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Development and evaluation of a training program for occupational health professionals

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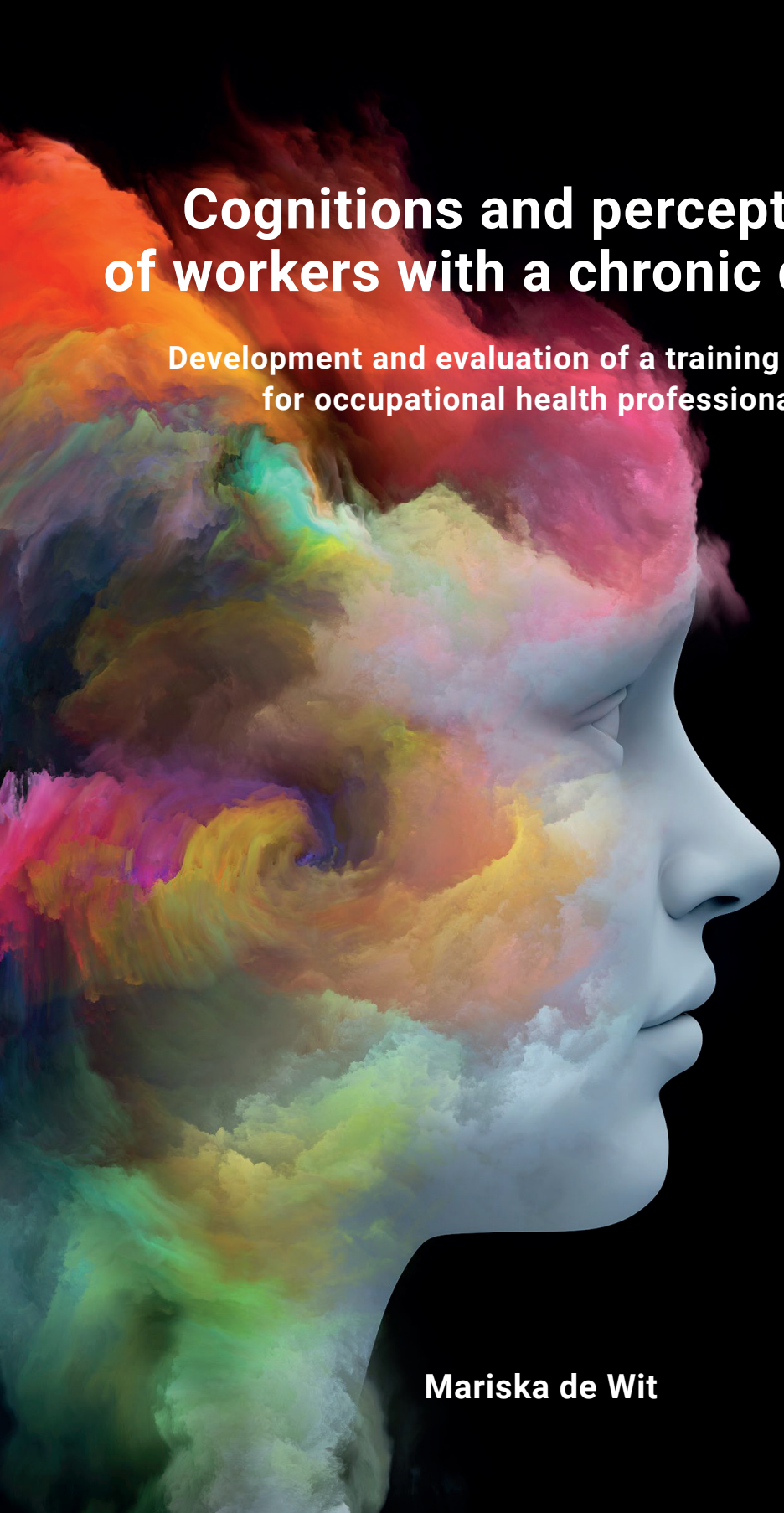

Mariska de Wit

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Development and evaluation of a training program for occupational health professionals

Mariska de Wit

The studies described in this thesis were carried out at the Amsterdam UMC, University of Amsterdam, Department of Public and Occupational Health, Coronel Institute of Occupational Health, Amsterdam Public Health research institute, Amsterdam, The Netherlands.

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Development and evaluation of a training program for occupational health professionals

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Contents

CHAPTER 1

General introduction

General introduction

Working with a chronic disease

The number of people in Europe with a chronic disease is rising.[1-3] A chronic disease is defined as 'a disease with a long duration and generally slow progression'.[4] According to the Public Health Status and Foresight Report of 2014 published by the Dutch National Institute for Public Health and the Environment (RIVM) the percentage of people living with a chronic disease in the Netherlands will rise from approximately 32% in 2014 to 40% in 2030.[3] This is partly because of early diagnosis and improved treatments which will ensure that people with a chronic disease live longer.[1, 3] As a result of the rising life expectancy of people, many countries have increased the state pension age. This has led to an increase in the number of people of working age with a chronic disease.[5]

People with a chronic disease more often experience poor health, fatigue, pain or functional limitations than people without a chronic disease, which can have a negative impact on their work participation.[6-10] A review and meta-analysis on associations between poor health and exit from paid employment of Van Rijn et al.[8] indicated that having a chronic disease increased the possibility for transition into disability pension or unemployment. These results were confirmed in a longitudinal study by Scharn et al.[9] among more than 21,000 people, which revealed that individuals with a chronic disease were less likely to have paid work compared to individuals without a chronic disease. A longitudinal cohort study of De Boer et al.[10] showed that having a chronic disease increased the possibility for unemployment, leaving paid employment, disability pension and early retirement.

Although having a chronic disease may have a negative effect on work participation, people with a chronic disease perceive work as very important to them.[11, 12] Work is a source of income, it provides them with social contact and it generates a feeling of being useful for society. Work is also perceived as important for the identity and pride of the worker with a chronic disease. Moreover, work helps them maintain mental and physical health.[11, 12] Because of the importance of work for this vulnerable group, along with possible negative impact of their limitations on their work status, it is very important to encourage and support people with a chronic disease to increase work participation.

Occupational health professionals in the Netherlands

Occupational health professionals (OHPs) have a key role when it comes to increasing work participation of people with a chronic disease. In the context of

this thesis, we refer to OHPs as those in the Netherlands who make important decisions regarding work participation or receiving benefits for workers with health problems: occupational physicians (OPs) and insurance physicians (IPs). According to the Dutch Gatekeeper Improvement Act (in Dutch: Wet verbetering poortwachter), the employer is required to pay at least 70% of the salary of the worker on sick leave for a period of two years.[13] This period can be extended to three years if the employer does not fulfill the obligations of the Act. The main role of the OP in this process is to prevent work-related diseases, promote health, and promote return to work in case of sick leave of the worker. When sick leave lasts for a longer period of time, the IP reviews whether the obligations described by the Gatekeeper Improvement Act are fulfilled and reviews the efforts of the worker, employer, and OP to promote the return to work. The IP assesses the functional abilities of the worker on sick leave, assesses whether the worker should receive a work disability benefit in consultation with the labor expert, and can provide recommendations to promote work participation.

Due to these tasks of OPs and IPs in the occupational health management and work disability assessment, both types of practitioners are involved in supporting the work participation of people with a chronic disease in the short and long run. The increase in the number of people of working age with a chronic disease makes the expertise of OHPs and their efforts to support work participation very important.

Factors affecting work participation

To be able to support work participation, OHPs need to be aware of the different factors which can influence work participation of people with a chronic disease. The main categories of factors that can explain differences in work participation in people are outlined by the International Classification of Functioning, Disability and Health (ICF) framework (Figure 1).[14, 15] According to this framework, differences in functioning and disability are caused by an interaction between health conditions (disorder or disease) and contextual factors which can be subdivided into environmental factors and personal factors.[15] Environmental factors are defined as the physical and social environment in which the individual lives and conducts his or her life. Personal factors are defined as the particular background of an individual's life and living and comprise characteristics of the individual that are not directly part of the disease or disorder, such as the age, gender, profession, and thoughts and behavior of the individual.[15] Previous research has focused on the association between a wide range of environmental and personal factors and work participation of people with a chronic disease.[16-21] For example, when looking

at personal factors there is consistent evidence that being of older age, being female, and having a lower education can negatively influence work participation of people with a chronic disease.[16, 18-21]

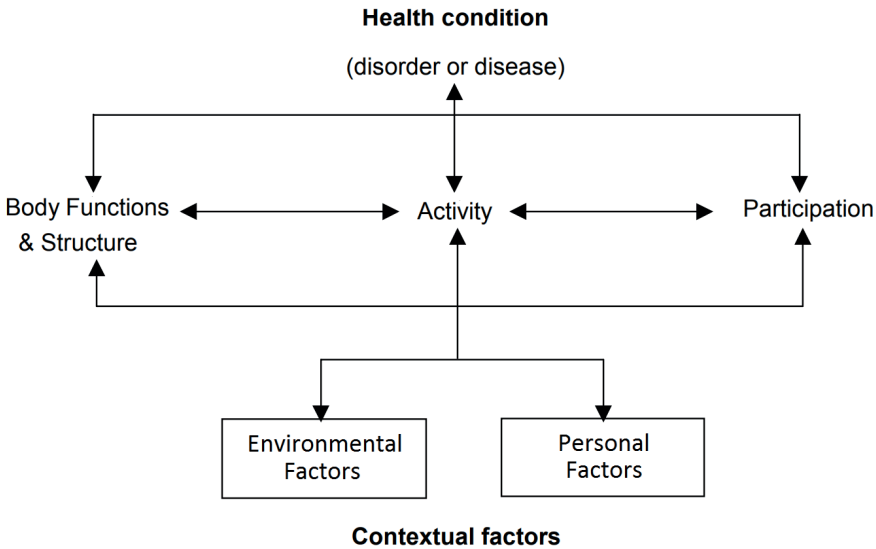

Figure 1. The International Classification of Functioning, Disability and Health[14]

Cognitions and perceptions and work participation

Personal factors that receive increasing attention are cognitions and perceptions of people with a chronic disease, here defined as the thoughts an individual has concerning his or her disease and concerning work participation. The increased attention for cognitions and perceptions is caused by a paradigm shift in health care, in which person-centered care becomes more important.[22] In person-centered care, the person instead of the disease is seen as the center of the health system, and the views of the person with the disease or disorder guide the healthcare.[23]

Also, in the occupational health field, person-centered care becomes more important. OHPs need to involve the views of workers during their practices to promote work participation. Cognitions and perceptions of workers are very important in this. Considering cognitions and perceptions may help OHPs in their efforts to increase work participation of workers with a chronic disease.

However, knowledge concerning cognitions and perceptions and the best way to involve these factors in the occupational health management and work disability assessment is scarce.

Previous studies indicated that cognitions and perceptions can positively or negatively influence health or recovery from illness.[24-26] Although this fact might indicate that cognitions and perceptions can also influence work participation, no clear overview of evidence of cognitions and perceptions associated with work participation is available for OHPs. Knowledge on cognitions and perceptions, can make OHPs more aware of the cognitions and perceptions they should consider in the occupational health management and work disability assessment of workers witch a chronic disease.

For OHPs to take these factors into account during their practices, they need to know how to identify limiting or promoting cognitions and perceptions from workers with a chronic disease. In contrast to other personal factors such as age, gender, and profession, cognitions and perceptions of workers are not easy to observe by OHPs. To identify cognitions and perceptions, it is crucial that OHPs obtain information from workers concerning these thoughts. Different methods are described in the literature for OHPs to obtain information from workers. For instance, OHPs can obtain information through screening questionnaires, conducting consultations, or from significant others of clients who are present during consultations.[27, 28] Little is known about the ways OHPs currently obtain information concerning cognitions and perceptions from workers with a chronic disease. It is currently not well-known which method is best to obtain information concerning cognitions and perceptions. Knowledge from the daily practice of other OHPs and from workers on how to obtain information concerning cognitions and perceptions might help OHPs to identify the limiting and promoting cognitions and perceptions for work participation.

It is important for OHPs to know how these cognitions and perceptions can be modified to increase work participation. OHPs should be able to recommend interventions toward limiting cognitions and perceptions. However, no recent review of interventions that influence work participation through effecting cognitions and perceptions is available.

Training program for OHPs

To put it plainly, information for OHPs about the involvement of cognitions and perceptions in their occupational health management and work disability

assessment is deficient. However, even when this information is available, OHPs do not necessarily automatically use this information in practice. Previous studies have shown that it is difficult to translate evidence-based knowledge into practice.[29, 30] For example, health professionals do not always follow evidence-based guidelines during their practice.[31, 32] Various barriers are identified for using evidence-based knowledge in practice by health professionals, such as a lack of time to read and get familiar with the evidence-based knowledge, a lack of awareness for the existence of it, or a lack of ability to use it.[32-34] Because translating evidence-based knowledge into practice often requires OHPs to change their behavior, it is important to look at effective ways to do so.[35]

The Behavior Change Wheel can be used as a guide to design interventions that are effective for changing behavior and has been successfully applied in previous studies for behavior change of OHPs (Figure 2).[35, 36] The Behavior Change Wheel is a framework for behavior change which consists of different layers. The hub of the wheel is the Capability-Opportunity-Motivation Behavior (COM-B) model, which identifies three essential conditions for behavior: capability, opportunity and motivation. Interventions need to change one or more of these conditions in order to change behavior. The wheel identifies different intervention types or functions to choose from, in order to change these conditions for behavior.[35]

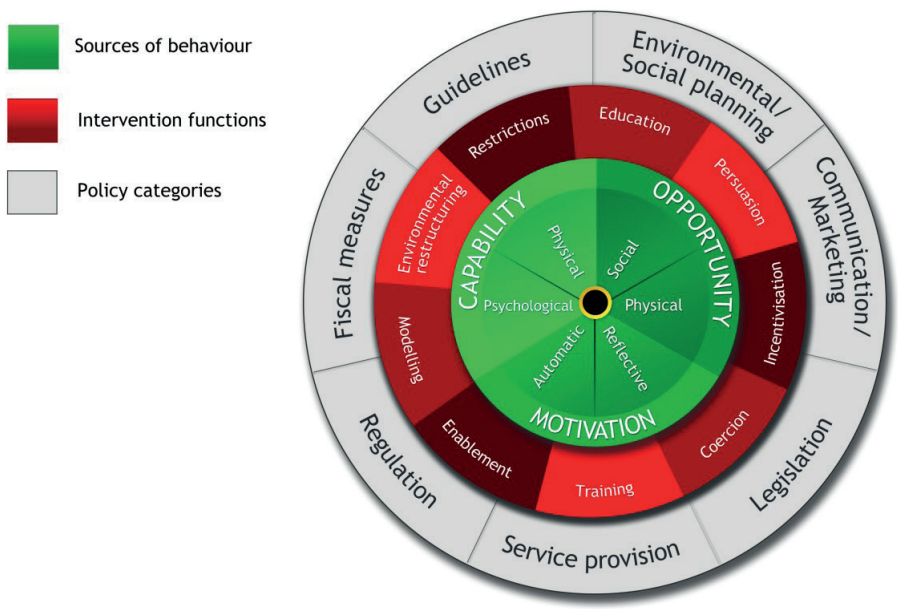

Figure 2. The Behavior Change Wheel[35]

To involve cognitions and perceptions in the occupational health management and work disability assessment of OHPs, it is most important that we increase the capability of OHPs for doing so. According to the Behavior Change Wheel, capability can be achieved by education and training. A training program with education to increase knowledge concerning cognitions and perception and training to increase skills to involve these factors during practice may be the most effective way to make sure that OHPs involve cognitions and perceptions during the occupational health management and disability assessment.

Aim of the thesis

The main objective is to gain more knowledge on how OHPs can involve cognitions and perceptions in the occupational health management and work disability assessment of workers with a chronic disease. Part I of this thesis focuses on acquiring knowledge from the literature, from OHPs and from workers with a chronic disease regarding cognitions and perceptions associated with work participation. Part II of this thesis describes the development and evaluation of the training program for OHPs to involve cognitions and perceptions in daily practice. The following research questions will be addressed in this thesis:

Part I: Acquiring knowledge about cognitions and perceptions

1. Which cognitions and perceptions of workers are associated with work participation? (**Chapter 2**)
2. How can information about cognitions and perceptions best be obtained from workers? (**Chapter 3** and **Chapter 4**)
3. Which existing interventions are focused on cognitions and perceptions and aimed at increasing work participation? (**Chapter 5**)

Part II: Development and evaluation of a training program on cognitions and perceptions

4. Is a training program on involving cognitions and perceptions in the occupational health management and work disability assessment feasible from the perspective of OHPs? (**Chapter 6**)
5. What is the effect of a training program for OHPs on the ability to involve cognitions and perceptions in the occupational health management and work disability assessment of workers with a chronic disease? (**Chapter 7**)

Outline of the thesis

Part I

In the first part of this thesis, knowledge is acquired on cognitions and perceptions associated with work participation. **Chapter 2** describes a systematic review of literature to identify the different cognitions and perceptions associated with work participation. **Chapter 3** presents a questionnaire study among OHPs about their opinion regarding the importance of cognitions and perceptions. In addition, this chapter describes how these OHPs currently obtain information concerning different cognitions and perceptions and which method is according to them the best method to obtain this information. To gain insight into the perspective from workers with a chronic disease concerning the best method for OHPs to obtain information regarding cognitions and perceptions, a focus group study was conducted which is described in **Chapter 4**. Finally, a scoping review was conducted to get an overview of interventions that are focused on cognitions and perceptions and aimed at improving work participation, which is presented in **Chapter 5**.

Part II

In the second part of this thesis, information about the development and evaluation of the training program for OHPs is presented. **Chapter 6** describes the development of the training program on involving cognitions and perceptions in the occupational health management and work disability assessment of workers with a chronic disease. In addition, this chapter describes how OHPs who participated in the training program evaluated the feasibility of the training program directly after participation as well as three to six months after participation. **Chapter 7** describes a randomized controlled trial in which effects of the training program on identifying cognitions and perceptions and recommending interventions toward cognitions and perceptions are studied. This thesis ends with the general discussion in **Chapter 8**, in which results are discussed and recommendations for research and practice are described.

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PART I

Acquiring knowledge about cognitions and perceptions

CHAPTER 2

Person-related factors associated with work participation in employees with health problems: a systematic review

Mariska de Wit
Haije Wind
Carel T. J. Hulshof
Monique H. W. Frings-Dresen

International Archives of Occupational and Environmental Health. 2018;91(5):497-512.

Abstract

Purpose: The objective of this systematic review was to explore and provide systematically assessed information about the association between person-related factors and work participation of people with health problems. The research question was: what is the association between selected person-related factors and work participation of workers with health problems?

Methods: A systematic review was carried out in PubMed and PsycINFO to search for original papers published between January 2007 and February 2017. The risk of bias of the studies included was assessed using quality assessment tools from the Joanna Briggs Institute. The quality of evidence was assessed using the GRADE framework for prognostic studies.

Results: In total, 113 studies were included, all of which addressed the association between person-related factors and work participation. The factors positively associated with work participation were positive expectations regarding recovery or return to work, optimism, self-efficacy, motivation, feelings of control, and perceived health. The factors negatively associated with work participation were fear-avoidance beliefs, perceived work-relatedness of the health problem, and catastrophizing. Different coping strategies had a negative or a positive relationship with work participation.

Conclusions: The results of this review provide more insight into the associations between different cognitions and perceptions and work participation. The results of this study suggest that person-related factors should be considered by occupational- and insurance physicians when they diagnose, evaluate or provide treatment to employees. Further research is required to determine how these physicians could obtain and apply such information and whether its application leads to a better quality of care.

Introduction

Sickness absence has negative financial consequences and leads to a loss of enthusiasm and satisfaction with the work situation.[1] In addition, long-term sick leave can lead to lower self-confidence, a depressed mood and feelings of isolation.[2, 3] These negative consequences of sick leave constitute significant reasons why it is important to minimize the work absence of employees due to health problems.

In order to minimize work absence and improve work participation, it is essential to know which factors influence work retention and return to work (RTW) after sick leave. Research has revealed that sick leave is determined by many different factors.[4, 5] In addition to disease-related and environmental factors, person-related factors such as cognitions and perceptions of employees also play a role in work participation.[4, 6, 7] Research by Dekkers-Sánchez et al.[4] has revealed that physicians identify person-related factors as important factors for RTW. The cognitions and perceptions of an employee about his or her health problems or limitations, are factors in which clinicians could intervene to encourage work participation.[4, 8]

As most research acknowledges the multifactorial nature of sick leave, many reviews have been conducted to gain better insight into the precise factors influencing the work participation of employees with health problems. However, most of these reviews are limited to specific diseases or disorders, or are limited to the outcome RTW rather than work participation in general.[9-11] In addition, as far as we know, there is no review which primarily focuses on the cognitions and perceptions of employees themselves that influence work participation. This is despite the fact that structuring the information about the influence of cognitions and perceptions could help to develop tailored interventions targeting these factors. Such interventions could in turn be used to support work participation of employees with health problems.[4] Moreover, a clear overview of the association between person-related factors and work participation could assist occupational physicians and insurance physicians to prevent sick leave or decrease the duration of sick leave in these employees.

This systematic review was conducted to fill this gap in research and provide structured information about the association between person-related factors and work participation for employees with all kinds of diseases, disorders and injuries. For this review of the literature, we formulated the following research question using the patient, intervention, comparison, outcome (PICO) statement:

in employees with health problems (P), which person-related factors (I) are associated with work retention and return to work after sick leave (O)?

Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed as a basis for reporting this systematic review.[12] This review is registered in the Prospective Register of Systematic Reviews (PROSPERO 2017 registration number CRD42017062459; https://www.crd.york.ac.uk/PROSPERO/).

Information sources and search strategy

Literature searches were conducted by the first author in the databases PubMed and PsycINFO (MdW). The search strategy had three main elements: health problems, person-related factors and work participation. The main person-related factors of interest that formed the basis of our search strategy were selected by two experts in occupational and insurance medicine. The possible relevance of these factors for work participation was confirmed by a workgroup consisting of three insurance physicians, two occupational physicians and a patient representative. The broad term 'work participation' covered concepts such as RTW, sickness absence and current work status. The search strategies used in PubMed and PsycINFO are presented in Appendix 1.

Eligibility criteria

This review includes studies published between January 2007 and February 2017 that investigated the association between person-related factors and work participation of employees with health problems. Articles considered eligible for inclusion had to be available in full-text in English or Dutch and had to be published in peer-reviewed journals. We included (non-)randomized controlled trials, cohort studies, cross-sectional studies and qualitative studies. Reference lists of meta-analyses and reviews that were found in our search were examined to identify additional publications, in order not to miss any relevant literature published between 2007 and 2017. Case studies were excluded from this review. Studies in which students, military personnel or veterans with health problems or employees with substance abuse problems were the subjects of the analyses were excluded. We also excluded studies in which disability was the only outcome, or studies in which it was not clear how the person-related factors were measured.

