HISTORY

WPDM/RTW SEARCH HISTORY EXECUTED JULY 19 2010

The search-histories represent the latest searches from summer 2010. The actual execution of the search differs somewhat from the search-history listed in the methods-section in that additional terms were added (based on peer review feedback) and the searches were re-run and updated. However the results remain the same.

Ovid Embase(R) 1948 to July Week 29 2010

	Searches
1	(Disabil$ adj5 managemen$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]
2	(disabil$ adj5 prevent$).mp. [mp=title, original title, abstract, name of substance word, subject head word, unique identifier]
3	(health adj5 safety managemen$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]
4	(safet$ adj5 managemen$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]
5	(industry$ adj5 managemen$).mp. [mp=title, original title, abstract, name of substance word, subjec heading word, unique identifier]
6	((corporat$ or organi?ation$) adj2 (program$ or strateg$ or practice$ or polic$)).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]
7	6 or 1 or 4 or 3 or 2 or 5
8	work resumption/
9	"back to work".mp.
10	"return to work".mp.
11	rtw.mp.
12	(ERSTW or (Early adj Safe Return to Work)).mp. [mp=title, original title, abstract, name of substanc word, subject heading word, unique identifier]
13	rehabilitation/
14	(reemploy$ or re-employ$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]
15	work retention.mp.
16	8 or 11 or 9 or 10 or 13 or 12 or 14 or 15

17 7 or 16

18 ((occupation$ or vocation$) adj5 rehabilitat$).mp. [mp=title, original title, abstract, name of substar word, subject heading word, unique identifier]

19 occupational disease/th, rh [Therapy, Rehabilitation]

20 vocational rehabilitation/

21 (industrial$ adj5 rehabilit$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]

22 21 or 17

23 workplace/

24 ((workplace$ or organi#ation$ or employer$ or corporat$) adj5 (factor$ or climate$ or cultur$ or role?)).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]

25 organization/

26 (Organi#ation$ adj Culture).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]

27 ((worksite$ or work site or workplace$ or employer) adj3 (intervent$ or base$)).mp. [mp=title, origi title, abstract, name of substance word, subject heading word, unique identifier]

28 (vocation$ adj3 intervent$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]

29 (occupational$ adj3 intervent$).mp. [mp=title, original title, abstract, name of substance word, subje heading word, unique identifier]

30 25 or 27 or 28 or 24 or 23 or 26 or 29

31 22 and 30

32 human.sh.

33 32 and 31

34 17 or 18 or 19 or 20 or 21

35 30 and 34

36 32 and 35

37 (Transition* adj1 work*).mp.

38 ((modifi* adj1 duty) or (modifi* adj1 duties)).mp.

39 (injury adj1 managemen*).mp.

40 (absence adj1 managemen*).mp.

41 (Stay* adj1 Work).mp.

42 37 or 38 or 39 or 40 or 41

43 30 and 42

44 limit 43 to humans

45	30 and 34
46	limit 45 to humans
47	limit 46 to yr="2009 - 2010"
48	from 47 keep 1-338
49	from 44 keep 1-28

Ovid MEDLINE(R) 1948 to July Week 25 2010

	Searches	Results
1	(Disabil$ adj5 managemen$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	620
2	(disabil$ adj5 prevent$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	1741
3	(health adj5 safety managemen$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	509
4	Safety Management/	12192
5	(safet$ adj5 managemen$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	13879
6	(industry$ adj5 managemen$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	497
7	(organi?ation$ adj2 polic$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	11183
8	(organi?ation$ adj2 practice$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	964
9	(organi#ation$ adj2 strateg$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	841
10	(corporat$ adj2 program$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	159
11	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10	29360
12	"back to work".mp. [mp=title, original title, abstract, name of	429

	substance word, subject heading word, unique identifier]	
13	(rtw or "return to work").mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	4256
14	((ERSTW or Early and Safe Return to Work).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	1
15	rehabilitation/	14910
16	(reemploy$ or re-employ$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	235
17	work retention.mp.	32
18	Occupational Diseases/rh, th [Rehabilitation, Therapy]	2914
19	Rehabilitation, Vocational/	7801
20	(industrial$ adj5 rehabilit$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	199
21	((occupation$ or vocation$) adj5 rehabilitat$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	9168
22	21 or 16 or 15 or 14 or 17 or 20 or 13 or 12 or 18 or 19	29920
23	Workplace/	9233
24	(workplace$ adj3 factor$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	422
25	(workplace$ adj3 cultur$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	105
26	(workplace$ adj3 role$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	114
27	(workplace$ adj3 climate$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	60
28	(occupational health and safet$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	6165
29	(organi#ation$ adj3 factor$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique	1795

	identifier]	
30	(organi#ation$ adj3 climate$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	363
31	(organi#ation$ adj3 cultur$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	10803
32	(organi#ation$ adj3 role?).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	1922
33	(employer$ adj3 factor$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	45
34	(employer$ adj3 climate$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	5
35	(employer$ adj3 cultur$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	5
36	(employer$ adj3 role?).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	103
37	(corporat$ adj3 cultur$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	214
38	(corporat$ adj3 factor$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	26
39	(corporat$ adj3 role$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	83
40	(corporat$ adj3 climate$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	7
41	exp Organizational Culture/	9868
42	(employer adj3 intervent$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	17
43	(workplace$ adj3 base$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	255
44	(workplace$ adj3 level$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	237
45	(workplace$ adj3 intervent$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	340

46	((worksite$ or work site) adj3 intervent$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	263
47	((worksite$ or work site) adj3 base$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	153
48	(vocation$ adj3 intervent$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	79
49	(occupational$ adj3 intervent$).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier]	504
50	on-the-job.mp.	2734
51	30 or 28 or 27 or 48 or 43 or 37 or 41 or 25 or 39 or 23 or 24 or 50 or 45 or 34 or 31 or 46 or 36 or 42 or 47 or 33 or 29 or 51 or 44 or 32 or 40 or 38 or 26 or 49	32242
52	22 or 11	58966
53	52 and 51	4146
54	limit 53 to humans	3871
55	limit 54 to yr="2009 - 2010"	462
56	(Transition* adj1 work*).af.	132
57	((modifi* adj1 duty) or (modifi* adj1 duties)).af.	30
58	(injury adj1 managemen*).af.	333
59	(absence adj1 managemen*).af.	17
60	(Stay* adj1 Work).af.	9
61	56 or 57 or 58 or 59 or 60	520
62	54 and 61	19