Study selection

One reviewer selected all relevant studies on the basis of the title and abstract (MdW). The other researchers (HW, CH, MF) each screened the title and abstract of one-third of all studies, so that all studies were independently screened by two reviewers (MdW and HW, MdW and CH or MdW and MF). Subsequently, the full-text articles of potentially relevant studies were reviewed by one reviewer to determine whether they fulfilled all the inclusion criteria (MdW). Additionally, three reviewers screened 10% of the full-text articles (HW, CH, MF). In the case of doubt, eligibility of the study was discussed until consensus was reached. Reasons for exclusion were documented.

Extraction of data

One reviewer extracted the details and findings of the studies included using a self-developed data-extraction form (MdW). Data-extraction from 30% of the studies was checked by the other three reviewers (HW, CH, MF). Disagreements about the data-extraction were resolved by discussion and consensus. The following details were extracted: number of subjects, age, gender, occupation and health status of subjects, study design, person-related factors of interest, time to follow-up and the main results. To ensure a clear overview of the main results, the coefficients and odds ratios were only noted in the table if they were significant and from multivariate analyses. In addition, we noted *p*-values from significant univariate analyses. Non-significant results were only described in words. We contacted authors when clarification of data was needed.

Quality assessment

The risk of bias of the studies included was assessed using quality assessment tools developed by the Joanna Briggs Institute.[13] Before the researchers assessed the risk of bias, the Joanna Briggs Institute criteria were discussed between the researchers in order to reduce ambiguity and disagreements between the researchers. One reviewer (MdW) assessed the risk of bias of all studies and the other reviewers (HW, CH, MF) each assessed the risk of bias of 10% of the studies. Disagreements were resolved by discussion and consensus. Each criterion from the quality tools was answered with 'yes', 'no', 'unclear' or 'not applicable'. For categorizing in studies with high, moderate and low risk of bias, we applied the same classification rules as used in the study by Reilly et al.[14] Studies which met more than 80% of the criteria were considered as high-quality studies with a low risk of bias. Studies which met 50-80% of the criteria were considered as moderate-quality studies with a moderate risk of bias. Studies which met less than 50% of the criteria were considered as low-quality studies with a high risk of

bias. Studies were not excluded on the basis of their risk of bias; however, the risk of bias was taken into account when drawing conclusions in this review.

Grading the level of evidence

The overall quality of evidence for the association between each person-related factor and work participation was assessed by one reviewer (MdW) using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach[15] and discussed with the other reviewers (HW, CH, MF). The base level of the quality of evidence for the associations was based on the design and phase of the studies. The factors that were further examined were the risk of bias, inconsistency, indirectness, imprecision and publication bias. The overall quality of evidence for the associations was categorized as high, moderate, low or very low. If possible, a meta-analysis was performed to assess the effects of the person-related factors on work participation.

Results

Studies selected

In total, 3032 studies were found in PubMed and 1226 studies in PsycINFO (Figure 1). After removing duplicates, studies without abstracts and books or book sections, 3465 studies remained. In total, 3226 studies were excluded after screening the title and abstract. The remaining 239 articles were reviewed on full text. Of these, 117 articles did not meet the inclusion criteria and were thus excluded. The reasons for excluding these articles were: (1) study group did not consist of employees; (2) participants did not have health problems at baseline; (3) factors of interest were not studied; (4) outcome of interest was not studied; (5) study method or results were not (clearly) described; or (6) other study type than (non-)randomized controlled trials, cohort studies, cross-sectional studies, qualitative studies, systematic reviews and meta-analyses. The remaining articles included 24 reviews and meta-analyses. After screening the reference lists of these studies, 15 studies were added, making a total of 113 studies that were included in this review. The characteristics of these studies are presented in the data-extraction tables in Appendix 2.

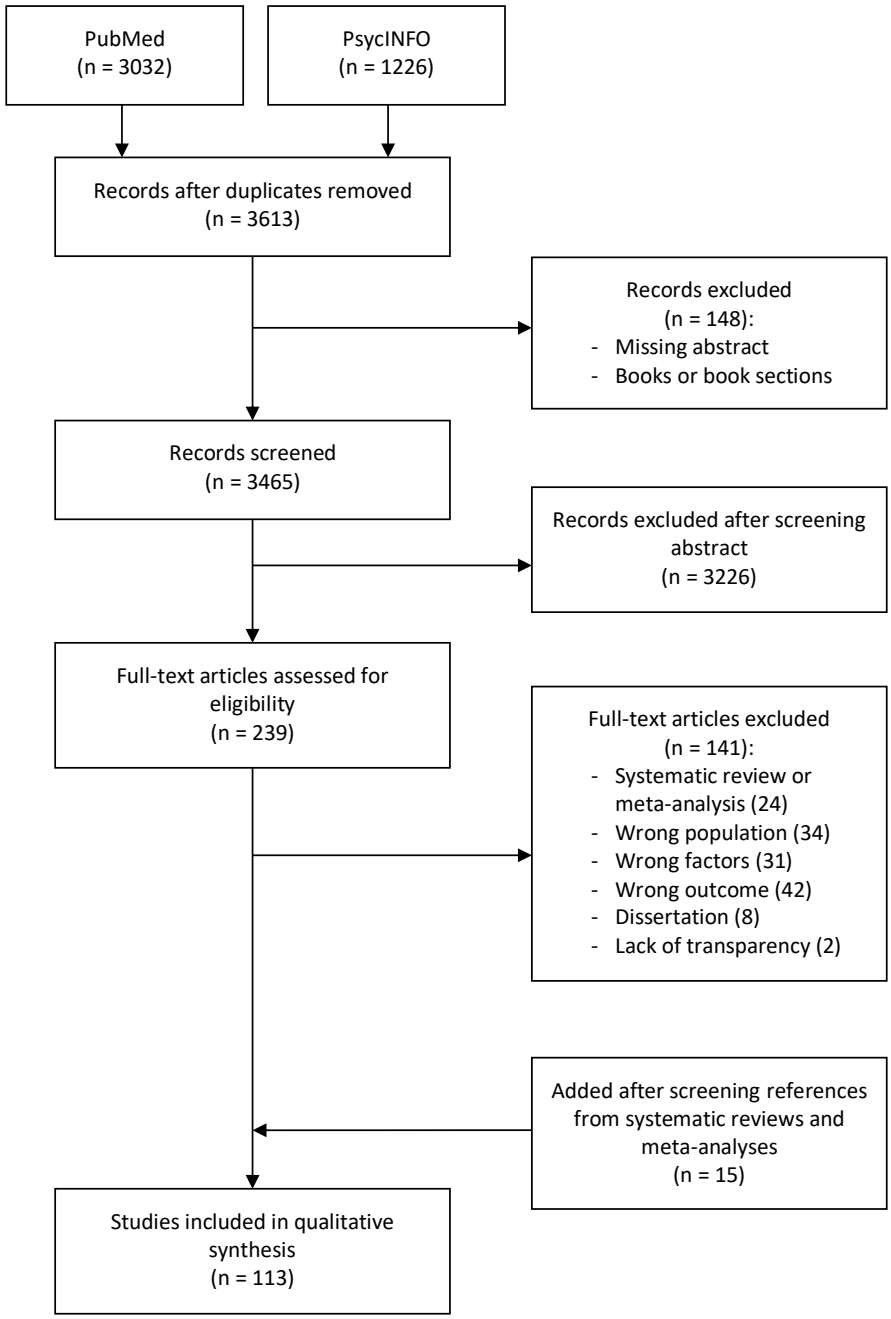

Figure 1. Search flowchart

Risk of bias

From the 113 studies included, 68 had a low risk of bias, one study had a high risk of bias and the remaining 44 studies were classified as having a moderate risk of bias. A frequent reason for risk of bias in qualitative studies was that information about the researcher and his possible influence on the study was lacking. Moreover, many cohort studies did not meet the criteria for complete follow-up. Scores on each criterion of the quality assessment tools can be found in Appendix 3.

Evidence for the influence of person-related factors on work participation

Results of the multivariate analyses of the quantitative studies that were included in this literature review are summarized in Tables 1 and 2. If no multivariate analyses were performed in a study, conclusions about the association between the person-related factor and work participation were based on the univariate or bivariate analyses that were performed in that study.[16] Due to the heterogeneity in methods used to measure the person-related factors and outcomes and the heterogeneity in the statistical analyses performed, it was not possible to perform meta-analyses. The quality of evidence for the potential factors associated with work participation as assessed by GRADE is presented in Table 3. Because we used broad terms for the work participation outcomes and used strict inclusion criteria for the participants and the factors measured in the studies, none of the evidence was downgraded for indirectness. In addition, the criteria for publication bias were judged as not applicable, as the large body of evidence made it impossible to come to a conclusion on possible publication bias. Moreover, most of the studies were explorative and the phase of the investigation was already considered as a factor that could downgrade the quality of evidence. The synthesis of evidence led to a rating of moderate evidence for the association between the factors expectations regarding recovery or RTW and perceived health and work participation. The overall quality of evidence for the association between the person-related factors optimism, catastrophizing, self-efficacy, coping strategies, fear-avoidance beliefs, feelings of control, and perceived work-relatedness of health problems and work participation was rated as low. The evidence for the association between motivation and work participation was rated as very low.

Expectations regarding recovery or RTW

In total, 32 quantitative studies investigated the association between expectations regarding recovery or RTW and work participation (Table 1).[17-48] The majority of these studies found evidence of a positive association, which suggests that having positive expectations about one's recovery or chances of RTW has a

positive effect on work participation for employees with health problems.[17, 18, 20-23, 25-30, 32-36, 38-45, 47, 48] However, some of these studies indicated that the effect was dependent on the subgroup of participants or the form of expectations.[27, 28, 36, 43, 48] For example, in a study by Ekberg et al.[27], positive recovery expectations were associated with early RTW, but RTW expectations were not. Only four studies did not find any association between expectations and work participation in multivariate analyses.[19, 24, 31, 46] There were no qualitative studies which suggested a positive association between these expectations and work participation. The overall quality of evidence for the effect of expectations regarding recovery or RTW on work participation was moderate. It was downgraded because all evidence came from exploratory studies.

Optimism

Being optimistic or pessimistic was the least investigated person-related factor addressed in the studies found in this systematic review. Three quantitative studies investigated the influence of optimism or pessimism (Table 1).[49-51] One quantitative study reported a negative effect of pessimism on RTW, but did not find any effect of optimism.[49] This was in contrast to a study by Øyeflaten et al.[51] which reported that being pessimistic about oneself and the future had no significant effect on RTW, and to a study by Lydell et al.[50,] which found support for a positive effect of optimism on RTW. There were three qualitative studies in which it was mentioned that being optimistic was important for work participation.[52-54] In summary, the majority of the studies suggest a positive association between optimism and work participation in employees with health problems. As most evidence came from explorative studies and because of inconsistency in study results, the overall quality of evidence was rated as low.

Self-efficacy

The association between self-efficacy and work participation was investigated in 29 quantitative studies (Table 1).[18, 27, 37, 42, 48, 51, 55-77] Eleven studies found a positive association between self-efficacy and work participation.[18, 27, 37, 59, 63-66, 70, 72, 76] Two studies found evidence of a positive association between self-efficacy and work participation for only some specific subgroups.[62, 71] The results of three other studies suggest that the association depends on the form of self-efficacy.[55-57] In summary, the majority of the results suggest that having more self-efficacy is associated with more work participation in employees with health problems. Six qualitative studies supported these results.[52, 54, 78-81] However, some quantitative studies did not find evidence of an association between self-efficacy and work participation.[42, 48, 51, 58, 61, 67, 68, 73-75] One study even found a negative association

between work-related social skills self-efficacy and current employment status.[77] As there was serious inconsistency in study results, the overall quality of evidence was downgraded to low.

Motivation

Of the eight quantitative studies which investigated the association between motivation and work participation (Table 1),[50, 82-88,] five found a positive association.[50, 82-84, 87] One additional quantitative study only found an influence of motivation for some forms of work participation.[86] This study by Puolakka et al.[86] indicated that motivation to work was associated with fewer days off work, but not with permanent work disability. Two studies with a low risk of bias did not find any association between motivation and work participation.[85, 88] Seven qualitative studies addressed the possible positive influence of motivation, which suggests that employees with health problems who are motivated will have higher levels of work participation.[52, 78, 79, 89-92] However, the overall quality of the quantitative evidence for this factor was downgraded to very low because evidence primarily came from explorative studies with serious risk of bias.

Feelings of control

There were 14 quantitative studies which addressed the possible positive association between feelings of control and work participation (Table 1).[19, 20, 27, 43, 67, 69, 70, 75, 93- 98] The results of six studies indicated that the feeling of having more control is associated with more work participation.[20, 43, 70, 95, 97, 98] These results were supported by one qualitative study by Dionne et al.[99], in which it was reported that participants who did not RTW considered that their return depended more on factors related to their environment than on personal factors. However, one quantitative study only found evidence on some specific forms of control but not others.[96] For example, in this study, having the feeling that one controls one's own pain was not associated with RTW, but believing that control of pain is a chance outcome decreased the likelihood of RTW.[96] Seven studies found no evidence of an association between feelings of control and work participation at all.[19, 27, 67, 69, 75, 93, 94] The overall quality of evidence derived from this review was low and was downgraded for serious inconsistency.

Perceived health

Twenty-four quantitative studies addressed the possible influence of perceived health on work participation (Table 1).[17, 27, 31, 32, 34, 36, 40, 42, 47, 59, 60, 85, 100-111] Seven studies found no association at all between the factor and work participation.[32, 34, 40, 59, 85, 102, 106] However, the majority of the studies found that being positive about one's general health was positively associated with work participation.[17, 27, 36, 47, 60, 100, 101, 103, 104, 107-111] There were three studies in which the results indicated that this association was dependent on the form of work participation.[42, 60, 105] For example, the results of the study by Grøvle et al.[105] suggested that perceived health was positively associated with the likelihood of RTW, but not with number of days until sustained RTW. The results of a study by Iakova et al.[31] indicated that improvement in general health was associated with a higher likelihood of RTW, but general health at baseline and physical health were not. There were no qualitative studies which addressed the association between perceived health and work participation. The quality of evidence was rated as moderate.

Table 1. Results of multivariate analyses of quantitative studies factors expectations, optimism, self-efficacy, motivation, feelings of control, and perceived health

Factor	Positive association	Negative association	No association
Positive RTW/ recovery expectations	**Audhoe et al. 2012[17]** Besen et al. 2015[18] **Busch et al. 2007[20]** **Carriere et al. 2015a[21]** **Carriere et al. 2015b[22]** Carstens et al. 2014[23] **Cowan et al. 2012[25]** **Du Bois et al. 2009[26]** **Ekberg et al. 2015[27] a, b** Gross and Battié 2010[28] c **Hou et al. 2012[29]** **Hou et al. 2008[30]** **Jensen et al. 2013[32]** **Johansson et al. 2010[33]** **Lindell et al. 2010[34] b** Magnussen et al. 2007b[35] Murgatroyd et al. 2016[36] a **Opsahl et al. 2016[38]** **Reme et al. 2009[39] b** **Richter et al. 2011[40]** Rönnberg et al. 2007[41] d **Sampere et al. 2012[42]** **Sluiter and Frings-Dresen 2008[43] a** **Spector et al. 2012[44]** Truchon et al. 2012[45] **Vuistiner et al. 2015[47]** **Wåhlin et al. 2012[48] c**		**Boot et al. 2008[19]** Coggon et al. 2013[24] **Ekberg et al. 2015[27] a** Gross and Battié 2010[28] c Iakova et al. 2012[31] Murgatroyd et al. 2016[36] a Nieuwenhuijsen et al. 2013[37] d **Sluiter and Frings-Dresen 2008[43] a** **Turner et al. 2008[46]** **Wåhlin et al. 2012[48] c**
Optimism	**Hystad and Bye 2012[49] a, e** Lydell et al. 2011[50] b, d		**Hystad and Bye 2012[49] a, e** **Øyeflaten et al. 2008[51]**

Table 1. Continued

Factor	Positive association	Negative association	No association
Self-efficacy	Besen et al. 2015[18] **Brouwer et al. 2015[55] [a, b]** **Brouwer et al. 2009[56] [a]** **Brouwer et al. 2010[57] [a]** **De Vries et al. 2012b[59]** **Dionne et al. 2007[60] [f]** **Ekberg et al. 2015[27] [b]** **Huijs et al. 2012[62] [c]** Huijs et al. 2017[63] Lagerveld et al. 2016[64] Mangels et al. 2011[65] [g] Martins 2015[66] [d] Nieuwenhuijsen et al. 2013[37] **Richard et al. 2011[69] [f]** **Roesler et al. 2013[70] [g]** **Sarda et al. 2009[71] [h]** Shaw et al. 2011[72] [b, g] Waghorn et al. 2007[76]	Waynor et al. 2016[77] [a]	**Brouwer et al. 2015[55] [a]** **Brouwer et al. 2009[56] [a]** **Brouwer et al. 2010[57] [a]** D'Amato and Zijlstra 2010[58] **Dionne et al. 2007[60] [f]** **Healey et al. 2011[61]** **Huijs et al. 2012[62] [c]** Murphy et al. 2011[67] **O'Sullivan et al. 2012[68]** **Øyeflaten et al. 2008[51]** **Richard et al. 2011[69] [f]** **Sampere et al. 2012[42]** **Sarda et al. 2009[71] [h]** **Strauser et al. 2010[73]** **Stulemeijer et al. 2008[74] [d]** **Volker et al. 2015[75]** **Wåhlin et al. 2012[48]** Waynor et al. 2016[77] [a]
Motivation	Awang et al. 2016[82] **Boyle et al. 2014[83] [d]** Braathen et al. 2007[84] Lydell et al. 2011[50] [b, d] **Puolakka et al. 2008[86] [f]** Saperstein et al. 2011[87]		**Elfving et al. 2009[85] [d]** **Puolakka et al. 2008[86] [f]** **Wan Kasim et al. 2014[88]**
Feelings of control	**Busch et al. 2007[20]** **Roesler et al. 2013[70]** **Selander et al. 2007[95]** **Sluiter and Frings-Dresen 2008[43]** **Torres et al. 2009[96] [a]** Truchon et al. 2010[97] [b] **Vlasveld et al. 2013[98] [b]**		**Boot et al. 2008[19]** **Ekberg et al. 2015[27]** Karoly et al. 2013[93] Krause et al. 2013[94] [d] Murphy et al. 2011[67] **Richard et al. 2011[69]** **Torres et al. 2009[96] [a]** **Volker et al. 2015[75]**

Table 1. Continued

Factor	Positive association	Negative association	No association
Perceived health	**Audhoe et al. 2012[17] [b, g]**		**Chen et al. 2012[102]**
	Boot et al. 2014[101] [d]		**De Vries et al. 2012b[59] [d]**
	Boot et al. 2011[100]		**Dionne et al. 2007[60] [f]**
	Dawson et al. 2011[103] [i]		**Elfving et al. 2009[85] [d]**
	Dionne et al. 2007[60] [f]		**Grøvle et al. 2013[105] [f]**
	Dyster-Aas et al. 2007[104] [d]		Hansen et al. 2009[106]
	Ekberg et al. 2015[27] [b]		Iakova et al. 2012[31] [a]
	Grøvle et al. 2013[105] [f]		**Jensen et al. 2013[32]**
	He et al. 2010[107]		**Lindell et al. 2010[34]**
	Iakova et al. 2012[31] [a]		**Richter et al. 2011[40]**
	Morrison et al. 2016[108] [d]		**Sampere et al. 2012[42] [c, e, f]**
	Murgatroyd et al. 2016[36]		
	Nielsen et al. 2012[109]		
	Ramel et al. 2013[110] [d]		
	Sampere et al. 2012[42] [c, e, f]		
	Sivertsen et al. 2013[111]		
	Vuistiner et al. 2015[47]		

Bold indicates studies with a low risk of bias

[a] Depends on the form/subscale of the factor; [b] Not for every moment on which the outcome is measured; [c] Depends on the type of disorder of the participant; [d] Outcomes from univariate analysis; [e] Depends on the gender of the participant; [f] Depends on the form of work participation; [g] Not for every moment on which the factor is measured; [h] Depends on the country where the participant lives; [i] Outcomes from bivariate analysis

Coping strategies

In total, 14 quantitative studies investigated the association between different coping strategies and work participation (Table 2).[31, 51, 59, 62, 93, 97, 103, 112-118] Nine studies found an effect of some coping strategies.[31, 51, 62, 93, 103, 112, 113, 116, 118] The results of these studies indicated that some coping strategies, such as active problem-solving,[62] could increase the chance of work participation in sick employees, while other coping strategies, such as passive coping[103] and avoidance coping,[31] could decrease the chance of work participation. However, five of the quantitative studies did not find any evidence of the effect of coping strategies.[59, 97, 114, 115, 117] Six qualitative studies addressed the importance of different coping strategies for work participation.[52, 54, 79, 81, 90, 119] The overall quality of evidence derived from this review was downgraded to low because most of the studies were explorative and because of serious inconsistency in study results.

Fear-avoidance beliefs

In total, 27 studies addressed the possible association between fear-avoidance beliefs and work participation (Table 2).[18, 21, 24, 26, 32, 35, 38, 40, 44- 46, 51, 59, 60, 85, 103-105, 114, 117, 120-126] Most of the studies made a distinction between fear-avoidance beliefs for movement or physical activity and fear-avoidance beliefs for work. Six studies did find an association between fear-avoidance beliefs for work and work participation, but did not find an association between fear-avoidance beliefs for physical activity or movement and work participation.[35, 51, 117, 122-124] However, Du Bois et al.[26] reported that fear-avoidance beliefs for movement, rather than fear-avoidance beliefs for work were associated with a higher chance of not returning to work. Three studies which only studied fear-avoidance for movement or physical activity found negative associations between this factor and work participation.[24, 59, 103] Two studies which only investigated the association between fear-avoidance for work and work participation, also found negative associations.[38, 45] Three studies found a negative association between general fear-avoidance and work participation.[104, 114, 120] Studies by Dionne et al.[60] and Grøvle et al.[105] indicated that the effect of fear-avoidance was dependent on how work participation is measured. For example, the results of the study by Grøvle et al.[105] suggested that fear-avoidance for movement is associated with the likelihood of RTW within two years, but not with number of days until sustained RTW. Ten studies did not find any association between fear-avoidance beliefs and work participation.[18, 21, 32, 40, 44, 46, 85, 121, 125, 126] There were no qualitative studies which addressed this association. However, overall, the majority of the studies which investigated fear-avoidance beliefs, found a negative association between fear-avoidance and work participation. Because most of these studies were explorative and because there was serious inconsistency in study results, the overall quality of evidence was downgraded to low.

Perceived work-relatedness

Of the limited number of studies that addressed the relationship between perceiving the health problem as work-related and work participation, three studies did not find any association between this factor and work participation,[24, 46, 103] while three studies found a negative association (Table 2).[32, 121, 127] These latter studies suggest that perceiving the health problem as work-related has a negative association with work participation in employees with health problems. Findings from an additional study, by Sampere et al.[42], supported this negative association, but only for women and only for employees with mental disorders. There were no qualitative studies which addressed this association. As all of the studies which investigated this association were explorative and because there was serious inconsistency, the overall quality of evidence was downgraded to low.

Catastrophizing

Fifteen quantitative studies examined the association between catastrophizing and work participation (Table 2).[18, 21, 25, 34, 44, 46, 59, 71, 93, 103, 121, 123, 124, 128, 129] Eight quantitative studies in this review did not find an effect of catastrophizing on work status or sickness absence.[18, 44, 46, 71, 103, 121, 123, 124] No qualitative studies reported the negative influence of catastrophizing on work participation. However, six quantitative studies,[21, 34, 59, 93, 128, 129] including four studies with a low risk of bias,[21, 34, 59, 128] found a negative association between catastrophizing and work participation. One quantitative study found a negative association between catastrophizing and return to modified work for some subgroups.[25] The evidence suggest that catastrophizing is negatively associated with work participation. Because most of the evidence came from explorative studies and because there was serious inconsistency, its overall quality was downgraded to low.

Table 2. Results of multivariate analyses of quantitative studies with factors coping strategies, fear-avoidance, work-relatedness and catastrophizing

Factor	Positive association	Negative association	No association
Coping strategies	**Huijs et al. 2012[62] [a, c]** Karoly et al. 2013[93] **Øyeflaten et al. 2008[51] [a]**	**Arwert et al. 2017[112] [a]** Dawson et al. 2011[103] [a] **Grytten et al. 2017[113] [a, g]** Iakova et al. 2012[31] Karoly et al. 2013[93] [d] **Norlund et al. 2011[116]** Strober and Arnett 2016[118] [a]	**Arwert et al. 2017[112] [a]** Dawson et al. 2011[103] [a, d] **De Vries et al. 2012b[59]** **Grytten et al. 2017[113] [a, g]** **Heymans et al. 2009[114]** **Huijs et al. 2012[62] [a, c]** **Luk et al. 2010[115] [d]** **Øyeflaten et al. 2008[51]** [a] Øyeflaten et al. 2016[117] Strober and Arnett 2016[118] [a] Truchon et al. 2010[97]

Table 2. Continued

Factor	Positive association	Negative association	No association
Fear-avoidance beliefs		Coggon et al. 2013[24] [i]	Besen et al. 2015[18] [j]
		Dawson et al. 2011[103] [i]	**Carriere et al. 2015a[21] [i]**
		De Vries et al. 2012b[59] [i]	**Dionne et al. 2007[60] [e, j]**
		Dionne et al. 2007[60] [e, g, i, j]	**Du Bois et al. 2009[26] [j]**
		Du Bois et al. 2009[26] [i]	**Elfving et al. 2009[85] [d]**
		Dyster-Aas et al. 2007[104] [d, k]	**Grøvle et al. 2013[105] [d, g, i]**
		Grøvle et al. 2013[105] [d, h, g, i]	**Heymans et al. 2009[114] [i]**
		Heymans et al. 2009[114] [k]	**Jensen et al. 2013[32] [k]**
		Heymans et al. 2007[120] [k]	Karels et al. 2010[121] [j]
		Kovacs et al. 2007[122] [j, k]	**Kovacs et al. 2007[122] [i]**
		Magnussen et al. 2007b[35] [j]	Magnussen et al. 2007b[35] [i]
		Mannion et al. 2009[123] [j]	Mannion et al. 2009[123] [i]
		Morris and Watson 2011[124] [j]	**Morris and Watson 2011[124] [d, i]**
		Opsahl et al. 2016[38] [h, j]	**Øyeflaten et al. 2008[51] [i]**
		Øyeflaten et al. 2008[51] [j]	Øyeflaten et al. 2016[117] [d, i]
		Øyeflaten et al. 2016[117] [j]	**Poulain et al. 2010[125] [i, j, k]**
		Truchon et al. 2012[45] [j]	**Richter et al. 2011[40] [i]**
			Spector et al. 2012[44] [j]
			Steenstra et al. 2010[126] [d, i, j]
			Turner et al. 2008[46] [j]
Perceived work-relatedness		**Jensen et al. 2013[32]**	Coggon et al. 2013[24]
		Karels et al. 2010[121]	Dawson et al. 2011[103]
		Kuijer et al. 2016[127]	**Sampere et al. 2012[42] [c, e]**
		Sampere et al. 2012[42] [c, e]	**Turner et al. 2008[46] [d]**
Catastrophizing		**Adams et al. 2017[128]**	Besen et al. 2015[18]
		Carriere et al. 2015a[21]	**Cowan et al. 2012[25] [f, g]**
		Cowan et al. 2012[25] [f, g]	Dawson et al. 2011[103]
		De Vries et al. 2012b[59]	Karels et al. 2010[121]
		Karoly et al. 2013[93]	Mannion et al. 2009[123]
		Lindell et al. 2010[34] [b]	**Morris and Watson 2011[124] [d]**
		Wijnhoven et al. 2007[129]	**Sarda et al. 2009[71]**
			Spector et al. 2012[44]
			Turner et al. 2008[46]

Bold indicates studies with a low risk of bias

[a] Depends on the form/subscale of the factor; [b] Not for every moment on which the outcome is measured; [c] Depends on the type of disorder of the participant; [d] Outcomes from univariate analysis; [e] Depends on the gender of the participant; [f] Depends on the job of the participant; [g] Depends on the form of work participation; [h] Outcomes from bivariate analysis; [i] Fear-avoidance beliefs for movement/physical activity; [j] Fear-avoidance beliefs for work; [k] Total fear-avoidance

Table 3. GRADE assessment of selected potential factors associated with work participation

			Quality assessment					Summary of findings			
								Effect			Overall quality
Factor	**Study design**	**Study phase**	**Risk of bias**	**Inconsistency**	**Indirectness[a]**	**Imprecision[b]**	**Publication bias[c]**	**+**	**-**	**0**	
Positive expectations regarding recovery or RTW	RCT: 1 PCS/RCS: 28 CSS: 3	Confirmative: 10 Explorative: 22	✓	✓	✓	✓	n.a.	27	0	10	Moderate +++
Optimism	RCT: 0 PCS/RCS: 3 CSS: 0	Confirmative: 1 Explorative: 2	✓	X	✓	n.a.[d]	n.a.	2	0	2	Low ++
Self-efficacy	RCT: 0 PCS/RCS: 23 CSS: 6	Confirmative: 11 Explorative: 18	✓	X	✓	✓	n.a.	18	1	18	Low ++
Motivation	RCT: 0 PCS/RCS: 3 CSS: 4 Non-RCT: 1	Confirmative: 1 Explorative: 7	X	✓	✓	✓	n.a.	6	0	3	Very low +
Feelings of control	RCT: 0 PCS/RCS: 9 CSS: 5	Confirmative: 5 Explorative: 9	✓	X	✓	✓	n.a.	7	0	8	Low ++
Perceived health	RCT: 0 PCS/RCS: 18 CSS: 6	Confirmative: 2 Explorative: 22	✓	✓	✓	✓	n.a.	17	0	11	Moderate +++
Coping strategies	RCT: 0 PCS/RCS: 9 CSS: 5	Confirmative: 3 Explorative: 11	✓	X	✓	✓	n.a.	3	7	11	Low ++

Table 3. Continued

			Quality assessment					Summary of findings			
								Effect			Overall quality
Factor	**Study design**	**Study phase**	**Risk of bias**	**Inconsistency**	**Indirectness[a]**	**Imprecision[b]**	**Publication bias[c]**	**+**	**-**	**0**	
Fear-avoidance beliefs	RCT: 1 PCS/RCS: 19 CSS: 7	Confirmative: 9 Explorative: 18	✓	X	✓	✓	n.a.	0	17	20	Low ++
Perceived work-relatedness	RCT: 0 PCS/RCS: 5 CSS: 2	Confirmative: 0 Explorative: 7	✓	X	✓	✓	n.a.	0	4	4	Low ++
Catastrophizing	RCT: 0 PCS/RCS: 8 CSS: 7	Confirmative: 5 Explorative: 10	✓	X	✓	✓	n.a.	0	7	9	Low ++

RCT: Randomized controlled trial, PCS: Prospective cohort study, RCS: Retrospective cohort study, CSS: Cross-sectional study

[a] The quality of evidence was not downgraded for indirectness due to the broad terms for work participations and the strict inclusion criteria for the participants and factors used for this study

[b] Studies which did not report confidence intervals for both significant and non-significant results, were not taken into account when deciding when to downgrade for imprecision

[c] The quality of evidence was not downgraded for publication bias because of the large body of evidence and because most of the studies were explorative studies and phase of investigation was already taken into account as a factor that could downgrade the overall quality of evidence

[d] The quality of evidence was not downgraded for imprecision because none of the studies in which the effect of pessimism or optimism was non-significant reported confidence intervals

Discussion

This systematic review of 113 studies identified the association between ten selected person-related factors and work participation of employees with health problems. The factors positively associated with work participation were positive expectations regarding recovery or RTW, optimism, self-efficacy, motivation, feelings of control, and perceived health. The factors negatively associated with work participation were fear-avoidance beliefs, perceived work-relatedness of the health problem and catastrophizing. Coping strategies had both positive and negative associations with work participation.

The synthesis of evidence showed that we can be moderately confident that positive expectations regarding recovery or RTW and better self-perceived health lead to a higher level of work participation in employees with health problems. This possible association between these expectations and work participation is in line with the findings of a review by Iles et al.[130], in which recovery expectations in employees with low back pain were a strong predictor of work outcome. Our finding on the association between self-perceived health and work participation is supported by the results of a review by Lidal et al.[131] in which poor state of health was one of the most frequent self-reported barriers to employment in employees with spinal cord injury.

For the person-related factors optimism, catastrophizing, self-efficacy, coping strategies, fear-avoidance beliefs, feelings of control, and perceived work-relatedness of health problems, the quality of evidence for an association with work participation was rather low. Nevertheless, the results of this review suggest that fear-avoidance beliefs, perceived work-relatedness of health problems and catastrophizing are negatively associated with work participation. Optimism, self-efficacy and feelings of control seem to lead to more work participation. According to the results of our review, different coping strategies can have a positive or a negative effect on work participation.

The results of our review of these factors are consistent with the results of a Delphi study by Peters et al.[132] , which indicate that researchers and clinicians in the field of work disability or RTW identify most of these factors (catastrophizing, self-efficacy, coping strategies, fear-avoidance beliefs and feelings of control) as affecting work participation. However, the results of the current review partly stand in contrast to the results of a review by De Vries et al.[133] , in which catastrophizing had no association with remaining at work for employees at all. However, that

review only included three cross-sectional studies on employees with chronic non-specific musculoskeletal pain, including two of low quality, which might explain this contradictory finding.

Studies conducted by Achterberg et al.[134] and Peters et al.[132] found that insurance physicians and experts identified motivation as the most important person-related factor for work participation. The results of the qualitative studies included in the current review are in line with this.[52, 78, 79, 89-92] Surprisingly, the current review found a very low quality of quantitative evidence for an association between motivation and work participation. The results of a review by Faber et al.[135] indicate that motivation consists of seven underlying aspects, including intrinsic motivation, expectations and self-efficacy. If researchers choose to study individual aspects of motivation rather than overall motivation, this could explain why we did not find many studies addressing the association between overall motivation and work participation. Moreover, when researchers choose to study the effects of factors such as self-efficacy and expectations alongside motivation, the overall effect of motivation could be underestimated due to the association with these other factors. These reasons could explain why we found very low evidence for an association between motivation and work participation.

Strengths and limitations of the current review

This systematic review studied the association between a set of selected person-related factors and work participation and was not limited to specific diseases or disorders; this makes the results of this study generalizable to various health problems. A key methodological strength of this review is that the articles were screened and assessed by multiple independent reviewers, explicitly to avoid bias. In addition, the quality of the studies as assessed by the assessment tools of the Joanna Briggs Institute,[13] was considered when interpreting the results of this review. The benefit of using these tools is that, although they are adapted to different study designs, the criteria on which the risk of bias is assessed are comparable between the different tools. A final strength of our study is that when assessing the level of evidence for possible associations, we used the GRADE framework for prognostic factor research[15] to prevent errors in judgement.

Despite methodological strengths, there were also some constraints in the methodology of our review. We included 113 studies which had different ways of defining and measuring the person-related factors, which raises uncertainties in the interpretation of our findings. Besides, we included studies with participants with different diseases and disorders and participants with different occupations.

At first sight, the diversity in participants improves the generalizability of our findings. However, it is possible that the influence of some of the studied factors on work participation differs across participants with different diseases and disorders or differs across occupations, which may also raise uncertainties in the interpretation of our findings. Moreover, due to heterogeneity of measurements of factors and outcomes, and heterogeneity in the statistical analyses performed in these studies, it was not possible to perform a meta-analysis. Furthermore, not every study controlled for the same variables in their analysis, and therefore there may have been hidden variables which may have influenced the outcomes.

Implications for practice and future research

We suggest that in addition to health-related factors and environmental factors, person-related factors should be considered by occupational physicians and insurance physicians when they diagnose, evaluate or provide treatment to employees. In particular, the factors perceived health and expectations regarding recovery or RTW may have significant influence on work participation and, therefore, they should be considered by occupational and insurance physicians in their efforts to improve work participation of employees with health problems.

Although the results of this review suggest that person-related factors are associated with work participation, the quality of evidence for the involvement of some of these factors was low or very low. Therefore, more research is needed to improve the quality of evidence for the involvement of these factors. Future research should also focus on how physicians might gain more insight into these different cognitions and perceptions of employees. This might assist in the identification of barriers to RTW or barriers to remaining at work for employees with health problems. Finally, research will be needed to determine whether the use of information about person-related factors by physicians improves work participation of employees with health problems and leads to a better quality of care.

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Appendix 1. Search strategy

Table 1. PubMed search strategy

Search	Query
#1 Population of interest	"chronic disease"[Mesh] OR chronic disease*[tw] OR chronic health[tw] OR chronic condition*[tw] OR long-term sickness[tw] OR long-term sick[tw] OR chronic patients[tw] OR disorder[tw] OR disorders[tw] OR disability[tw] OR disabilities[tw] OR injury[tw] OR injuries[tw]
#2 Person-related factors	"diagnostic self evaluation"[Mesh] OR self evaluation[tw] OR subjective health complaints[tw] OR self-appraisal[tw] OR health concerns[tw] OR perceived health[tw] OR illness perceptions[tw] OR patient beliefs[tw] OR patient perceptions[tw] OR perceived severity[tw] OR disability perceptions[tw] OR pain beliefs[tw] OR perceived disability[tw] OR perceived illness[tw] OR perceived impairment[tw] OR beliefs about illness[tw] OR illness beliefs[tw] OR illness representations[tw] OR illness cognitions[tw] OR illness identity[tw] OR psychological factors[tw] OR Motivation[Mesh:NoExp] OR motivation[tw] OR motivated[tw] OR unmotivated[tw] OR willingness to work[tw] OR meaning of work[tw] OR employee motivation[tw] OR work attitudes[tw] OR work motives[tw] OR work reasons[tw] OR work drive[tw] OR rehabilitation expectation*[tw] OR patient expectation*[tw] OR prognostic expectation*[tw] OR improvement expectation*[tw] OR recovery expectation*[tw] OR return to work expectation*[tw] OR RTW expectation*[tw] OR negative expectation*[tw] OR positive expectation*[tw] OR optimism[Mesh] OR optimism[tw] OR pessimism[Mesh] OR pessimism[tw] OR expected outcome[tw] OR perceived curability[tw] OR perceived work ability[tw] OR irrational cognitions[tw] OR irrational beliefs[tw] OR irrational thoughts[tw] OR irrational feelings[tw] OR irrationality[tw] OR Catastrophization[Mesh] OR catastrophization[tw] OR catastrophizing[tw] OR cognitive insufficiency[tw] OR negative perceptions[tw] OR negative orientation[tw] OR negative thoughts[tw] OR Shared decision making[tw] OR involvement in decision making[tw] OR participation in decision making[tw] OR patient participation[Mesh] OR patient participation[tw] OR client participation[tw] OR informed decision making[tw] OR "patient preference"[Mesh] OR patient preference*[tw] OR "internal-external control"[Mesh:NoExp] OR internal-external control[tw] OR control orientation[tw] OR control beliefs[tw] OR perceptions of control[tw] OR illness controllability[tw] OR perceived cause*[tw] OR external orientation[tw] OR internal orientation[tw] OR work-related*[tw] OR "Adaptation, Psychological"[Mesh] OR psychological adaption[tw] OR coping[tw] OR fear-avoidance[tw] OR adaptive response[tw] OR avoidance behavior[tw] OR cognitive reappraisal[tw] OR "Self concept"[Mesh] OR self-concept[tw] OR self-efficacy[tw] OR self-confidence[tw] OR self-esteem[tw] OR perceived ability[tw] OR self-image[tw] OR perceived competence[tw]
#3 Work participation outcome	"return to work"[Mesh] OR (return to[tw] AND work[tw]) OR RTW[tw] OR returning to work[tw] OR back to work[tw] OR unemployment[Mesh] OR unemployment[tw] OR "Employment"[Mesh:NoExp] OR employment[tw] OR employability[tw] OR work resumption[tw] OR working age[tw] OR "job satisfaction"[Mesh] OR job satisfaction[tw] OR "sick leave"[Mesh] OR sick leave[tw] OR absenteeism[Mesh] OR absenteeism[tw] OR work retention[tw] OR job retention[tw] OR job status[tw] OR work status[tw] OR paid work[tw] OR vocational status[tw] OR occupational status[tw] OR work functioning[tw] OR job functioning[tw] OR work capacity[tw] OR employment capacity[tw] OR work participation[tw] OR stay at work[tw] OR presenteeism[tw] OR work outcomes[tw] OR work ability[tw]
#4	#1 AND #2 AND #3
Limits:	Publication date from 01/01/2007-02/2017; English language or Dutch language.

Table 2. PsycINFO search strategy

Search	Query
#1 Population of interest	"chronicity (disorders)"/ or chronic illness/ or (chronic disease$ or chronic health or chronic condition$ or chronic illness).ab,id,ti. or (long-term sickness or long-term sick or chronic patients).ab,id,ti. or disorders/ or (disorder or disorders).ab,id,ti. or disabilities/ or (disability or disabilities).ab,id,ti. or injuries/ or (injury or injuries).ab,id,ti.
#2 Person-related factors	self evaluation/ or (self evaluation or subjective health complaints or self-appraisal or health concerns or perceived health or illness perceptions).ab,id,ti. or health attitudes/ or health attitudes.ab,id,ti. or client attitudes/ or (client attitudes or patient beliefs or patient perceptions or perceived severity or disability perceptions or pain beliefs or perceived disability or perceived illness or perceived impairment or beliefs about illness or illness beliefs or illness representations or illness cognitions or illness identity or psychological factors).ab,id,ti. or motivation/ or motivation.ab,id,ti. or employee motivation/ or (motivated or unmotivated or willingness to work or meaning of work).ab,id,ti. or "work (attitudes toward)"/ or work attitudes.ab,id,ti. or employee attitudes/ or (employee attitudes or work motives or work reasons or work drive).ab,id,ti. or (rehabilitation expectation$ or patient expectation$ or prognostic expectation$ or improvement expectation$ or recovery expectation$ or return to work expectation$ or RTW expectation$ or negative expectation$ or positive expectation$ or expected outcome or perceived curability or perceived work ability).ab,id,ti. or optimism/ or optimism.ab,id,ti. or pessimism/ or pessimism.ab,id,ti. or irrational beliefs/ or (irrational beliefs or irrational cognitions or irrational thoughts or irrational feelings or irrationality).ab,id,ti. or negativism/ or catastrophizing/ or (negativism or catastrophization or catastrophizing or cognitive insufficiency or negative perceptions or negative orientation or negative thoughts).ab,id,ti. or client participation/ or (client participation or patient participation or shared decision making or involvement in decision making or participation in decision making or informed decision-making or patient preference$).ab,id,ti. or "internal external locus of control"/ or (locus of control or internal-external control or control orientation or control beliefs or perceptions of control or illness controllability or perceived cause$ or external orientation or internal orientation or work-related$).ab,id,ti. or coping behavior/ or (coping or psychological adaption or fear-avoidance or adaptive response or avoidance behavior).ab,id,ti. or cognitive appraisal/ or cognitive appraisal.ab,id,ti. or self-concept/ or self-concept.ab,id,ti. or self-efficacy/ or self-efficacy.ab,id,ti. or self-confidence/ or self-confidence.ab,id,ti. or self-esteem/ or (self-esteem or perceived ability or self-image or perceived competence).ab,id,ti.
#3 Work participation outcome	reemployment/ or (return to work or (return to adj3 work) or back to work or RTW).ab,id,ti. or unemployment/ or unemployment.ab,id,ti. or employment status/ or (employment or work resumption or working age or paid work or work functioning or job functioning).ab,id,ti. or occupational status/ or (occupational status or job status or work status or vocational status or work participation or stay at work or presenteeism or work outcomes or work ability).ab,id,ti. or employability/ or (employability or work capacity or employment capacity).ab,id,ti. or job satisfaction/ or (job satisfaction or work retention or job retention).ab,id,ti. or employee absenteeism/ or (employee absenteeism or sick leave or absenteeism).ab,id,ti.
#4	#1 and #2 and #3
Limits:	Publication date from 01/01/2007-02/2017; English language or Dutch language.

Appendix 2. Data-extraction tables

Table 1. Association between person-related factor 'expectations regarding recovery or RTW' and work participation

First author, year Country (Continent)	Study design	Population N: Number of subjects A: Age; mean age (SD), range G: Gender O: Occupation H: Health status	Follow-up	Risk of bias	Results
Audhoe et al. 2012[17] The Netherlands (Europe)	Prospective cohort study	N: 932 A: 18-34: 232, 35-44: 260, 45-65: 418 G: 398 males, 514 females O: Agency workers H: Psychological complaints	10, 18, 27 months	Low	Positive RTW expectations at 10 months were associated with work participation at 18 months (p <. 01) and positive RTW expectations at 18 months were associated with work participation at 27 months (p < .01) in univariate analysis. Positive RTW expectations at 10 months were a prognostic factor for work participation at 18 months (OR: 1.7 (1.08-2.71), p = .02) in multiple logistic analysis. Positive RTW expectations at 18 months were a prognostic factor for work participation at 27 months (OR: 2.6 (1.12-5.86), p = .03) in multiple logistic analysis.
Besen et al. 2015[18] United States (North-America)	Prospective cohort study	N: 241 A: 38 (11.4), 18-63 G: 130 males, 111 females O: 76% blue collar H: Low back pain	1 week, 3 months	Moderate	More favorable RTW expectations were negatively related to days of absence (r = -.19, p < .01) and negatively related to work status (r = -.42, p < .001) in univariate analysis (correlations). In multivariate analysis positive RTW expectations were associated with fewer days of absence (-.19, p < .05) and with work status (.35, p < .001).

Table 1. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Boot et al. 2008[19] The Netherlands (Europe)	Cross-sectional study	Employed N: 345 A: 44.2 (10.2) G: 168 males, 177 females O: - H: Chronic physical disease Fully work-disabled N: 170 A: 52.4 (8.6) G: 66 males, 104 females O: - H: Chronic physical disease	-	Low	The participants in the employed group had more positively oriented illness perceptions about how long their illness would last (p =. 027) and about the effect of their treatment (p < .001) compared to those who were fully work-disabled in univariate analysis. Those factors had no effect in multivariate logistic regression analysis.
Busch et al. 2007[20] Sweden (Europe)	Prospective cohort study	Sick absent N: 130 A: <45: 64, >45: 66 G: 45 males, 85 females O: - H: Chronic musculoskeletal pain Work capable N: 103 A: <45: 58, >45: 45 G: 32 males, 71 females O: - H: Chronic musculoskeletal pain	3, 7, 11, 15 months	Low	Expectations of recovery were a significant predictor of long-term sickness absence in univariate analysis (p < .05). Having low expectations of recovery was a significant predictor of long-term sickness absence during follow-up (B = .88, OR: 2.41 (1.22-4.78), p = .01) in multivariate logistic regression analysis.
Carriere et al. 2015a[21] Canada (North-America)	Prospective cohort study	N: 154 A: 36.4 (9.2), 20-60 G: 81 males, 73 females O: Diverse H: Whiplash associated disorders	1 year	Low	High RTW expectations were directly related to successful RTW (β = 1.05, p < .001) in multivariate analysis. Pain catastrophizing influenced RTW expectations (p < .001). Expectations partially mediated the relation between pain catastrophizing and RTW status in multiple regression analysis.

Table 1. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Carriere et al. 2015b[22] Canada (North-America)	Prospective cohort study	N: 109 A: 36.08 (9.70) G: 47 males, 62 females O: Diverse H: Work-related musculoskeletal disorders	1 year	Low	Lower recovery expectations were associated with lower probability of RTW (χ^2 = 36.75, p < .001) in univariate Chi-square analysis. Recovery expectations contributed significantly to the prediction of RTW status at follow-up (χ^2 = 31.51, OR .952 (.932–.972), p < .001) in multivariate logistic regression analysis. Low recovery expectations were associated with a low probability of RTW. Recovery expectations fully mediated the relation between depression and RTW status at follow-up in logistic regression analysis.
Carstens et al. 2014[23] United States (North-America)	Prospective cohort study	N: 496 A: 37.0 (11.3), 18-65 G: 287 males, 209 females O: - H: Work-related acute back pain	3 months	Moderate	Four different recovery clusters were identified: having stable high expectations, having stable medium expectations, having decreasing expectations and having stable low expectations. The participants with stable low expectations for recovery had a higher risk for not returning to work within 3 months (OR: 3.38 (2.40-8.18), p < .01) as compared to participants with stable high expectations for recovery. The participants with decreasing expectations had the highest risk for not returning to work (OR: 5.29 (2.11-13.26), p < .01) in comparing to the other participants in multivariate logistic regression analysis. There was no difference between the participants in the stable high cluster and the participants in the stable medium cluster.
Coggon et al. 2013[24] Diverse (Europe, South- North-America, South-America, Africa, Asia, Oceania)	Cross-sectional study	N: 12416 A: 20-29: 3058, 30-39: 3971, 40-49: 3451, 50-59: 1936 G: 4348 males, 8068 females O: Diverse H: Musculoskeletal illness	-	Moderate	Adverse beliefs about the prognosis of pain did not have a significant effect on prolonged sickness in the full model (PRR: 1.03 (.86-1.23)) in Poisson regression analysis.
Cowan et al. 2012[25] United States (North-America)	Prospective cohort study	N: 66 A: 49.7 (11.3) G: 17 males, 49 females O: Desk-based, non-desk-based H: Carpal tunnel release	2-4 months	Low	Less expected time until RTW (p = .001) was associated with earlier return to modified work in bivariate analysis. In multivariate analysis less expected time until RTW (R^2 = .36) was significantly associated with earlier return to modified work. In bivariate analysis less expected time until RTW (p < .001) was significantly associated with earlier return to full work. Less expected time until RTW was also a significant predictor of earlier return to full work (R^2 = .18) in multivariate analysis.

Table 1. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Du Bois et al. 2009[26] Belgium (Europe)	Prospective cohort study	N: 346 A: 41 G: 183 males, 163 females O: 74% blue collar H: Low back pain	6 months	Low	Expecting to RTW within 6 months was positively associated to RTW within 3 months (OR: 1.14 (1.04–1.25)) in multivariate analysis. The question 'Do you expect to RTW within 6 months?' was together with 4 other questions able to correctly classify the poor outcome (no RTW within 3 months) of 62% of the participants in multivariate logistic regression analysis.
Ekberg et al. 2015[27] Sweden (Europe)	Prospective cohort study	RTW <3 months N: 195 A: 44 (11), 18-65 G: 38 males, 157 females O: 77 white collar, 89 pink collar, 29 blue collar H: Common mental disorders RTW 3-12 months N: 98 A: 44 (10), 18-65 G: 14 males, 84 females O: 47 white collar, 34 pink collar, 16 blue collar H: Common mental disorders	1 year	Low	Participants who returned to work within 3 months had higher expectations of recovery from treatment than participants who returned to work between 3 and 12 months (p = .035) in univariate Chi-square analysis. Expectations of recovery from treatment were also associated with RTW in the 3-month sub-cohort, but not in the 3-12 month sub-cohort in multivariate Cox regression analysis when looking at the influence of personal resources. Positive expectations of recovery from treatment were associated with early RTW in the final model (HR: 1.50 (1.04-2.16)) in multivariate Cox regression analysis. Expectations of RTW did not differ between the two groups in univariate analysis and were not associated with RTW in multivariate analysis.

Table 1. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Gross and Battié 2010[28] Canada (North-America)	Prospective cohort study	Specific pathology N: 234 A: 38.1 (11.6) G: 199 males, 35 females O: - H: Specific pathology Back pain N: 298 A: 38.1 (10.6) G: 203 males, 95 females O: - H: Back pain Non-back strain/sprain/pain N: 461 A: 40.5 (10.4) G: 290 males, 171 females O: - H: Non-back strain/sprain/pain Other pain N: 47 A: 40.7 (9.1) G: 28 males, 19 females O: - H: Other pain	1 year	Moderate	Positive work related recovery expectations were significantly associated with more days to suspension of time loss benefits in participants with back pain in univariate (p < .05) and in multivariate analysis (OR: .83 (.73-.96), p < .05), but not in other diagnostic groups in multivariate analysis. Participants with back pain and with positive expectations recover more rapidly, than participants with back pain with neutral or negative expectations. Expectations did influence the time to claim closure in univariate analysis for participants with back pain (p < .05), but did not influence time to claim closure in other diagnostic groups or in multivariate analysis. When taking the non-chronic and chronic back pain groups apart, recovery expectations were associated with time to benefit suspension in univariate (p < .05) and in multivariate analysis (OR: .76 (.62-.92), p < .05) in the non-chronic back pain group, but not in the chronic back pain group. Recovery expectations were associated with time to claim closure in univariate (p < .05) and in multivariate analysis (OR: .80 (.66-.98), p < .05) in the non-chronic back pain group, but not in the chronic back pain group.

Table 1. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Hou et al. 2012[29] Taiwan (Asia)	Prospective cohort study	N: 804 A: 41.8 (15.2), 20-65 G: 574 males, 230 females O: White-collar, blue-collar, part-time job H: Traumatic limb injury	1, 3, 6, 12, 18, 24 months	Low	The participants who expected that the likelihood for RTW within one month was moderate (OR: .29, (.17-.51)) or high (OR: .20 (.09-.47)) were more likely to be in the fast RTW group than in the slow RTW group, in comparing to participants who expected that there was no chance for RTW within one month. The participants who expected that the likelihood for RTW within one month was moderate (OR: .52 (.34-.80)) or high (OR: .34 (.17-.69)) were more likely to be in the average RTW group than the slow RTW group in multinomial logistic regression analysis. There were no significant differences in expectations for RTW between participants in the average RTW and the fast RTW group.
Hou et al. 2008[30] Taiwan (Asia)	Prospective cohort study	N: 154 A: 36.9 (10.9), 18-65 G: 115 males, 39 females O: White-collar and blue-collar H: Orthopaedic injury	1, 3, 6 months	Low	For non-workers' compensation group expecting that the likelihood for RTW within one month is high, was associated with a greater chance of RTW in univariate and multivariate analysis (OR: 4.88 (2.31-10.30)). For workers' compensation group high expectations (OR: 2.87 (1.11-13.15)) and very high expectations (OR: 11.14 (2.40-51.59)) for RTW within one month were associated with a greater chance of RTW in univariate and in multivariate Cox regression analysis.
Iakova et al. 2012[31] Switzerland (Europe)	Prospective cohort study	N: 411 A: 43.3 (10.3), <60 G: 336 males,75 females O: - H: Orthopedic trauma	2 years	Moderate	Expected injury outcome (recovering vs. no recovery or worsening) was positively associated with RTW in a univariate regression ($p < .001$), but was not a significant predictor of RTW in the full model in multivariate analysis.
Jensen et al. 2013[32] Denmark (Europe)	Prospective cohort study	N: 325 A: 41.7 (10.4), 18-60 G: 159 males, 166 females O: - H: Low back pain	1 year	Low	Low expectations for RTW ($p < .001$) predicted unsuccessful RTW after one year in univariate analysis. Low RTW expectations were in combination with five other variables also negatively associated with RTW in multivariate logistic regression analysis ($p < .001$).
Johansson et al. 2010[33] Sweden (Europe)	Prospective cohort study	N: 59 A: 40 (8), 18-60 G: 35 males, 24 females O:- H: Lumbar disc herniation	1 year	Low	Having low expectations to RTW within 3 months was a predictor of sick leave 12 months after surgery (OR: 19.5 (2.1-179.2), $p = .009$) in multivariate logistic regression analysis.

Table 1. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Lindell et al. 2010[34] Sweden (Europe)	Prospective cohort study	Rehabilitation group N: 63 A: 42.2 (2.4), <60 G: 30 males, 33 females O: 87% blue collar H: non-acute non-specific spinal pain Primary-care group N: 62 A: 43.0 (2.6), <60 G: 27 males, 35 females O: 87% blue collar H: non-acute non-specific spinal pain	6, 12, 18, 24 months	Low	The participants' own belief in RTW was a significant predictor of RTW at 6 months (p = .03), 12 months (p = .002), 18 months (p = .005), and 24 months (p = .008) in univariate analysis. The participants' own belief in RTW was a predictor of RTW at 6 months (OR: 4.1 (1.1-15.7), p = .02) and 12 months (OR: 5.2 (1.5-17.5), p = .009), but not at 18 months and 24 months in multivariate analysis.
Magnussen et al. 2007b[35] Norway (Europe)	Randomized controlled trial	Intervention N: 45 A: 49.1 (6.4), 36-56 G: 19 males, 26 females O: - H: Back pain Control N: 44 A: 49 (4.5), 36-56 G: 14 males, 30 females O: - H: Back pain	1 year	Moderate	Belief in RTW was associated with having entered in a RTW process (being on educational course or being in work training) in univariate analysis (p = .003). The participants who at baseline believed to RTW (OR: 10.5 (2.4-44.5), p < .05) were more likely to have entered a RTW process when adjusted for age and gender in multivariate logistic regression analysis.

Table 1. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Murgatroyd et al. 2016[36] Australia (Oceania)	Prospective cohort study	N: 334 A: 36 (13.9), >18 G: 267 males, 67 females O: Diverse H: Upper and/or lower extremity fractures	6, 12, 24 months	Moderate	Recovery expectations for work (p = .08) and recovery expectations for usual activities (p < .001) were associated with RTW in univariate analysis. Expecting that one could perform usual activities in less than 90 days was associated with a shorter time to RTW (HR: 2.10 (1.49-2.95), p < .001) in comparing to expecting that one could not perform usual activities within 90 days in the Cox model in multivariate analysis. However, recovery expectations for work were not associated with RTW in multivariate Cox regression analysis.
Nieuwenhuijsen et al. 2013[37] The Netherlands (Europe)	Retrospective cohort study	N: 179 A: 45 (10) G: 51 males, 128 females O: - H: Common mental disorders	3, 6, 9, 12 months	Moderate	Participants with positive RTW expectations did not differ in median time till RTW in comparing to workers with negative RTW expectations in a univariate log-rank test. Positive RTW expectations were not significantly associated with a shorter median time to RTW.
Opsahl et al. 2016[38] Norway (Europe)	Prospective cohort study	N: 574 A: 44.3 (9.7), 20-60 G: 285 males, 289 females O: - H: Low back pain	1 year	Low	Having high expectations of RTW instead of low or moderate expectations predicted RTW at 12 months for men (p < .05) and women (p < .05) in bivariate analysis and for men (OR: 4.17 (1.90-9.17)) and women (OR: 3.36 (1.58-7.14)) in the full model in multivariate analysis. Having uncertain expectations were no better than having low or moderate expectations in bivariate logistic regression analysis.
Reme et al. 2009[39] Norway (Europe)	Prospective cohort study	N: 246 A: 41.1 (10.7), <60 G: 120 males, 126 females O: - H: Low back pain	3, 12, 24 months	Low	Negative RTW expectations predicted non RTW in univariate analysis (p < .01). In adjusted regression models negative RTW expectations predicted non RTW at 3 months (OR: 4.2 (1.7-10.0), p = .001), but did not predict non RTW at 12 or 24 months.
Richter et al. 2011[40] The Netherlands (Europe)	Prospective cohort study	N: 276 A: 45 (7) G: 256 males, 20 females O: Self-employed H: Musculoskeletal symptoms	1 year	Low	Participants who estimated their RTW to be within one month had shorter claim duration than participants who estimated RTW in more than a month or never (OR: .24 (.15-.38), p < .001) or who had no idea of when they would RTW (OR: .23 (.15-.34), p < .001) in univariate and in multivariate Cox regression analysis.
Rönnberg et al. 2007[41] Sweden (Europe)	Prospective cohort study	N: 148 A: 40, 18-66 G: 80 males, 68 females O: - H: Lumbar disc hernia	2 years	Moderate	Participants who expected to return (76%) and not return (24%) to their present or similar work, returned in 78% and 26%, respectively (p = .021) in univariate analysis.

Table 1. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Sampere et al. 2012[42] Spain (Europe)	Prospective cohort study	N: 663 A: 39.8 (11.4) G: 364 males, 299 females O: - H: Musculoskeletal disorder, mental disorders or other physical conditions	2 years	Low	Expectations of returning to the same job were associated with time to RTW in bivariate analysis (p < .005). Expecting that the time required to RTW was 1-3 months (HR: .50 (.39-.63)) or was more than 3 months (HR: .36 (.25-.52)) was predictive for more time to RTW in comparing to expecting that the time required to RTW was less than 1 months. Lack of expectations of returning to the same job (HR: .13 (.06-.31)) and not knowing when to return (HR: .46 (.37-.57)) were also associated with a longer time to RTW in the full model among the total study population in multivariate analysis. RTW expectations were related to time to RTW across different health conditions and across different genders in multivariate analysis.
Sluiter and Frings-Dresen 2008[43] The Netherlands (Europe)	Cross-sectional study	Employed N: 745 A: 40.0 (8.3) G: 283 males,462 females O: - H: Repetitive strain injury Sick-listed N: 376 A: 42.3 (9.4) G: 83 males, 293 females O: - H: Repetitive strain injury	-	Low	Participants with repetitive strain injury who were sick-listed differed from the working group in treatment control (p < .001). Sick-listed participants scored lower on treatment control than participants in the working group which indicated that they had less positive expectations about the effect of their treatment in multivariate ANOVA analysis. However, they did not differ in their perceptions about how long their illness would last.
Spector et al. 2012[44] United States (North-America)	Prospective cohort study	N: 670 A: 44.9 (9.6), >18 G: 255 males, 415 females O: Diverse H: Carpal tunnel syndrome	2 years	Low	Low or uncertain recovery expectations were significantly associated with long-term disability (missing work days and retrieving compensation) in univariate (p < .05) and in multivariate analysis (OR: 2.51 (1.39-4.54), p = .002).

Table 1. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Truchon et al. 2012[45] Canada (North-America)	Prospective cohort study	N: 535 A: 42 (10), 18-60 G: 317 males, 218 females O: Diverse H: Low back pain	6, 12 months	High	Expectations of time to RTW (β = -.25, p = .00) as measured with the new developed absenteeism screening questionnaire were predictive for long-term absence from work in multivariate Cox regression analysis.
Turner et al. 2008[46] United States (North-America)	Prospective cohort study	N: 1885 A: 39.4 (11.2) G: 1282 males, 603 females O: Diverse H: Back injury	1 year	Low	Having low or high instead of very high recovery expectations was associated with work disability (p < .001) in univariate analysis. In a multi-domain model none of the psychological factors, including recovery expectations, contributed independently to the prediction of 1-year work disability (wage replacement compensation for total disability 12 months after claim submission). This was because the score on the Roland-Morris disability questionnaire was substantially correlated with all the psychological factors.
Vuistiner et al. 2015[47] Switzerland (Europe)	Prospective cohort study	N: 1090 A: 42.9 (11.3), <62 G: 890 males, 200 females O: - H: Orthopaedic trauma	4 years	Low	The probability of being declared fit for work was higher for those expecting a positive evolution in univariate analysis and in multivariate Cox regression analysis (HR: 1.50 (1.32-1.70)).
Wåhlin et al. 2012[48] Sweden (Europe)	Prospective cohort study	N: 699 A: 48 (10.7), 18-65 G: 201 males, 498 females O: - H: Musculoskeletal or mental disorders	3 months	Low	For participants with mental disorders there was no association between RTW expectations and RTW. For participants with musculoskeletal disorders high RTW expectations were significantly associated with RTW within 3 months (OR: 2.41 (1.22-4.78)) in multiple logistic regression analysis.

RTW: Return to work

Table 2. Association between person-related factor 'optimism' and work participation

First author, year Country (Continent)	Study design	Population N: Number of subjects A: Age; mean age (SD), range G: Gender O: Occupation H: Health status	Follow-up	Risk of bias	Results
De Vries et al. 2011[52] The Netherlands (Europe)	Qualitative study	N: 21 A: 49 (6.9), 10-60 G: 9 males, 12 females O: Diverse H: Chronic nonspecific musculoskeletal pain	-	Low	A positive outlook was according to participants with chronic nonspecific musculoskeletal pain an important factor for staying at work.
Ellingsen and Aas 2009[53] Norway (Europe)	Qualitative study	N: 4 A: 38-52 G: 2 males, 2 females O: - H: Acquired brain injury	-	Moderate	A belief that things would work out (optimism) was considered as a very important facilitating factor for work participation according to participants. Pessimism was a inhibiting factor for work participation.
Hystad and Bye 2012[49] Norway (Europe)	Prospective cohort study	N: 1190 A: 41.67 (10.87) G: 922 males, 268 females O: Diverse H: Musculoskeletal symptoms	2 years	Low	Pessimism was related to more sickness absence in 2 years for women ($R^2 = .12$, $p < .01$) after controlling for age, physical work environment and proposed mediators, but not for men ($R^2 = .04$, $p = .057$) in multivariate analysis. However, the coefficient did not significantly differ between men and women. There was no effect for optimism. Pessimism was a more salient predictor of physical health and functioning than optimism in a multiple mediation model.
Lundqvist and Samuelsson 2012[54] Sweden (Europe)	Qualitative study	N: 14 A: 51 (8.1), 37-63 G: 8 males, 6 females O: - H: Brain injury	-	Moderate	According to participants it was important to have a positive attitude for progressing in rehabilitation and RTW.

Table 2. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Lydell et al. 2011[50] Sweden (Europe)	Prospective cohort study	N: 320 A: 42 G: 130 males, 190 females O: Diverse H: Musculoskeletal disorders	1, 5, 10 years	Moderate	There were more participants in the motivation and optimism group who had returned to work 1 year after baseline as compared to the hindrance and hesitation group. However, there were no significant differences between the groups after 5 and 10 years in univariate Chi-square analysis.
Øyeflaten et al. 2008[51] Norway (Europe)	Prospective cohort study	N: 135 A: 45 (8.4), 24-61 G: 48 males, 87 females O: Diverse H: Musculoskeletal complaints	3, 12 months	Low	Hopelessness (having negative expectancies about oneself and the future) had no significant effect on RTW at 3 and 12 months in univariate or multivariate logistic regression analysis.

RTW: Return to work

Table 3. Association between person-related factor 'self-efficacy' and work participation

First author, year Country (Continent)	Study design	Population N: Number of subjects A: Age; mean age (SD), range G: Gender O: Occupation H: Health status	Follow-up	Risk of bias	Results
Besen et al. 2015[18] United States (North-America)	Prospective cohort study	N: 241 A: 38 (11.4), 18-63 G: 130 males, 111 females O: 76% blue collar H: Low back pain	1 week, 3 months	Moderate	Greater RTW confidence (confidence in ability to RTW) was negatively related to days of absence (r = -.34, p < .001) and positively related to work status (r = .32, p < .001) in univariate analysis (correlations). In multivariate analysis greater RTW confidence (r = -.10, p < .05) was associated with fewer days of absence. Greater RTW confidence (r = .09, p < .05) was also directly associated with work status.
Brouwer et al. 2015[55] Canada (North-America)	Prospective cohort study	N: 632 A: 15-29: 93, 30-39: 137, 40-49: 228, >49: 173 G: 350 males, 282 females O: - H: Musculoskeletal disorders	1, 6, 12 months	Low	High levels of pain RTW self-efficacy (ability to cope with pain) as measured with the new return-to-work self-efficacy scale 1 month after injury was positively related to 6-month RTW status in univariate (p < .001) and in multivariate analysis (β = .18, OR: 1.20 (1.06-1.37), p = .005). Overall RTW self-efficacy was positively associated with 6 month RTW status in univariate (p = .004), but not in multivariate analysis. Other self-efficacy scales (supervisor RTW self-efficacy and co-worker RTW self-efficacy) were not significant in predicting 6-months RTW status in univariate or multivariate analysis. Overall RTW self-efficacy (p = .015) and pain RTW self-efficacy (p = .029) predicted 12 month RTW status in univariate analysis, but not in multivariate analysis. Supervisor RTW self-efficacy and co-worker self-efficacy did not predict 12 month RTW status in univariate or multivariate logistic regression analysis. Improvements in overall RTW self-efficacy (β = .66, OR: 1.92 (1.04-3.57), p = .038) and coworker RTW self-efficacy (ability to obtain help from coworkers) (β = .89, OR: 2.43 (1.18-5.00), p = .016) predicted 12-month RTW status, but only in multivariate logistic regression analysis. Other improvements of forms of RTW self-efficacy (pain RTW self-efficacy and supervisor RTW self-efficacy) were not significant in predicting RTW status in univariate or multivariate analysis.

Table 3. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Brouwer et al. 2009[56] The Netherlands (Europe)	Prospective cohort study	N: 926 A: 45.8 (9.5), 18-63 G: 466 males, 460 females O: - H: Musculoskeletal symptoms, other physical symptoms, mental symptoms	10 months	Low	Willingness to expend effort in completing a behavior (p = .00) and willingness to initiate behavior (p = .01) (two subscales of self-efficacy) were associated with less time till RTW in univariate analysis. The subscale persistence in the face of adversity was not associated with time till RTW in univariate analysis. Willingness to expend effort in completing the behavior was associated with shorter time till RTW (HR: 1.42 (1.17-1.74), p = .00) in multivariate analysis. Other subscales (willingness to initiate behavior and persistence in the face of adversity) were not significant in multivariate analysis.
Brouwer et al. 2010[57] The Netherlands (Europe)	Prospective cohort study	Musculoskeletal conditions N: 352 A: 45.4 (9.4) G: 201 males, 151 females O: - H: Musculoskeletal conditions Other physical health conditions N: 265 A: 47.7 (9.5) G: 148 males, 117 females O: - H: Other physical health conditions Mental health conditions N: 245 A: 44.2 (9.4) G: 86 males, 159 females O: - H: Mental health conditions	10 months	Low	High willingness to expend effort in completing a behavior was a significant predictor of shorter time to RTW for all three subgroups (musculoskeletal, other physical and mental health subgroup) in univariate analysis (p < .05). Willingness to initiate behavior was only associated with shorter time till RTW for the musculoskeletal subgroup in univariate analysis (p < .01), but not for the other physical subgroup and the mental health subgroup. The subscale persistence in the face of adversity was not associated with time to RTW in all three groups. Willingness to expend effort in completing a behavior (self-efficacy) was associated with time to RTW after 10 months (p < .05) in all three groups participants (musculoskeletal subgroup: HR 1.49 (1.12-1.99), p < .01, other physical subgroup: HR: 1.53 (1.07-2.18), p = .02, mental health subgroup: HR: 1.60 (1.07-2.40), p = .02) in the multivariate model. Other subscales of self-efficacy (willingness to initiate behavior and persistence in the face of adversity) were not significantly associated with time to RTW in multivariate analysis.

Table 3. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
D'Amato and Zijlstra 2010[58] Austria, Ireland, Finland, the Netherlands, the United Kingdom (Europe)	Prospective cohort study	N: 1460 A: <36: 210, 36-45: 337, 46-54: 515, >55: 396 G: 711 males, 749 females O: Diverse H: Mental or physical health problems	6 months	Moderate	Self-efficacy was not significant in predicting RTW in multivariate logistic regression analysis.
De Vries et al. 2011[52] The Netherlands (Europe)	Qualitative study	N: 21 A: 49 (6.9), 10-60 G: 9 males, 12 females O: Diverse H: Chronic nonspecific musculoskeletal pain	-	Low	Being self-confident was according to participants with chronic nonspecific musculoskeletal pain an important factor for staying at work.
De Vries et al. 2012b[59] The Netherlands (Europe)	Cross-sectional study	Staying at work N: 119 A: 51, 20-60 G: 48 males, 71 females O: - H: Chronic nonspecific musculoskeletal pain Sick leave and referred for rehabilitation N: 122 A: 39, 20-60 G: 56 males, 66 females O: - H: Chronic nonspecific musculoskeletal pain	-	Low	Pain self-efficacy (higher in staying at work group) was associated with work status in univariate analysis (p = .001). Participants in the staying at work group reported significantly higher pain self-efficacy beliefs compared to sick-listed participants in the sick-leave group (B = .09, OR: 1.09 (1.05-1.14), p = .001) in multivariate logistic regression analysis. However, self-efficacy was not one of the factors which best discriminated participants within the sick leave group and the staying at work group in backwards stepwise logistic regression analysis.
Dionne et al. 2007[60] Canada (North-America)	Prospective cohort study	N: 1007 A: 38.7 (10.6), 18-64 G: 589 males, 418 females O: - H: Back pain	6 weeks, 12 weeks, 1 year, 2 years	Low	Self-efficacy was associated with less failure after attempt(s) to RTW for women (OR: .69 (.51–.91), p < .05) and men (OR: .21 (.07–.68), p < .05) in multivariate analysis. However, self-efficacy was not associated with partial success or failure to RTW.

Table 3. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Dunn et al. 2010[78] United States (North-America)	Qualitative study	N: 23 A: 27-59 G: 11 males, 12 females O: Diverse H: Serious mental illness	-	Moderate	Seven facilitators of vocational recovery were received from the interviews. Having the confidence to work was important in helping participants with serious mental illness RTW and maintain their employment.
Ekberg et al. 2015[27] Sweden (Europe)	Prospective cohort study	RTW <3 months N: 195 A: 44 (11), 18-65 G: 38 males, 157 females O: 77 white collar, 89 pink collar, 29 blue collar H: Common mental disorders RTW 3-12 months N: 98 A: 44 (10), 18-65 G: 14 males, 84 females O: 47 white collar, 34 pink collar, 16 blue collar H: Common mental disorders	1 year	Low	Self-efficacy did not differ between participants who went back to work within 3 month and participants who went back to work between 3 and 12 months in univariate Chi-square analysis. Self-efficacy was related to RTW in the 3-12 months cohort, but not in sub-cohort for participants who returned to work within 3 months in multivariate Cox regression analysis. Significant variables from multiple Cox regression within each block of predictors (health, function and work ability, personal resources and work conditions) were included in the full model. Self-efficacy was not associated with early RTW in the final model in multivariate Cox regression analysis.
Hartke et al. 2011[79] United States (North-America)	Qualitative study	N: 12 A: 51, 31-67 G: 8 males, 4 females O: Diverse H: Stroke	-	Moderate	Struggling with regaining self-confidence was a barrier that stroke survivors encounter in their efforts to RTW.
Healey et al. 2011[61] United Kingdom (Europe)	Cross-sectional study	N: 612 A: 50.8 (12.2) G: 438 males, 174 females O: - H: Ankylosing spondylitis	-	Low	Self-efficacy was negatively associated with unemployment and absenteeism (number of sick leave days) in univariate analysis ($p < .05$), but was not associated with employment status and absenteeism in multivariate logistic regression analysis.

Table 3. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Huijs et al. 2012[62] The Netherlands (Europe)	Prospective cohort study	N: 682 A: 46.6 (9.25) G: 284 males, 389 females O: - H: Physical problems, mental problems or a combination of physical and mental problems	2 years	Low	Less RTW self-efficacy was associated with a longer duration until full RTW for participants with physical problems, and physical and mental problems in univariate analysis ($p < .01$), but not for participants with only mental problems. Self-efficacy was associated with duration until full RTW for participants with sickness absence due to physical complaints (HR: 1.38 (1.15-1.64), $p < .01$) and for participants with physical and mental problems (HR: 1.24 (1.01-1.51), $p = .04$), but not for participants with only mental problems in multivariate analysis.
Huijs et al. 2017[63] The Netherlands (Europe)	Prospective cohort study	N: 883 A: 46.4 (9.2) G: 386 males, 497 females O: - H: Long-term sick-listed employees with and without depressive symptoms	1 year, 2 years	Moderate	RTW self-efficacy predicted duration until RTW within 1 year and within 2 years in univariate analysis ($p < .01$). A higher level of RTW self-efficacy predicted a shorter duration until full RTW within 1 year (HR: 1.19 (1.06-1.33), $p < .01$) or 2 years (HR: 1.20 (1.06-1.35), $p < .01$) after the start of sick leave for participants with depressive symptoms in multivariate analysis.
Lagerveld et al. 2016[64] The Netherlands (Europe)	Prospective cohort study	N: 168 A: 40.7 (9.9), >50: 32 G: 67 males, 101 females O: - H: Common mental disorders	1, 3, 6, 9 months	Moderate	Higher baseline self-efficacy (HR: 3.16 (2.04-4.87), $p < .01$) and stronger self-efficacy increase (HR: 1.91 (1.46-2.53), $p < .01$) were significant predictors of a faster RTW within 9 months in multivariate Cox regression analysis.
Lundqvist and Samuelsson 2012[54] Sweden (Europe)	Qualitative study	N: 14 A: 51 (8.1), 37-63 G: 8 males, 6 females O: - H: Brain injury	-	Moderate	According to participants it was important to have self-confidence for progressing in rehabilitation and RTW.
Magnussen et al. 2007a[80] Norway (Europe)	Qualitative study	N: 17 A: 38-56 G: 5 males, 12 females O: - H: Back pain	-	Moderate	Low self-esteem was for many participants a main barrier for RTW.

Table 3. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Mangels et al. 2011[65] Germany (Europe)	Prospective cohort study	Short-term sick leave N: 161 A: 48.6 (13.7) G: 39 males, 122 females O: - H: Musculoskeletal disease Long-term sick leave N: 53 A: 50.3 (6.5) G: 12 males, 41 females O: - H: Musculoskeletal disease	1 year	Moderate	Pretreatment self-efficacy did not contribute to the prediction of sick leave at follow-up in multivariate analysis. Participants with low scores on self-efficacy at follow-up were more likely to be on long-term sick leave at follow-up than patients with higher scores on self-efficacy (β = -.36, p < .001) in hierarchical regression analysis.
Martins 2015[66] Portugal (Europe)	Cross-sectional study	N: 149 A: 40.61 (11.13), 19-64 G: 109 males, 40 females O: - H: Chronic disease or injury, using a wheelchair	-	Moderate	Participants who are employed scored higher on self-efficacy than retired or unemployed participants (t = 6.26, p < .001) in a t-test.
Murphy et al. 2011[67] Australia (Oceania)	Prospective cohort study	N: 72 A: 35.3 (14.4) G: 58 males, 14 females O: - H: Spinal cord injury	2 years	Moderate	Self-efficacy was not a predictor of employment status in univariate analysis or multivariate discriminate function analysis.
Nieuwenhuijsen et al. 2013[37] The Netherlands (Europe)	Retrospective cohort study	N: 179 A: 45 (10) G: 51 males, 128 females O: - H: Common mental disorders	3, 6, 9, 12 months	Moderate	Positive RTW self-efficacy was associated with a shorter time until RTW (χ^2 = 17.8, p < .000) in a Kaplan-Meier curve in survival analysis.

Table 3. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
O'Sullivan et al. 2012[68] United states (North-America)	Cross-sectional study	N: 56 A: 40.7 (13.2), 19-69 G: 23 males, 32 females O: - H: Physical disability, psychiatric disability, learning disability	-	Low	Collective work behavior self-efficacy was associated with length of prior employment. Participants who reported higher levels of work behavior self-efficacy reported longer periods of employment (r = .36, p < .01) in univariate analysis. However, self-efficacy was not an independent predictor of length of prior employment when adding personality factors in hierarchical regression analysis.
Øyeflaten et al. 2008[51] Norway (Europe)	Prospective cohort study	N: 135 A: 45 (8.4), 24-61 G: 48 males, 87 females O: Diverse H: Musculoskeletal complaints	3, 12 months	Low	Self-efficacy had no significant effect on RTW at 3 and 12 months in univariate or multivariate logistic regression analysis.
Richard et al. 2011[69] Canada (North-America)	Prospective cohort study	N: 1007 A: 38.7 (10.6), 18-64 G: 589 males, 418 females O: - H: Back pain	2 years	Low	Participants with high RTW self-efficacy were less likely to be found in the failure after attempt to RTW group (OR: .28 (.14-.57), p < .05) or in the failure group (OR: .19 (.07-.48), p < .05) than participants with low self-efficacy in bivariate and multivariate analysis. Participants with a moderate level of RTW self-efficacy were less likely to be found in the failure after attempt (OR: .82 (.47-1.40), p < .05) or in the failure group at 2 years (OR: .51 (.26-1.00), p < .05) in univariate and multivariate analysis. There was no effect of self-efficacy and the chance of being in the partial success group.
Roesler et al. 2013[70] Australia (Oceania)	Prospective cohort study	N: 192 A: 35.1, 18-63 G: 163 males, 29 females O: Blue collar, white collar H: Hand injury	4, 12 weeks	Low	Self-efficacy at 7-10 days was a negative predictor of failing to RTW before 12 weeks (B = -.21, Exp(B) = .81, p = .014), but self-efficacy at 28 days was not a predictor of RTW before 12 weeks in multivariate logistic regression analysis.
Sampere et al. 2012[42] Spain (Europe)	Prospective cohort study	N: 663 A: 39.8 (11.4) G: 364 males, 299 females O: - H: Musculoskeletal disorder, mental disorders or other physical conditions	2 years	Low	General self-efficacy was not related to time to RTW in bivariate analysis and not in multivariate analysis.

Table 3. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Sarda et al. 2009[71] Australia (Oceania) Brazil (South-America)	Cross-sectional study	Australian N: 207 A: 44, 18-65 G: - O: - H: Chronic pain Brazil N: 222 A: 45, 18-65 G: - O: - H: Chronic pain	-	Low	In the Brazilian sample low self-efficacy was associated with a more chance of being unemployed (OR: 2.52 (1.06-6.00), p = .04) in multivariate analysis. Self-efficacy was not associated with chance of being unemployed in the Australian sample in multivariate logistic regression analysis.
Shaw et al. 2011[72] United States (North-America)	Prospective cohort study	N: 399 A: 36.5 (11.2), 18-63 G: 236 males, 163 females O: Mostly blue-collar H: Acute low-back pain	3 months	Moderate	Participants with medium (OR: 3.40 (1.58-7.33), p < .01) or high (OR: 4.93 (2.23-10.91), p < .01) RTW self-efficacy at visit 1 at the occupational health clinic were more likely to RTW within 7 days in univariate (p < .01) and multivariate analysis. Self-efficacy at visit 1 was not a predictor of RTW within 3 months in univariate or multivariate analysis. High self-efficacy at visit 2 (4-10 days after first visit at the clinic) was a significant predictor of RTW within 3 months in univariate (p < .05) and multivariate analysis (OR: 3.72 (1.51-9.13), p < .01).
Strauser et al. 2010[73] United States (North-America)	Cross-sectional study	N: 84 A: 40.7 (13.2), 19-69 G: 35 males, 48 females O: - H: Physical disabilities, psychiatric disabilities, learning disabilities	-	Low	Level of contextual work behavior self-efficacy was not different between employed and unemployed participants. Contextual work behavior self-efficacy did not contribute to predicting the longest period of prior employment next to work personality in hierarchical multiple regression analysis.
Stulemeijer et al. 2008[74] The Netherlands (Europe)	Prospective cohort study	N: 201 A: 35.6 (12.3), 18-60 G: 123 males, 78 females O: - H: Mild traumatic brain injury	6 months	Low	Self-efficacy did not predict RTW in univariate analysis.

Table 3. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Tamminga et al. 2012[81] The Netherlands (Europe)	Qualitative study	N: 12 A: 42 (7), 18-65 G: 0 males, 12 females O: - H: Breast cancer	-	Low	Being confident was a RTW facilitator according to participants with breast cancer.
Volker et al. 2015[75] The Netherlands (Europe)	Prospective cohort study	N: 493 A: >44: 308 of 487 G: 220 males, 237 females O: - H: Long-term sick-listed	2 years	Low	Participants with high RTW self-efficacy had a shorter time to RTW compared to participants with low RTW self-efficacy (HR: 2.02 (1.50-2.73), $p < .01$) in bivariate Cox regression analysis. Higher RTW self-efficacy was not significantly associated with shorter duration until RTW (HR: 1.60 (1.12-2.28), $p = .010$) in multivariate analysis.
Waghorn et al. 2007[76] Australia (Oceania)	Prospective cohort study	N: 104 A: 19-24: 12, 25-34: 37, 35-44: 28, 45-56: 27 G: 75 males, 29 females O: - H: Schizophrenia or schizoaffective disorders	6, 12 months	Moderate	Total work self-efficacy was associated with current employment in univariate analysis ($p < .001$) and in a multivariate mixed regression model ($F = 5.84$, $p = .02$). General work skills self-efficacy ($p < .001$), job securing skills self-efficacy ($p < .05$) and career planning skills self-efficacy ($p < .01$) were also associated with current employment status in univariate analysis. Work-related social skills self-efficacy was not related to current employment in univariate analysis.
Wåhlin et al. 2012[48] Sweden (Europe)	Prospective cohort study	N: 699 A: 48 (10.7), 18-65 G: 201 males, 498 females O: - H: Musculoskeletal or mental disorders	3 months	Low	For participants with mental disorders and with musculoskeletal disorders there was no association between self-efficacy and RTW in multiple logistic regression analysis.
Waynor et al. 2016[77] United States (North-America)	Prospective cohort study	N: 105 A: 44 (10.8) G: 62 males, 43 females O: Diverse H: Serious mental illness	6 months	Moderate	Baseline self-efficacy was not a positive predictor of competitive employment at 6 months. Only the subscale work-related social skills self-efficacy (one subscale of self-efficacy) was negatively associated with current employment status ($r = -.24$, $p = .03$) in univariate analysis and was a significant predictor of obtaining employment in multivariate logistic regression analysis. Lower work-related social skills self-efficacy was a predictor of competitive employment. The subscales career planning self-efficacy, general work skills self-efficacy and job securing skills self-efficacy were not.

RTW: Return to work

Table 4. Association between person-related factor 'motivation' and work participation

First author, year Country (Continent)	Study design	Population N: Number of subjects A: Age; mean age (SD), range G: Gender O: Occupation H: Health status	Follow-up	Risk of bias	Results
Åhrberg et al. 2010[89] Sweden (Europe)	Qualitative study	N: 7 A: 30-57 G: 0 males, 7 females O: - H: Chronic pain problems	-	Moderate	Motivation was important for RTW according to women who were on long-term sick leave.
Awang et al. 2016[82] Malaysia (Asia)	Cross-sectional study	N: 9850 A: <30: 3041, 30-39: 3081, >39: 3728 G: 7776 males, 2074 females O: Diverse H: Work-related injury	-	Moderate	Participants who successful returned to formal employment were more often motivated than participants with unsuccessful RTW (p < .01) in univariate Chi-square analysis. Motivated participants were 7 times more likely to return to employment compared to those who were not motivated (B: 2.04, OR: 7.67 (5.50-10.69), p < .05) in multivariate logistic regression analysis.
Boyle et al. 2014[83] Australia (Oceania)	Cross-sectional study	Employed N: 14 A: 36.5 (12.6), 18-75 G: 11 males, 3 females O: Diverse H: Spinal cord injury or traumatic brain injury Unemployed N: 16 A: 41.8 (13.7), 18-75 G: 15 males, 1 female O: Diverse H: Spinal cord injury or traumatic brain injury	-	Low	The most commonly cited facilitator for employment was motivation.

Table 4. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Braathen et al. 2007[84] Norway (Europe)	Non-randomized experimental study	Intervention N: 183 A: <40: 44, 40-49: 68, >49: 61 G: 48 males, 135 females O: - H: Long-term sick leave Control N: 96 A: <40: 25, 40-49: 31, >49: 36 G: 24 males, 72 females O: - H: Long-term sick leave	4 months	Moderate	RTW at 4 months was predicted by improved work motivation (B = .67, OR: 1.96 (1.04-3.69), p = .04) in multivariate logistic regression analysis. Improvement of one unit of a 5-point motivation scale increased the probability of RTW by 96% .
De Vries et al. 2011[52] The Netherlands (Europe)	Qualitative study	N: 21 A: 49 (6.9), 10-60 G: 9 males, 12 females O: Diverse H: Chronic nonspecific musculoskeletal pain	-	Low	There were different important motivators for staying at work. Motivation to work may be considered to be an important prerequisite for staying at work.
Dekkers-Sánchez et al. 2010[90] The Netherlands (Europe)	Qualitative study	N: 27 A: 49, 25-63 G: 14 males, 13 females O: Blue collar, white collar H: Chronic work disability	-	Moderate	Work motivation was a promoting factor for RTW proposed by work disabled participants.
Dunn et al. 2010[78] United States (North-America)	Qualitative study	N: 23 A: 27-59 G: 11 males, 12 females O: Diverse H: Serious mental illness	-	Moderate	Having the motivation to work was important in helping participants with serious mental illness RTW and maintain their employment.

Table 4. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Elfving et al. 2009[85] Sweden (Europe)	Prospective cohort study	N: 312 A: 43, 22-63 G: 144 males, 168 females O: Diverse H: Spinal pain	6 months	Low	Self-motivation was not a significant predictor of less sickness absence after 6 months in univariate analysis (logistic regression).
Hartke et al. 2011[79] United States (North-America)	Qualitative study	N: 12 A: 51, 31-67 G: 8 males, 4 females O: Diverse H: Stroke	-	Moderate	Being motivated emerged to be an important facilitator that stroke survivors encounter in their efforts to RTW after stroke.
Lydell et al. 2011[50] Sweden (Europe)	Prospective cohort study	N: 320 A: 42 G: 130 males, 190 females O: Diverse H: Musculoskeletal disorders	1, 5, 10 years	Moderate	There were more participants in the motivation and optimism group who had returned to work 1 year after baseline as compared to the hindrance and hesitation group. However, there were no significant differences between the groups after 5 and 10 years in univariate Chi-square analysis.
Puolakka et al. 2008[86] Finland (Europe)	Prospective cohort study	N: 152 A: 39 (10) G: 86 males, 66 females O: - H: Lumbar disc herniation	2 months, 5 years	Low	More motivation to work two months after surgery was associated with less work disability days after lumbar disc herniation surgery (B: -2.88 (-3.97- -1.79), $p < .001$). However, motivation for work was not associated with permanent disability pension after lumbar disc herniation in multivariate analysis.
Saperstein et al. 2011[87] United States (North-America)	Cross-sectional study	N: 145 A: 42.76 (8.84) G: 116 males, 29 females O: - H: Schizophrenia	-	Moderate	Intrinsic motivation was correlated with total hours worked after rehabilitation ($p = .01$) and mean work behavior ratings ($p < .001$) in univariate analysis. Intrinsic motivation was significantly correlated with total hours worked after rehabilitation ($\beta = 0.31$, $p = .002$) and mean work behavior ratings at the conclusion of rehabilitation ($\beta = 0.32$, $p = .001$) in hierarchical regression analysis. Intrinsic motivation was a significant mediator of the relationship between negative symptoms and work outcomes.

Table 4. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Van Velzen et al. 2011[91] The Netherlands (Europe)	Qualitative study	N: 12 A: 52.1 (6.7), 18-60 G: 9 males, 3 females O: Diverse H: Brain injury	-	Moderate	Motivation was according to almost all participants a facilitator for RTW.
Wan Kasim et al. 2014[88] Malaysia (Asia)	Cross-sectional study	N: 126 A: 39.6 (9.2), 18-60 G: 113 males, 13 females O: Diverse H: Severe mental illness	-	Low	Being motivated to work was associated with successful employment ($p < .000$) in bivariate analysis. However, when this variable was entered into a stepwise logistic regression model to predict successful employment status, motivation was not significant.
Wilbanks and Ivankova 2015[92] United States (North-America)	Qualitative study	N: 4 A: 42-57 G: 3 males, 1 female O: Diverse H: Spinal cord injury	-	Low	Motivation was one of the four major themes that emerged as a facilitator for RTW from interviews with participants with spinal cord injury. Both extrinsic and intrinsic motivators seem to be important for rejoining the workforce.

RTW: Return to work

Table 5. Association between person-related factor 'feelings of control' and work participation

First author, year Country (Continent)	Study design	Population N: Number of subjects A: Age; mean age (SD), range G: Gender O: Occupation H: Health status	Follow-up	Risk of bias	Results
Boot et al. 2008[19] The Netherlands (Europe)	Cross-sectional study	Employed N: 345 A: 44.2 (10.2) G: 168 males, 177 females O: - H: Chronic physical disease Fully work-disabled N: 170 A: 52.4 (8.6) G: 66 males, 104 females O: - H: Chronic physical disease	-	Low	The participants in the employed group had more positively oriented illness perceptions about the personal control over their illness (p < .001) compared to those who were fully work-disabled in univariate analysis, but personal control had no effect in multivariate analysis.
Busch et al. 2007[20] Sweden (Europe)	Prospective cohort study	Sick absent N: 130 A: <45: 64, >45: 66 G: 45 males, 85 females O: - H: Chronic musculoskeletal pain Work capable N: 103 A: <45: 58, >45: 45 G: 32 males, 71 females O: - H: Chronic musculoskeletal pain	3, 7, 11, 15 months	Low	Mastery (beliefs about control over current life and future) was a significant predictor of long-term sickness absence in univariate analysis (p < .05). Low sense of self mastery (B = .73, OR: 2.08 (1.27-3.40), p = .004) was a significant predictor of long-term sickness absence during follow-up in multivariate logistic regression analysis.

Table 5. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Dionne et al. 2013[99] Canada (North-America)	Qualitative study	No RTW or recent RTW N: 10 A: 30-39: 2, 40-49: 3, 50-59: 5, >59: 0 G: 7 males, 3 females O: Manual work, service job H: Back pain RTW N: 9 A: 30-39: 1, 40-49: 4, 50-59: 3, >59: 1 G: 7 males, 2 females O: Manual work, service job H: Back pain	-	Moderate	The participants' perceptions of the control they had over their health problem played an important role in determining whether or not they returned to work. Participants in the no or recent return group considered that their return depended more on factors related to the work environment and to the healthcare system than on personal factors (extern instead of intern locus of control).
Ekberg et al. 2015[27] Sweden (Europe)	Prospective cohort study	RTW <3 months N: 195 A: 44 (11), 18-65 G: 38 males, 157 females O: 77 white collar, 89 pink collar, 29 blue collar H: Common mental disorders RTW 3-12 months N: 98 A: 44 (10), 18-65 G: 14 males, 84 females O: 47 white collar, 34 pink collar, 16 blue collar H: Common mental disorders	1 year	Low	Mastery (the extent to which individuals perceive themselves in control of forces that affect their lives) was not different between the participants who returned within 3 months and the participants who returned in 3-12 months in univariate Chi-square analysis. Mastery was not related to RTW in the 3 month sub-cohort or in the 3-12 months sub-cohort in multivariate Cox regression analysis.

Table 5. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Karoly et al. 2013[93] United States (North-America)	Cross-sectional study	On disability N: 434 A: 25-44: 122, 45-64: 260, 65-80: 52 G: 221 males, 213 females O: - H: Chronic pain Working N: 859 A: 25-44: 464, 45-64: 309, 65-80: 86 G: 481 males, 378 females O: - H: Chronic pain	-	Moderate	Participants who were working had higher scores on pain control than participants on disability ($p < .05$) in a t-test. Pain control was not a predictor of work status in multivariate logistic regression analysis.
Krause et al. 2013[94] Germany (Europe)	Cross-sectional study	Early-retired N: 39 A: 45.87 (9.57), 18-60 G: 15 males, 24 females O: - H: Multiple Sclerosis Employed N: 48 A: 34.96 (10.04), 18-60 G: 19 males, 29 females O: - H: Multiple Sclerosis	-	Moderate	Post-hoc analysis revealed that there are no significant differences between early retired participants with MS and employed participants with MS on self-reported health locus of control in univariate analysis.
Murphy et al. 2011[67] Australia (Oceania)	Prospective cohort study	N: 72 A: 35.3 (14.4) G: 58 males, 14 females O: - H: Spinal cord injury	2 years	Moderate	Internal locus of control had a positive relationship with paid employment at 2 years ($p < .05$). However internal locus of control was not significant in predicting employment status in univariate analysis. Locus of control was not a significant predictor of employment in multivariate discriminant function analysis.

Table 5. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Richard et al. 2011[69] Canada (North-America)	Prospective cohort study	N: 1007 A: 38.7 (10.6), 18-64 G: 589 males, 418 females O: - H: Back pain	2 years	Low	Participants who had a higher level of powerful others health locus of control were more likely to be found in the failure after attempt or in the failure group at 2 years in bivariate analyses ($p < .05$) in comparing to participants with a lower score. Participants with a higher level of chance health locus of control were more likely to be found in failure group at 2 years in bivariate analyses ($p < .05$) instead of participants with a lower score. There was no significant effect of internal locus of control on RTW in bivariate analysis. In multivariate analysis none of the forms of health locus of control was significant in predicting RTW.
Roesler et al. 2013[70] Australia (Oceania)	Prospective cohort study	N: 192 A: 35.1, 18-63 G: 163 males, 29 females O: Blue collar, white collar H: Hand injury	4, 12 weeks	Low	Participants who attributed recovery to external factors at 28 days were more than five times more likely to have a delayed recovery (RTW later than 12 weeks) (B = 1.70, Exp (B) = 5.11, $p = .015$) in multivariate logistic regression analysis.
Selander et al. 2007[95] Sweden (Europe)	Prospective cohort study	N: 347 A: 42 G: 187 males, 160 females O: - H: Back pain	6 months	Low	Participants with high internal locus of control had roughly 70% better chances of receiving a positive rehabilitation outcome (less sickness allowance than before) as compared to participants with low internal locus in bivariate ($p = .000$) and in multivariate analysis (OR: .73 (.59-.89), $p = .003$).
Sluiter and Frings-Dresen 2008[43] The Netherlands (Europe)	Cross-sectional study	Employed N: 745 A: 40.0 (8.3) G: 283 males,462 females O: - H: Repetitive strain injury Sick-listed N: 376 A: 42.3 (9.4) G: 83 males, 293 females O: - H: Repetitive strain injury	-	Low	Participants with repetitive strain injury who were sick listed differed from the working group in in personal control ($p < .001$) in multivariate analysis of variance. Sick-listed participants scored lower on personal control than participants in the working group which indicated that they felt they had less control over their disease.

Table 5. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Torres et al. 2009[96] Spain (Europe)	Prospective cohort study	N: 98 A: 43.6 (7.9), 21-59 G: 3 males, 95 females O: Blue collar, white collar H: Fibromyalgia	1, 3, 6, 12 months	Low	High scores on the fate scale (factor in the chance subscale) of the multidimensional health locus of control pain questionnaire predicted which participants with fibromyalgia would not be able to return after discharge (B = .102, χ^2 = 24.47, Exp (B): 1.107 (1.06-1.15), p < .001) in the full model in multivariate logistic regression and which participants remained active during at least 6 months during follow up (B = .039, χ^2 = 15.37, Exp (B): 1.039 (1.02-1.06), p < .001). However, for the last model was inadequate goodness-of-fit. Other scales of multidimensional health locus of control scale (internal, powerful professionals, luck subscales) did not have a significant effect.
Truchon et al. 2010[97] Canada (North-America)	Prospective cohort study	N: 439 A: 38 (10), 18-60 G: 261 males, 178 females O: - H: Low back pain	6, 12 months	Moderate	At 12 months, cognitive appraisal of low back pain (control of pain and fear of physical activity) was predictive of absence from work (work status), when controlling for other variables (OR: 2.57, p = .00) in multivariate logistic regression analysis, but cognitive appraisal was not predictive for work absence at 6 months. Cognitive appraisal did also predict days of absence at 6 months (β = 17.11, p < .05) and at 12 months (β = 38.72, p < .05) in multivariate analysis.
Vlasveld et al. 2013[98] The Netherlands (Europe)	Cross-sectional study	Current depressive or anxiety disorder N: 1023 A: 40.6 (11.2), 18-65 G: 363 males, 660 females O: - H: Current depressive/anxiety disorder Remitted depressive or anxiety disorder N: 402 A: 43.3 (11.1), 18-65 G: 128 males, 274 females O: - H: Remitted depressive/anxiety disorder	-	Low	In participants with psychopathology external locus of control was associated with long-term absenteeism (longer than 2 weeks) (OR: .744 (.63-.89), p = .001), but not with short-term absenteeism (shorter than 2 weeks) in multinomial logistic regression analysis.
Volker et al. 2015[75] The Netherlands (Europe)	Prospective cohort study	N: 493 A: >44: 308 of 487 G: 220 males, 237 females O: - H: Long-term sick-listed	2 years	Low	Participants who scored high on sense of mastery (more control) had a shorter time to RTW compared to participants with low sense of mastery (HR: 1.668 (1.202-2.315), p = .002) in bivariate Cox regression analysis. Sense of mastery was not significantly associated with shorter duration until RTW in multivariate analysis.

RTW: Return to work

Table 6. Association between person-related factor 'perceived health' and work participation

First author, year Country (Continent)	Study design	Population N: Number of subjects A: Age; mean age (SD), range G: Gender O: Occupation H: Health status	Follow-up	Risk of bias	Results
Audhoe et al. 2012[17] The Netherlands (Europe)	Prospective cohort study	N: 932 A: 18-34: 232, 35-44: 260, 45-65: 418 G: 398 males, 514 females O: Agency workers H: Psychological complaints	10, 18, 27 months	Low	Moderate to good perceived health instead of poor health was associated with work participation (not being sick-listed and being able to or being back to work) at 18 months (p <. 01) and with work participation at 27 months (p < .01) in univariate analysis. Moderate to good perceived health (OR: 4.2 (2.43-7.20), p < .01) at 10 months was a prognostic factor for work participation at 18 months in multiple logistic analysis. Perceived health at 18 months was not a prognostic factor for work participation at 27 months in multiple logistic analysis.
Boot et al. 2014[101] Canada (North-America)	Prospective cohort study	No comorbidity N: 1382 A: 38.4 (10.9) G: 700 males, 682 females O: Diverse H: Musculoskeletal injuries Comorbidity N: 183 A: 43.0 (11.7) G: 94 males, 89 females O: Diverse H: Musculoskeletal injuries and somatic comorbidity	1 year	Low	A better general health was a significant predictor of RTW after 12 months for participants with and without comorbidity (OR: 1.77 (1.21-2.58)) in univariate logistic regression analysis.

Table 6. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Boot et al. 2011[100] The Netherlands (Europe)	Cross-sectional study	N: 7748 A: 43 (12), 15-65 G: 3968 males, 3780 females O: - H: Chronic illness	-	Moderate	Lower perceived health status was associated with more sick leave in each chronic illness group (B > 0 ; p < .05) in multivariate analysis. Limitations at work, work characteristics and work adjustments partially explained the association between perceived health and sick leave.
Chen et al. 2012[102] Taiwan (Asia)	Cross-sectional study	N: 120 A: 35.7, 16-23: 18, 25-45: 78, 46-60: 24 G: 92 males, 28 females O: - H: Work-related hand injury	-	Low	Self-perceived general health was not associated with time of work in multivariate stepwise regression analysis.
Dawson et al. 2011[103] Australia and New Zealand (Oceania)	Cross-sectional study	No sick leave N: 1678 A: 45.2 (37.0-51.1), 18-65 G: 126 males, 1552 females O: Nursing or midwives H: Low back pain Sick leave N: 486 A: 43.9 (35.2-51.0), 18-65 G: 47 males, 439 females O: Nursing or midwives H: Low back pain	-	Moderate	General physical health was better for participants who were not on sick leave than for participants who were on sick leave in bivariate analyses (OR: .94 (.93-.96), p < .001).

Table 6. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
De Vries et al. 2012b[59] The Netherlands (Europe)	Cross-sectional study	Staying at work N: 119 A: 51, 20-60 G: 48 males, 71 females O: - H: Chronic nonspecific musculoskeletal pain Sick leave and referred for rehabilitation N: 122 A: 39, 20-60 G: 56 males, 66 females O: - H: Chronic nonspecific musculoskeletal pain	-	Low	General health perception was not significantly different between participants who were staying at work and who were sick-listed in univariate analysis.
Dionne et al. 2007[60] Canada (North-America)	Prospective cohort study	N: 1007 A: 38.7 (10.6), 18-64 G: 589 males, 418 females O: - H: Back pain	6 weeks, 12 weeks, 1 year, 2 years	Low	Fair or poor self-reported health status instead of excellent or very good health status was associated with failure in RTW in good health for men (OR: 8.20 (1.14–58.75), $p < .05$) and with partial success in RTW for men (OR: 3.08 (1.01–9.42), $p < .05$) but not with failure after attempts in multivariate analysis. The influence of general health on RTW for women was not studied.
Dyster-Aas et al. 2007[104] Sweden (Europe)	Cross-sectional study	N: 48 A: 44.4 (10.2), 23-64 G: 37 males, 11 females O: - H: Burn injury	-	Low	Participants who returned to work scored higher on general health than participants who did not RTW ($z = 2.9$, $p < .01$) in a univariate Mann-Whitney U test.

Table 6. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Ekberg et al. 2015[27] Sweden (Europe)	Prospective cohort study	RTW <3 months N: 195 A: 44 (11), 18-65 G: 38 males, 157 females O: 77 white collar, 89 pink collar, 29 blue collar H: Common mental disorders RTW 3-12 months N: 98 A: 44 (10), 18-65 G: 14 males, 84 females O: 47 white collar, 34 pink collar, 16 blue collar H: Common mental disorders	1 year	Low	Participants who returned to work within 3 months had a higher self-rated health than participants who returned to work at 3-12 months (p = .005) in univariate Chi-square analysis. Self-rated health remained associated with RTW when looking at the health, function and work ability factors in the sub-cohort of participants returning within 3-12 months in multivariate Cox regression analysis, but not in the sub-cohort for participants who returned to work within 3 months. Significant variables from multiple Cox regression within each block of predictors (health, function and work ability, personal resources and work conditions) were included in the full model. Self-rated health was not associated with early RTW in the final model in multivariate Cox regression analysis.
Elfving et al. 2009[85] Sweden (Europe)	Prospective cohort study	N: 312 A: 43, 22-63 G: 144 males, 168 females O: Diverse H: Spinal pain	6 months	Low	General health was not a significant predictor of less sickness absence after 6 months in univariate logistic regression analysis.
Grøvle et al. 2013[105] Norway (Europe)	Prospective cohort study	Analysis RTW at 2 years N: 237 A: 43.2 (9.2), >18 G: 136 males, 101 females O: - H: Sciatica Analysis time to sustained RTW N: 125 A: 42.1 (10.4), >18 G: 68 males, 57 females O: - H: Sciatica	2 years	Low	General health was associated with RTW at 2 years (p = .00) and time to sustained RTW (p = .01) in univariate analyses. General health was significantly associated with a higher chance of RTW at the 2-year follow-up in multivariate analysis (OR: 1.03 (1.01-1.05), p < .01), but not with time to sustained RTW.

Table 6. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Hansen et al. 2009[106] Denmark (Europe)	Prospective cohort study	N: 75 A: 46 (10.1) G: 22 males, 53 females O: - H: Endoscopic carpal tunnel release	3 months	Moderate	Self-reported health status was not a significant predictor of sick leave of more than 21 days in univariate logistic regression or multiple logistic regression.
He et al. 2010[107] China (Asia)	Retrospective cohort study	N: 323 A: 37.8 (8.7), <60 G: 259 males, 64 females O: Workers in a state-owned locomotive vehicles company H: Occupational injury	7 months	Low	Participants with bad self-perceived health status instead of good perceived health status got less chance of successfully RTW in univariate (p < .01) and in multivariate Cox regression analysis (B: .32, HR: .35 (.18-.65), p < .001). Participants with better self-report health status took shorter sick leave (p < .01) in univariate analysis.
Iakova et al. 2012[31] Switzerland (Europe)	Prospective cohort study	N: 411 A: 43.3 (10.3), <60 G: 336 males, 75 females O: - H: Orthopedic trauma	2 years	Moderate	General health at admission (p < .001), improvement in general health during stay (p = .02), and physical health (p = .002) were significant for predicting RTW at 2 years in univariate analysis, but not in the complete model in multivariate regression analysis. However, backward selection created a minimal model with a minimal amount of predictors to predict RTW and in this model improvement of general health (OR: 1.16 (1.04-1.28)) was a significant predictor of RTW.
Jensen et al. 2013[32] Denmark (Europe)	Prospective cohort study	N: 325 A: 41.7 (10.4), 18-60 G: 159 males, 166 females O: - H: Low back pain	1 year	Low	Perceiving general health as bad (OR: 3.25 (1.53-6.89), p = .002) instead of very good, good or not so good, predicted unsuccessful RTW at after one year in univariate analysis, but did not contribute in the final model in multivariate analysis.
Lindell et al. 2010[34] Sweden (Europe)	Prospective cohort study	Rehabilitation group N: 63 A: 42.2 (2.4), <60 G: 30 males, 33 females O: 87% blue collar H: non-acute non-specific spinal pain Primary-care group N: 62 A: 43.0 (2.6), <60 G: 27 males, 35 females O: 87% blue collar H: non-acute non-specific spinal pain	6, 12, 18, 24 months	Low	State of health was positively associated with stable RTW at 6 (p = .02) and 18 months (p = .01) in univariate analysis, but was not a significant predictor in the multiple logistic regression.

Table 6. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Morrison et al. 2016[108] Unites States (North-America)	Prospective cohort study	Employed full-time N: 219 A: 54.2 (11.6), 18-75 G: 132 males, 87 females O: - H: Cancer and hematopoietic stem cell transplantation Underemployed because of health N: 188 A: 53.3 (12.4), 18-75 G: 124 males, 64 females O: - H: Cancer and hematopoietic stem cell transplantation Underemployed not because of health N: 77 A: 56.5 (12.3), 19-74 G: 40 males, 37 females O: - H: Cancer and hematopoietic stem cell transplantation	1 year	Moderate	There was a significant association between 1 year employment and current perceived health (χ^2 = 91.24, p < .001) in Chi-square analysis. Full-time employed participants reported their health as very good or good, those who were unemployed reported their health as good, fair or poor in univariate analysis.
Murgatroyd et al. 2016[36] Australia (Oceania)	Prospective cohort study	N: 334 A: 36 (13.9), >18 G: 267 males, 67 females O: Diverse H: Upper and/or lower extremity fractures	6, 12, 24 months	Moderate	Self-assessed pre injury health status (p = .03) was associated with RTW in univariate analysis. Having fair to poor self-assessed pre-injury health status instead of having excellent health status was associated with longer time to RTW (HR: .36 (.14-.91), p < .05) in the Cox model in multivariate Cox regression analysis.
Nielsen et al. 2012[109] Denmark (Europe)	Prospective cohort study	N: 205 A: 40.1 (10.1) G: 42 males, 163 females O: Private, governmental and municipal sector H: Mental health problems	Max 52 weeks	Low	Self-rated health predicted a shorter time to RTW in univariate analysis (p < .05) and in multivariate analysis (HR: 1.18 (1.03-1.34), p < .05) with Cox regression modeling.

Table 6. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Ramel et al. 2013[110] Sweden (Europe)	Prospective cohort study	RTW N: 27 A: 38 (14.2), 19-64 G: 22 males, 5 females O: - H: Hand injury No RTW N: 13 A: 42 (12.2), 19-64 G: 10 males, 3 females O: - H: Hand injury	3, 12 months	Low	Participants who did not RTW after 3 months had a lower health status at 12 months than participants who did RTW (p = .039). Participants who did not RTW after 12 months had a lower self-reported health status at 12 months than participants who did RTW (p = .023) in univariate logistic regression analysis.
Richter et al. 2011[40] The Netherlands (Europe)	Prospective cohort study	N: 276 A: 45 (7) G: 256 males, 20 females O: Self-employed H: Musculoskeletal symptoms	1 year	Low	General health was not a prognostic factor for claim duration in univariate or multivariate analysis.
Sampere et al. 2012[42] Spain (Europe)	Prospective cohort study	N: 663 A: 39.8 (11.4) G: 364 males, 299 females O: - H: Musculoskeletal disorder, mental disorders or other physical conditions	2 years	Low	General health status was associated with time to RTW in bivariate analysis (p < .05). Poor perceived health status (HR: .71 (.59-.85)) instead of a good perceived health status was associated with a longer time to RTW in the full model among the total study population in multivariate analysis. Perceived poor health status was only significantly related to longer non-work related episodes in women (HR: .63 (.42-.95)) but not for men, when comparing men with women. Perceived health status was not related to longer time till RTW for workers on sick leave for mental disorders in multivariate analysis, but was related for participants with musculoskeletal disorders (HR: .52 (.39-.71)) and for participants with other physical conditions (HR: .72 (.52-.99)).

Table 6. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Sivertsen et al. 2013[111] Norway (Europe)	Cross-sectional study	Work group N: 2161 A: 51.29 (9.68), 20-69 G: 1067 males, 1094 females O: - H: Musculoskeletal pain Sick leave group N: 4511 A: 49.9 (9.95), 20-69 G: 1576 males, 2935 females O: - H: Musculoskeletal pain	-	Low	The work group and sick leave group differed in self-rated health status (higher for work group) (p = .001) in univariate analysis. Self-rated health was a significant predictor of work status (B = .51, Exp (B) = 1.66 (1.49-1.84), p = .0001) in multivariate logistic regression analysis. When self-rated health raised with one unit, the odds for being in the work group increased by 66%.
Vuistiner et al. 2015[47] Switzerland (Europe)	Prospective cohort study	N: 1090 A: 42.9 (11.3), <62 G: 890 males, 200 females O: - H: Orthopaedic trauma	4 years	Low	The probability of being declared fit for work was higher in participants with better perceived general health at hospitalization in univariate and multivariate Cox regression analysis (HR: 1.16 (1.13-1.19)).

RTW: Return to work

Table 7. Association between person-related factor 'coping strategies' and work participation

First author, year Country (Continent)	Study design	Population N: Number of subjects A: Age; mean age (SD), range G: Gender O: Occupation H: Health status	Follow-up	Risk of bias	Results
Arwert et al. 2017[112] The Netherlands (Europe)	Cross-sectional study	RTW N: 18 A: 48.5 (9.5), 20-90 (18-65 during hospitalization) G: 10 males, 8 females O: - H: Stroke Non-RTW N: 28 A: 47.1 (9.9), 20-90 (18-65 during hospitalization) G: 19 males, 9 females O: - H: Stroke	2-5 years	Low	Participants who returned to work scored lower on avoidance coping than participants who did not RTW in univariate (p < .05) and multivariate analysis (OR: .20 (.05-.78), p < .05). There were no significant differences in other types of coping (active coping and seeking support) in univariate and multivariate logistic regression analysis.
Becker et al. 2007[119] United States (North-America)	Qualitative study	N: 38 A: 49.2 (7.0) G: 22 males, 17 females O: Diverse H: Severe mental illness	-	Moderate	Appropriate skills for coping with psychiatric problems appeared to play an important role in finding and maintaining work for participants with severe mental illness.

Table 7. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Dawson et al. 2011[103] Australia and New Zealand (Oceania)	Cross-sectional study	No sick leave N:1678 A: 45.2 (37.0-51.1), 18-65 G: 126 males, 1552 females O: Nursing or midwives H: Low back pain Sick leave N: 486 A: 43.9 (35.2-51.0), 18-65 G: 47 males, 439 females O: Nursing or midwives H: Low back pain	-	Moderate	Participants on sick leave showed more passive coping (p < .001) than participants who were not on sick leave in univariate analysis. There was no difference in active coping in univariate analysis. Passive coping increased the likelihood of low back pain sick leave in the preceding 12 months (OR: 1.07 (1.04-1.12), p < .001) in multivariate analysis.
De Vries et al. 2011[52] The Netherlands (Europe)	Qualitative study	N: 21 A: 49 (6.9), 10-60 G: 9 males, 12 females O: Diverse H: Chronic nonspecific musculoskeletal pain	-	Low	Coping with pain was according to participants an important factor for staying at work.
De Vries et al. 2012b[59] The Netherlands (Europe)	Cross-sectional study	Staying at work N: 119 A: 51, 20-60 G: 48 males, 71 females O: - H: Chronic nonspecific musculoskeletal pain Sick leave and referred for rehabilitation N: 122 A: 39, 20-60 G: 56 males, 66 females O: - H: Chronic nonspecific musculoskeletal pain	-	Low	Active coping (higher for stay at work group) an passive coping (higher in sick leave group) were associated with work status in univariate analysis (p = .001), but not in multivariate logistic regression analysis. The coping form expression of emotions was higher in the staying at work group (p = .049) in univariate analysis and coping self-statements was higher in the staying at work group (p = .042) in univariate analysis. However, these two forms of coping were not associated with work status in multivariate logistic regression analysis. Other forms of coping (palliative reaction, social support) were not associated in univariate and multivariate logistic regression analysis.

Table 7. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Dekkers-Sánchez et al. 2010[90] The Netherlands (Europe)	Qualitative study	N: 27 A: 49, 25-63 G: 14 males, 13 females O: Blue collar, white collar H: Chronic work disability	-	Moderate	Poor coping style was according to disabled participants a perpetuating factor for long-term sick leave. Coping was also a promoting factor for RTW proposed by work disabled participants.
Grytten et al. 2017[113] Norway (Europe)	Prospective cohort study	Employed N: 41 A: 32.29 (7.90) G: 19 males, 22 females O: Diverse H: Multiple sclerosis Unemployed N: 52 A: 34.59 (10.14) G: 10 males, 42 females O: Diverse H: Multiple sclerosis	13 years	Low	Unemployed and employed participants did not differ in coping style at baseline (planning, restraint coping, seeking social support for instrumental reasons, seeking social support for emotional reasons, positive reinterpretation and growth, focus on and venting of emotions, denial, behavioral disengagement, mental disengagement). Only the coping styles focus on and venting of emotions and denial were associated with time to awarding disability in univariate analysis (p = .05). For participants who were employed at baseline the coping strategy of denial was associated with shorter time to awarding disability pension (or a shorter time to unemployment) in multivariate analysis (HR: 1.59, 1.08-2.32, p = .02). Other coping styles were not significantly associated with time to awarding disability in multivariate analysis.
Hartke et al. 2011[79] United States (North-America)	Qualitative study	N: 12 A: 51, 31-67 G: 8 males, 4 females O: Diverse H: Stroke	-	Moderate	Positive coping strategies was a category that emerged to be an important facilitator that stroke survivors encounter in their efforts to RTW after stroke.
Heymans et al. 2009[114] The Netherlands (Europe)	Prospective cohort study	N: 628 A: 40.6 (9.5), 18-65 G: 446 males, 182 females O: Blue collar, white collar workers H: Low back pain	1 year	Low	Pain coping was not associated with work absence in multivariate Cox regression analysis.

Table 7. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Huijs et al. 2012[62] The Netherlands (Europe)	Prospective cohort study	N: 682 A: 46.6 (9.25) G: 284 males, 389 females O: - H: Physical problems, mental problems or a combination of physical and mental problems	2 years	Low	A lower level of active problem solving coping was associated with a longer duration until full RTW for the group with physical problems and the group with mental problems (p < .05), but not for the group with both physical and mental problems in univariate analysis. However, multivariate analysis showed that the lower level of active problem solving coping was only a predictor of a longer duration until RTW in participants with both physical and mental problems (HR: 1.58 (1.04-2.41), p = .03). More avoidance coping was a significant predictor of longer duration until full RTW in univariate analysis for participants with physical problems, but not for participants with mental problems or with both physical and mental problems. Avoidance coping was not a significant predictor in multivariate analysis in all three groups.
Iakova et al. 2012[31] Switzerland (Europe)	Prospective cohort study	N: 411 A: 43.3 (10.3), <60 G: 336 males,75 females O: - H: Orthopedic trauma	2 years	Moderate	Participants who used more avoidance of situations that are reminders of the accident had lower chances of RTW in univariate analysis (p = .01) and in the complete model (OR: .69 (.61-.79), p < .001) in multivariate analysis.
Karoly et al. 2013[93] United States (North-America)	Cross-sectional study	On disability N: 434 A: 25-44: 122, 45-64: 260, 65-80: 52 G: 221 males, 213 females O: - H: Chronic pain Working N: 859 A:25-44: 464, 45-64: 309, 65-80: 86 G: 481 males, 378 females O: - H: Chronic pain	-	Moderate	Participants who were working had higher scores on ignoring, task persistence and positive self-talk than participants who were not working in univariate analysis. Participants on disability had higher scores on guarding in a t-test. Task persistence was also associated with work status in multivariate analysis (b = .014, eb: 1.15 (1.11-1.19), p < .001).

Table 7. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Luk et al. 2010[115] Hong Kong (Asia)	Prospective cohort study	Returned to work N: 28 A: 37 (9), 20-56 G: 57 males, 8 females O: - H: Chronic low back pain Not returned to work N: 26 A: 42 (8), 20-56 G: 22 males, 4 females O:- H: Chronic low back pain	7, 14 weeks, 6 months	Low	The pain control (ability to cope with pain) ratings did not significantly differ between participants who returned to work and participants who did not RTW in a t-test.
Lundqvist and Samuelsson 2012[54] Sweden (Europe)	Qualitative study	N: 14 A: 51 (8.1), 37-63 G: 8 males, 6 females O: - H: Brain injury	-	Moderate	Coping (gaining awareness and develop coping strategies) was important for progressing in rehabilitation and RTW according to participants after acquiring brain injury.
Norlund et al. 2011[116] Sweden (Europe)	Prospective cohort study	N: 117 A: 24-55 G: 35 males, 82 females O: - H: Burnout	1 year, 2 years	Low	Using covert coping towards supervisors or workmates was not associated with changes in sick leave in univariate analysis. However, using covert coping (choosing avoidance behavior when experiencing a conflict) towards supervisors (OR: 2.78 (1.17-6.62), $p < .05$) and workmates (OR: 2.58 (1.05-6.34), $p < .05$) was associated with unchanged sick leave, when adjusting for background characteristics in multivariate analysis. Participants who showed less covert coping, had less sick leave at follow-up in comparing to the days of sick leave at baseline in logistic regression analyses.
Øyeflaten et al. 2008[51] Norway (Europe)	Prospective cohort study	N: 135 A: 45 (8.4), 24-61 G: 48 males, 87 females O: Diverse H: Musculoskeletal complaints	3, 12 months	Low	The chances of RTW were higher with high scores on instrumental mastery-oriented coping than with low scores of coping at 3 months (OR: .3 (.10-.74), $p = .01$) and 12 months (OR: 5.9 (1.63-21.41), $p = .007$) in univariate and multivariate analysis. However other forms of coping (emotion-focused coping, hopelessness and coping expectancy) did not predict RTW in univariate or multivariate logistic regression analysis.

Table 7. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Øyeflaten et al. 2016[117] Norway (Europe)	Prospective cohort study	N: 1155 A: 46 (9.1) G: 349 males, 806 females O: - H: Long-term sick leave	3 years and 4 months	Moderate	Poor coping ability (r = .13, p <.001) was positively associated with days on sickness benefits after work rehabilitation in univariate analysis. Poor coping ability did not have a direct or an indirect effect on days on sickness benefits after work rehabilitation in multivariate analysis with structural equation modeling.
Strober and Arnett 2016[118] United States (North-America)	Cross-sectional study	Unemployed N: 27 A: 51.74 (8.31) G: 0 males, 27 females O: - H: Multiple sclerosis Employed N: 41 A: 46.07 (8.93) G: 0 males, 41 females O: - H: Multiple sclerosis	-	Moderate	Participants who left the workforce were more likely to endorse maladaptive coping behaviors like behavioral disengagement (F = 4.30, p = .042) and substance use (F = 6.04, p = .017) than participants who continued to work in multivariate analysis of covariance. There were no differences in the other 13 coping subscales.
Tamminga et al. 2012[81] The Netherlands (Europe)	Qualitative study	N: 12 A: 42 (7), 18-65 G: 0 males, 12 females O: - H: Breast cancer	-	Low	The implementation of copings strategies to deal with cancer and work was a facilitator for RTW according to participants with breast cancer.
Truchon et al. 2010[97] Canada (North-America)	Prospective cohort study	N: 439 A: 38 (10), 18-60 G: 261 males, 178 females O: - H: Low back pain	6, 12 months	Moderate	Avoidance coping did not predict employment status or days of absence in multivariate linear regression analysis.

RTW: Return to work

Table 8. Association between person-related factor 'fear-avoidance beliefs' and work participation

First author, year Country (Continent)	Study design	Population N: Number of subjects A: Age; mean age (SD), range G: Gender O: Occupation H: Health status	Follow-up	Risk of bias	Results
Besen et al. 2015[18] United States (North-America)	Prospective cohort study	N: 241 participants A: 38 (11.4), 18-63 G: 130 males, 111 females O: 76% blue collar H: Low back pain	1 week, 3 months	Moderate	Fear-avoidance beliefs were positively related to days of absence ($r = .21$, $p < .001$) and negatively with work status ($r = -.27$, $p < .001$) in univariate analysis (correlations). In multivariate analysis fear-avoidance beliefs were only indirectly associated to days of absence and work status.
Carriere et al. 2015a[21] Canada (North-America)	Prospective cohort study	N: 154 A: 36.4 (9.2), 20-60 G: 81 males, 73 females O: Diverse H: Whiplash associated disorders	1 year	Low	Participants who returned to work scored lower on fear-avoidance beliefs for movement than participants who did not RTW ($t = 3.38$, $p < .001$) in univariate analysis. Lower scores on fear-avoidance beliefs for movement ($\beta = -.30$, $t(254) = -1.26$, $p = .21$) were not associated with successful RTW when controlling for RTW expectations. Expectations mediated the relation between fear-avoidance beliefs for movement and RTW status in multivariate regression analysis.
Coggon et al. 2013[24] Diverse (Europe, South- North-America, South-America, Africa, Asia, Oceania)	Cross-sectional study	N: 12416 A: 20-29: 3058, 30-39: 3971, 40-49: 3451, 50-59: 1936 G: 4348 males, 8068 females O: Diverse H: Musculoskeletal illness	-	Moderate	Fear-avoidance for physical activity was a significant predictor of prolonged sickness in the full model (PRR: .68 (.53-.85)) in multivariate Poisson regression analysis.

Table 8. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Dawson et al. 2011[103] Australia and New Zealand (Oceania)	Cross-sectional study	No sick leave N: 1678 A: 45.2 (37.0-51.1), 18-65 G: 126 males, 1552 females O: Nursing or midwives H: Low back pain Sick leave N: 486 A: 43.9 (35.2-51.0), 18-65 G: 47 males, 439 females O: Nursing or midwives H: Low back pain	-	Moderate	Participants on sick leave had more fear-avoidance beliefs for movement (p < .001) than participants who were not on sick leave in bivariate analysis. Fear of movement was associated with sick leave in multivariate analyses for women (OR: 1.05 (1.02-1.08), p = .001) and for men (OR: 1.17 (1.05-1.29), p = .004).
De Vries et al. 2012b[59] The Netherlands (Europe)	Cross-sectional study	Staying at work N: 119 A: 51, 20-60 G: 48 males, 71 females O: - H: Chronic nonspecific musculoskeletal pain Sick leave and referred for rehabilitation N: 122 A: 39, 20-60 G: 56 males, 66 females O: - H: Chronic nonspecific musculoskeletal pain	-	Low	Fear-avoidance for movement (higher in sick leave group) was negatively associated with work status in univariate analysis (p = .001). Participants who were on sick leave scored higher on fear-avoidance beliefs for movement than participants who stayed at work (B = -.06, OR: .94 (.90-.99), p = .028) in multivariate logistic regression analysis. However, fear-avoidance beliefs for movement was not one of the factors which best discriminated participants within the sick leave group and the staying at work group in backwards stepwise logistic regression analysis.
Dionne et al. 2007[60] Canada (North-America)	Prospective cohort study	N: 1007 A: 38.7 (10.6), 18-64 G: 589 males, 418 females O: - H: Back pain	6 weeks, 12 weeks, 1 year, 2 years	Low	Fear-avoidance beliefs towards work were associated with failure in RTW in good health for women (OR: 3.01 (1.14–7.91), p <. 05) and for men (OR: 4.08 (1.76–9.44), p < .05) in multivariate analysis. Fear-avoidance beliefs for work were not associated with partial success of RTW or failure after attempt to RTW. Fear-avoidance beliefs for activity were associated with partial success of RTW (OR: 1.36 (1.07-1.75), with failure after attempt (OR: 1.94 (1.27-2.95)) and with failure to RTW (OR: 1.98 (1.01-3.89)) for women.

Table 8. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Du Bois et al. 2009[26] Belgium (Europe)	Prospective cohort study	N: 346 A: 41 G: 183 males, 163 females O: 74% blue collar H: Low back pain	6 months	Low	Fear-avoidance beliefs for work, fear-avoidance beliefs for activity and fear-avoidance beliefs for movement were associated with sick leave for longer than 3 months (p < .01) in univariate analysis. Only the item "It is not advisable to be physically active" for measuring fear-avoidance beliefs for movement was significantly associated with no RTW in multivariate analysis (OR: 1.39 (1.10-1.76)).
Dyster-Aas et al. 2007[104] Sweden (Europe)	Cross-sectional study	N: 48 A: 44.4 (10.2), 23-64 G: 37 males, 11 females O: - H: Burn injury	-	Low	The participants who returned to work expressed less fear-avoidance beliefs (z = 3.2, p < .01) than those who were not working in a univariate Mann-Whitney U test.
Elfving et al. 2009[85] Sweden (Europe)	Prospective cohort study	N: 312 A: 43, 22-63 G: 144 males, 168 females O: Diverse H: Spinal pain	6 months	Low	Fear-avoidance beliefs for movement were not a significant predictor of less sickness absence after 6 months in univariate logistic regression analysis.
Grøvle et al. 2013[105] Norway (Europe)	Prospective cohort study	Analysis RTW at 2 years N: 237 A: 43.2 (9.2), >18 G: 136 males, 101 females O: - H: Sciatica Analysis time to sustained RTW N: 125 A: 42.1 (10.4), >18 G: 68 males, 57 females O: - H: Sciatica	2 years	Low	Fear-avoidance beliefs for work were associated with RTW at 2 years (p = .00) and time to sustained RTW (p = .01) in univariate analyses. Less fear-avoidance for work was significantly associated with a higher probability of RTW at the 2-year follow-up (OR: .93, (.90-.97), p = .00) and more fear-avoidance for work was associated with a longer time to sustained RTW (OR: .97 (.95-.99), p = .00) in multivariate analysis. Fear-avoidance beliefs for movement were associated with RTW at 2 years (p = .00), but not with time to sustained RTW in univariate analyses.
Heymans et al. 2009[114] The Netherlands (Europe)	Prospective cohort study	N: 628 A: 40.6 (9.5), 18-65 G: 446 males, 182 females O: Blue collar, white collar H: Low back pain	1 year	Low	A higher score for fear-avoidance beliefs was associated with a higher risk for not returning to work at 6 months in multivariate Cox regression analysis (B: -.02, HR: .98 (.97-1.00)). However, the effect was small. Fear-avoidance beliefs for movement were not associated with work absence in multivariate analysis (Cox regression).

Table 8. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Heymans et al. 2007[120] Australia (Oceania)	Retrospective cohort study	N: 194 A: 41.8 (9.9), 18-65 G: 65 males, 129 females O: - H: Low back pain	6 months	Low	Less fear-avoidance beliefs were predictive for being returned to work at 6 months (OR: .95 (.91-.99)) in multivariate logistic regression analysis.
Jensen et al. 2013[32] Denmark (Europe)	Prospective cohort study	N: 325 A: 41.7 (10.4), 18-60 G: 159 males, 166 females O: - H: Low back pain	1 year	Low	Fear-avoidance was associated with unsuccessful RTW (OR: 1.62 (1.27-2.06), $p < .001$) in univariate analysis, but did not contribute in the final model in multivariate analysis.
Karels et al. 2010[121] The Netherlands (Europe)	Prospective cohort study	N: 483 A: 41.5 (10.4) G: 161 males, 322 females O: Diverse H: Arm, neck and shoulder complaints	3, 6 months	Moderate	High fear-avoidance beliefs for movement were associated with the occurrence of sickness absence in univariate analysis (OR: 2.1 (1.3-3.4), $p < .05$), but not in multivariate analysis because it was correlated with other factors as somatization and catastrophizing.
Kovacs et al. 2007[122] Spain (Europe)	Prospective cohort study	No sick leave N: 77 A: 47 G: 31 males, 46 females O: - H: Low back pain Short/medium sick leave N: 46 A: 46 G: 21 males, 25 females O: - H: Low back pain Long sick leave N: 42 A: 45 G: 24 males, 18 females O: - H: Low back pain	1 year	Low	Scores on fear-avoidance for work, fear-avoidance for physical activity and total fear-avoidance were significantly lower for participants with no sick leave in comparing to participants with sick leave ($p = .000$) in univariate analysis. More total fear-avoidance beliefs increased the odds of being on sick leave for up to 60 days (OR: 1.02 (1.01-1.04), $p = .011$) and the odds of being sick listed for 61 to 365 days (OR: 1.08 (1.05-1.11), $p = .000$). When the subscales were used instead of the total fear-avoidance beliefs scale, only fear-avoidance for work was significant for predicting sick leave for up to 60 days (OR: 1.04 (1.01-1.08), $p = .022$) and sick leave for up to 61-365 days (OR: 1.11 (1.06-1.16), $p = .000$), but not fear-avoidance beliefs for physical activity. Each additional point in the fear-avoidance for work score increased the odds of being on sick leave for up to 60 days by 4.2% and the odds of being sick listed for 61 to 365 days by 11.0% in a multivariate ordinal logistic regression model.

Table 8. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Magnussen et al. 2007b[35] Norway (Europe)	Randomized controlled trial	Intervention N: 45 A: 49.1 (6.4), 36-56 G: 19 males, 26 females O: - H: Back pain Control N: 44 A: 49 (4.5), 36-56 G: 14 males, 30 females O: - H: Back pain	1 year	Moderate	There was no significant difference in fear-avoidance beliefs for work and fear-avoidance beliefs for activity between participants who had entered a RTW process (being on educational course or being in work training) and who had not entered a RTW process in univariate analysis. However, when adjusting for age and gender, the odds ratio for fear-avoidance for work was significant (OR = 10.6 (1.5-78.1), $p < .05$) in multivariate analysis, in the way that disability pensioners with a lower score on fear-avoidance were more likely to have entered a RTW process at 1-year follow-up.
Mannion et al. 2009[123] Switzerland (Europe)	Cross-sectional study	N: 670 A: 44.5 (10.2) G: 362 males, 308 females O: - H: Low back pain	-	Moderate	Fear-avoidance beliefs for work and activity were higher for participants with work absence, than for participants without work absence ($p = .0001$) in univariate analysis with Spearman rank correlation coefficients. Fear-avoidance for work was a significant predictor of days of work absence (β = .15, $p = .001$) in hierarchical multiple regression analysis, but fear-avoidance for activity was not. Fear-avoidance beliefs for work and activity were also significantly different between participants with reductions in productivity and participants without reductions in productivity ($p = .0001$) in univariate analysis. Fear-avoidance for work was a significant predictor of reduced productivity at work due to low back pain (β = .26, $p = .0001$) in multivariate analysis, but fear-avoidance for activity was not.

Table 8. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Morris and Watson 2011[124] Jersey (Europe)	Cross-sectional study	Sick-listed N: 62 A: 45.19 (10.41), >18 G: 40 males, 22 females O: Private sector: 45, public: sector: 17 H: Low back pain Non-sick-listed N: 57 A: 46.04 (11.98), >18 G: 29 males, 28 females O: Private sector: 45, public sector: 11 H: Low back pain	-	Low	Sick-listed participants recorded higher scores on the fear-avoidance for work measure (p < .000) than non- sick-listed participants in univariate analysis. There was no difference for fear-avoidance beliefs for activity. Logistic regression analysis revealed that fear-avoidance for work was a significant predictor of being sick-listed (B = .07, Exp (B) = 1.08 (1.02-1.13), p = .004) in multivariate analysis.
Opsahl et al. 2016[38] Norway (Europe)	Prospective cohort study	N: 574 A: 44.3 (9.7), 20-60 G: 285 males, 289 females O: - H: Low back pain	1 year	Low	Low fear-avoidance beliefs for work were associated with more chance to RTW at 12 months for men and women in bivariate analysis in comparing to high scores of fear-avoidance beliefs (p < .05). Having moderate fear-avoidance beliefs for work instead of low fear-avoidance beliefs was associated with more chance to RTW at 12 months for women (p < .05), but not for men in bivariate analysis.
Øyeflaten et al. 2008[51] Norway (Europe)	Prospective cohort study	N: 135 A: 45 (8.4), 24-61 G: 48 males, 87 females O: Diverse H: Musculoskeletal complaints	3, 12 months	Low	Fear-avoidance for work was the most important risk factor for not returning to work at 3 months (OR: 3.8 (1.30-11.32), p = .02) and 12 months (OR: 9.5 (2.40-37.53), p = .001) in univariate and multivariate analysis, but fear-avoidance for activity was not a risk factor.
Øyeflaten et al. 2016[117] Norway (Europe)	Prospective cohort study	N: 1155 A: 46 (9.1) G: 349 males, 806 females O: - H: Long-term sick leave	3 years and 4 months	Moderate	More fear-avoidance beliefs (r = .38, p <.001) were positively associated with days on sickness benefits after work rehabilitation (p <.001) in univariate analysis. Fear-avoidance beliefs for work were directly associated with days on sickness benefits after work rehabilitation (β = .27, p < .001) in the full structural model in multivariate analysis with structural equation modeling. Fear-avoidance beliefs for activity were not associated with RTW in univariate analysis.
Poulain et al. 2010[125] France (Europe)	Prospective cohort study	N: 105 A: 32.9 (9.8) G: 45 males, 60 females O: Diverse H: Chronic low-back pain	1, 6, 12 months, 3.5 years	Low	Participants who returned to work had less fear-avoidance beliefs for work (p = .01) and less global fear-avoidance beliefs (p = .05) than participants who had not returned to work in univariate analysis. Fear-avoidance beliefs for activity did not differ between the two groups. However, no form of fear-avoidance beliefs was an independent factor associated with RTW in a multivariate analysis.

Table 8. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Richter et al. 2011[40] The Netherlands (Europe)	Prospective cohort study	N: 276 A: 45 (7) G: 256 males, 20 females O: Self-employed H: Musculoskeletal symptoms	1 year	Low	Fear-avoidance beliefs for movement were associated with a longer period of claim duration in univariate analysis (p = .03), but not in multivariate Cox regression analysis.
Spector et al. 2012[44] United States (North-America)	Prospective cohort study	N: 670 A: 44.9 (9.6), >18 G: 255 males, 415 females O: Diverse H: Carpal tunnel syndrome	2 years	Low	High or very high fear-avoidance for work was associated with higher odds of long-term disability (missing work days and retrieving compensation) in univariate analysis (p < .05) in comparing to having very low or moderate fear-avoidance. However, fear-avoidance was not a significant predictor of long-term disability in the final multi-domain model in multivariate analysis.
Steenstra et al. 2010[126] Canada (North-America)	Cross-sectional study	N: 442 A: 42.1 (10.3), >15 G: 254 males, 188 females O: - H: Low back pain	-	Low	Fear-avoidance beliefs for work and activity as measured 4 week after injury were not significantly associated with employment status at 4 weeks after injury in univariate Cox regression analysis.
Truchon et al. 2012[45] Canada (North-America)	Prospective cohort study	N: 535 A: 42 (10), 18-60 G: 317 males, 218 females O: Diverse H: Low back pain	6, 12 months	High	Fear-avoidance beliefs for work (β = -.35, p < .00) were predictive of long-term absence from work in multivariate Cox regression analysis.
Turner et al. 2008[46] United States (North-America)	Prospective cohort study	N: 1885 A: 39.4 (11.2) G: 1282 males, 603 females O: Diverse H: Back injury	1 year	Low	Work fear-avoidance was associated with work disability (p < .001) in univariate analysis. In a multi-domain model none of the psychological factors contributed independently to the prediction of 1-year work disability (wage replacement compensation for total disability 12 months after claim submission). This was because the score on the Roland-Morris disability questionnaire (RDQ) was substantially correlated with all the psychological factors, including work fear-avoidance.

RTW: Return to work

Table 9. Association between person-related factor 'perceived work-relatedness' and work participation

First author, year Country (Continent)	Study design	Population N: Number of subjects A: Age; mean age (SD), range G: Gender O: Occupation H: Health status	Follow-up	Risk of bias	Results
Coggon et al. 2013[24] Diverse (Europe, South- North-America, South-America, Africa, Asia, Oceania)	Cross-sectional study	N: 12416 A: 20-29: 3058, 30-39: 3971, 40-49: 3451, 50-59: 1936 G: 4348 males, 8068 females O: Diverse H: Musculoskeletal illness	-	Moderate	The risk of prolonged sickness was higher for participants with adverse beliefs about work-relatedness of musculoskeletal pain (PRR 1.22 (1.01-1.47)) in Poisson regression models. However, when number of painful anatomical sites was included in the model, the effect of beliefs about work-relatedness of musculoskeletal pain was not significant anymore.
Dawson et al. 2011[103] Australia and New Zealand (Oceania)	Cross-sectional study	No sick leave N: 1678 A: 45.2 (37.0-51.1), 18-65 G: 126 males, 1552 females O: Nursing or midwives H: Low back pain Sick leave N: 486 A: 43.9 (35.2-51.0), 18-65 G: 47 males, 439 females O: Nursing or midwives H: Low back pain	-	Moderate	People on sick leave perceived work more often as a cause for their pain ($p < .001$) in bivariate analysis, but perceiving work as a cause was not related to sick leave in multivariate analysis.
Jensen et al. 2013[32] Denmark (Europe)	Prospective cohort study	N: 325 A: 41.7 (10.4), 18-60 G: 159 males, 166 females O: - H: Low back pain	1 year	Low	Blaming the work for pain (OR: 2.40 (1.40-4.12), $p = .002$) predicted unsuccessful RTW after one year in univariate analysis. Blaming the work for pain was in combination with other variables also negatively associated with RTW in multivariate logistic regression analyses ($p < .001$).
Karels et al. 2010[121] The Netherlands (Europe)	Prospective cohort study	N: 483 A: 41.5 (10.4) G: 161 males, 322 females O: Diverse H: Arm, neck and shoulder complaints	3, 6 months	Moderate	Self-reported work relatedness of complaints was significantly related to sickness absence during follow-up in the univariate model ($p < .05$), but also in the multivariate model (OR: 3.2 (1.6-6.4), $p < .05$).

Table 9. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Kuijer et al. 2016[127] The Netherlands (Europe)	Retrospective cohort study	Returned to work N: 121 A: 58.8 (8.3), <60: 69, >59: 52 G: 63 males, 58 females O: - H: Knee arthroplasty No RTW N: 46 A: 62.1 (8.3), <60: 16, >59: 30 G: 19 males, 27 females O: - H: Knee arthroplasty	At least 2 years	Low	Participant-reported work-relatedness of the knee symptoms was associated with no RTW after total knee arthroplasty surgery (OR: 5.3 (2.0-14.1)) in multivariate backward stepwise logistic regression.
Sampere et al. 2012[42] Spain (Europe)	Prospective cohort study	N: 663 A: 39.8 (11.4) G: 364 males, 299 females O: - H: Musculoskeletal disorder, mental disorders or other physical conditions	2 years	Low	Thinking that there was a partial or complete relation between health and job instead of making no connection was associated with a longer time to RTW in bivariate analysis ($p < .05$). However, thinking that there was a partial or complete connection between the current health problem and job was not significantly associated with time to RTW in the total study population in multivariate analysis. When looking in women and men apart, thinking that there was a complete relation between health an job was related to longer time to RTW for women (HR: .63 (.42-.95)). Making a partial connection (HR: .43 (.23-.81)) or making a complete connection (HR: .41 (.20-.82)) between health and job was related to longer time till RTW for participants on sick leave for mental disorders, but not for participants with musculoskeletal disorders or other physical conditions.
Turner et al. 2008[46] United States (North-America)	Prospective cohort study	N: 1885 A: 39.4 (11.2) G: 1282 males, 603 females O: Diverse H: Back injury	1 year	Low	Blame for injury (work, self, someone else or nothing) was not associated with work disability (wage replacement compensation for total disability 12 months after claim submission) in univariate analysis.

RTW: Return to work

Table 10. Association between person-related factor 'catastrophizing' and work participation

First author, year Country (Continent)	Study design	Population N: Number of subjects A: Age; mean age (SD), range G: Gender O: Occupation H: Health status	Follow-up	Risk of bias	Results
Adams et al. 2017[128] Canada (North-America)	Prospective cohort study	N: 80 A: males 46.7 (9.5), females 45.7 (8.3) G: 26 males, 54 females O: - H: Major depressive disorder	1 month	Low	Reductions in catastrophizing were associated with a higher probability of occupational re-engagement (β = .36, OR: 1.4 (1.09-1.91), p = .01) in multivariate logistic regression analysis.
Besen et al. 2015[18] United States (North-America)	Prospective cohort study	N: 241 participants A: 38 (11.4), 18-63 G: 130 males, 111 females O: 76% blue collar H: Low back pain	1 week, 3 months	Moderate	Catastrophizing was positively related to days of absence (r = .23, p < .001) and negatively with work status (r = -.37, p < .001) in univariate analysis (correlations). Catastrophizing was only indirectly associated to days of absence and work status in multivariate analysis.
Carriere et al. 2015a[21] Canada (North-America)	Prospective cohort study	N: 154 A: 36.4 (9.2), 20-60 G: 81 males, 73 females O: Diverse H: Whiplash associated disorders	1 year	Low	Participants who returned to work scored lower on catastrophizing than participants who did not RTW (t = 6.63, p < .001) in univariate analysis. Lower scores on pain catastrophizing (β = -.74, t(254) = -2.92, p = .004) were associated with successful RTW when controlling for RTW expectations. Pain catastrophizing also influences RTW expectations (p < .001). Expectations partially mediated the relation between pain catastrophizing and RTW status in multiple regression analysis.
Cowan et al. 2012[25] United States (North-America)	Prospective cohort study	N: 66 A: 49.7 (11.3) G: 17 males, 49 females O: Desk-based, non-desk-based H: Carpal tunnel release	2-4 months	Low	In bivariate analysis less catastrophic thinking (p = .005) was associated with earlier return to modified work. Pain catastrophizing was not significant for all subjects in predicting return to modified work, but was for desk-based subjects (R^2 = .15) in multivariate analysis. In bivariate analysis less catastrophic thinking (p = .028) was associated with earlier return to full work. Pain catastrophizing was not a significant predictor of earlier return to full time work in multivariate analysis.

Table 10. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Dawson et al. 2011[103] Australia and New Zealand (Oceania)	Cross-sectional study	No sick leave N:1678 A: 45.2 (37.0-51.1), 18-65 G: 126 males, 1552 females O: Nursing or midwives H: Low back pain Sick leave N: 486 A: 43.9 (35.2-51.0), 18-65 G: 47 males, 439 females O: Nursing or midwives H: Low back pain	-	Moderate	Participants on sick leave had more pain catastrophizing (p < .001) than participants who were not on sick leave in bivariate analysis. Pain catastrophizing had no multivariable association with low back pain sick leave, possibly because it was correlated with passive coping and fear of movement.
De Vries et al. 2012b[59] The Netherlands (Europe)	Cross-sectional study	Staying at work N: 119 A: 51, 20-60 G: 48 males, 71 females O: - H: Chronic nonspecific musculoskeletal pain Sick leave and referred for rehabilitation N: 122 A: 39, 20-60 G: 56 males, 66 females O: - H: Chronic nonspecific musculoskeletal pain	-	Low	Pain catastrophizing (higher in sick leave group) was associated with work status in univariate analysis (p = .001). Participants who were on sick leave scored higher on pain catastrophizing than participants who stayed at work (B = -.07, OR: .93 (.88-.98), p = .005) in multivariate logistic regression analysis. However, catastrophizing was not one of the factors which best discriminated participants within the sick leave group and participants within the staying at work group in backwards stepwise logistic regression analysis.
Karels et al. 2010[121] The Netherlands (Europe)	Prospective cohort study	N: 483 A: 41.5 (10.4) G: 161 males, 322 females O: Diverse H: Arm, neck and shoulder complaints	3, 6 months	Moderate	High catastrophizing was associated with the occurrence of sickness absence in univariate analysis (OR: 2.8 (1.8-4.5), p < .05), but not in multivariate analysis because it was correlated with other factors as somatization.

Table 10. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Karoly et al. 2013[93] United States (North-America)	Cross-sectional study	On disability N: 434 A: 25-44:122, 45-64: 260, 65-80: 52 G: 221 males, 213 females O: - H: Chronic pain Working N: 859 A: 25-44: 464, 45-64: 309, 65-80: 86 G: 481 males, 378 females O: - H: Chronic pain	-	Moderate	Participants who were not working scored higher on catastrophizing than participants who were working (p < .05) in univariate analysis (t-test). Catastrophizing (b = -.08, e: .92 (.90-.95), p < .001) was a negative predictor of continued employment after controlling for severity and demographic factors in multivariate logistic regression analysis.
Lindell et al. 2010[34] Sweden (Europe)	Prospective cohort study	Rehabilitation group N: 63 A: 42.2 (2.4), <60 G: 30 males, 33 females O: 87% blue collar H: non-acute non-specific spinal pain Primary-care group N: 62 A: 43.0 (2.6), <60 G: 27 males, 35 females O: 87% blue collar H: non-acute non-specific spinal pain	6, 12, 18, 24 months	Low	Non-catastrophizing was a predictor of RTW at 18 months (p = .002) and at 24 months (p = .04), but not for RTW at 6 months and 12 months in univariate analysis. Non-catastrophizing was only a predictor of RTW at 18 months (OR: 3.4 (1.3-9.1), p = .01) in multivariate logistic regression analysis, but not for RTW at 6 months, 12 months and 24 months. .
Mannion et al. 2009[123] Switzerland (Europe)	Cross-sectional study	N: 670 A: 44.5 (10.2) G: 362 males, 308 females O: - H: Low back pain	-	Moderate	Negative beliefs (thoughts about inevitable consequences) about low back pain were associated with more days off work (p = .0001) and reduced work-productivity (p = .0001) in univariate analysis with Spearman rank correlation coefficients. However, due to overlap between fear-avoidance beliefs and negative beliefs, negative beliefs was not a significant predictor of days of work absence in hierarchical multiple regression analysis.

Table 10. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Morris and Watson 2011[124] Jersey (Europe)	Cross-sectional study	Sick-listed N: 62 A: 45.19 (10.41), >18 G: 40 males, 22 females O: Private sector: 45, public: sector: 17 H: Low back pain Non-sick-listed N: 57 A: 46.04 (11.98), >18 G: 29 males, 28 females O: Private sector: 45, public sector: 11 H: Low back pain	-	Low	There was no significant difference between the non-sick listed and sick-listed participants beliefs about the inevitable consequences of low back pain in univariate analysis.
Sarda et al. 2009[71] Australia (Oceania) Brazil (South-America)	Cross-sectional study	Australian N: 207 A: 44, 18-65 G: - O: - H: Chronic pain Brazil N: 222 A: 45, 18-65 G: - O: - H: Chronic pain	-	Low	Catastrophizing was not associated with unemployment in the Australian and Brazilian sample in multivariate logistic regression analysis.
Spector et al. 2012[44] United States (North-America)	Prospective cohort study	N: 670 A: 44.9 (9.6), >18 G: 255 males, 415 females O: Diverse H: Carpal tunnel syndrome	2 years	Low	A high score on catastrophizing was associated with higher odds of long-term disability (missing work days and retrieving compensation) in univariate analysis ($p < .01$), but was not significant in the final multi-domain model in multivariate analysis.

Table 10. Continued

First author, year	Study design	Population	Follow-up	Risk of bias	Results
Turner et al. 2008[46] United States (North-America)	Prospective cohort study	N: 1885 A: 39.4 (11.2) G: 1282 males, 603 females O: Diverse H: Back injury	1 year	Low	Catastrophizing was associated with 1-year work disability (wage replacement compensation for total disability 12 months after claim submission) in univariate analysis (p < .001). In a multi-domain model none of the psychological factors, including catastrophizing, contributed independently to the prediction of 1-year work disability. This was because the score on the Roland-Morris disability questionnaire was substantially correlated with all the psychological factors.
Wijnhoven et al. 2007[129] The Netherlands (Europe)	Cross-sectional study	N: 2517 A: 25-64 G: 1070 males, 1447 females O: - H: Musculoskeletal pain	-	Moderate	For men with paid work high pain catastrophizing was positively associated with work leave in the past 12 months (PR: 1.56 (1.11-2.19), p < .05). For women with paid work medium catastrophizing (PR: 1.80 (1.14-2.85), p < .05) and high catastrophizing (PR: 1.69 (1.06-2.69), p < .05) were positively associated with work leave in the past 12 months in log-binomial regression analysis.

RTW: Return to work

Appendix 3. Scores quality assessment tools

Table 1. Scores on the criteria of the Joanna Briggs Institute quality assessment tools for the included articles

Study	Study design	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Quality score /total	Risk of bias
Adams et al. 2017[128]	PCS	1	1	1	1	1	1	1	0	1	X	1	X	X	10/11	Low
Åhrberg et al. 20108[9]	QS	1	1	1	1	1	0	0	1	1	1	X	X	X	8/10	Moderate
Arwert et al. 2017[112]	CSS	1	1	1	1	1	1	1	1	X	X	X	X	X	8/8	Low
Audhoe et al. 2012[17]	PCS	1	1	0	1	1	1	1	1	0	1	1	X	X	9/11	Low
Awang et al. 2016[82]	CSS	0	1	0	1	1	1	1	1	X	X	X	X	X	6/8	Moderate
Becker et al. 2007[119]	QS	0	1	1	1	1	0	1	0	1	1	X	X	X	7/10	Moderate
Besen et al. 2015[18]	PCS	1	1	1	1	1	1	0	1	0	0	1	X	X	8/11	Moderate
Boot et al. 2008[19]	CSS	1	1	1	1	1	1	1	1	X	X	X	X	X	8/8	Low
Boot et al. 2014[101]	PCS	1	1	1	1	1	1	1	1	0	0	1	X	X	9/11	Low
Boot et al. 2011[100]	CSS	1	1	0	1	1	1	0	1	X	X	X	X	X	6/8	Moderate
Boyle et al. 2014[83]	CSS	1	1	1	1	1	1	1	1	X	X	X	X	X	8/8	Low
Braathen et al. 2007[84]	non-RCT	1	1	0	1	0	0	1	0	1	X	X	X	X	5/9	Moderate
Brouwer et al. 2015[55]	PCS	1	1	1	1	1	1	1	1	1	1	1	X	X	11/11	Low
Brouwer et al. 2009[56]	PCS	1	1	1	1	1	1	1	1	1	X	1	X	X	11/11	Low
Brouwer et al. 2010[57]	PCS	1	1	1	1	1	1	1	1	0	1	1	X	X	10/11	Low
Busch et al. 2007[20]	PCS	1	1	1	1	1	0	1	1	1	X	1	X	X	10/11	Low
Carriere et al. 2015a[21]	PCS	1	1	1	1	1	1	1	1	0	0	1	X	X	9/11	Low
Carriere et al. 2015b[22]	PCS	1	1	1	1	1	1	1	1	0	1	1	X	X	10/11	Low
Carstens et al. 2014[23]	PCS	1	1	1	0	0	0	1	1	0	0	1	X	X	6/11	Moderate
Chen et al. 2012[102]	CSS	1	1	1	1	1	1	0	1	X	X	X	X	X	7/8	Low

Table 1. Continued

Study	Study design	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Quality score /total	Risk of bias
Coggon et al. 2013[24]	CSS	1	1	1	0	1	1	0	1	X	X	X	X	X	6/8	Moderate
Cowan et al. 2012[25]	PCS	1	1	1	1	1	1	0	1	1	1	1	X	X	10/11	Low
D'Amato and Zijlstra 2010[58]	PCS	0	1	1	1	1	0	1	1	0	0	1	X	X	7/11	Moderate
Dawson et al. 2011[103]	CSS	1	1	1	0	1	1	0	1	X	X	X	X	X	6/8	Moderate
De Vries et al. 2011[52]	QS	1	1	1	1	1	1	1	1	1	1	X	X	X	10/10	Low
De Vries et al. 2012b[59]	CSS	1	1	1	1	1	1	0	1	X	X	X	X	X	7/8	Low
Dekkers-Sánchez et al. 2010[90]	QS	1	1	1	1	1	0	0	1	1	1	X	X	X	8/10	Moderate
Dionne et al. 2013[99]	QS	0	1	1	1	1	1	0	1	1	1	X	X	X	8/10	Moderate
Dionne et al. 2007[60]	PCS	1	0	1	1	1	0	1	1	1	X	1	X	X	9/11	Low
Du Bois et al. 2009[26]	PCS	1	0	1	1	1	1	0	1	1	X	1	X	X	9/11	Low
Dunn et al. 2010[78]	QS	1	1	1	1	1	0	0	1	1	1	X	X	X	8/10	Moderate
Dyster-Aas et al. 2007[104]	CSS	1	1	1	1	1	1	0	1	X	X	X	X	X	7/8	Low
Ekberg et al. 2015[27]	PCS	1	1	1	1	1	1	1	1	0	1	1	X	X	10/11	Low
Elfving et al. 2009[85]	PCS	1	1	1	1	1	0	0	1	1	X	1	X	X	9/11	Low
Ellingsen and Aas 2009[53]	QS	1	1	1	1	1	0	0	1	1	1	X	X	X	8/10	Moderate
Gross and Battié 2010[28]	PCS	1	1	1	1	1	1	0	1	0	0	1	X	X	8/11	Moderate
Grøvle et al. 2013[105]	PCS	1	1	1	1	1	1	1	1	1	X	1	X	X	11/11	Low
Grytten et al. 2017[113]	PCS	1	1	1	1	1	1	0	1	1	X	1	X	X	10/11	Low
Hansen et al. 2009[106]	PCS	1	1	0	1	1	0	0	1	1	X	1	X	X	8/11	Moderate
Hartke et al. 2011[79]	QS	1	1	1	1	1	0	0	1	0	1	X	X	X	7/10	Moderate
He et al. 2010[107]	RCS	1	1	0	1	1	1	1	1	1	X	1	X	X	9/11	Low
Healey et al. 2011[61]	CSS	1	1	1	1	1	1	1	1	X	X	X	X	X	8/8	Low
Heymans et al. 2009[114]	PCS	0	1	1	1	1	1	1	1	1	X	1	X	X	11/11	Low
Heymans et al. 2007[120]	RCS	1	1	1	1	1	0	1	1	1	X	1	X	X	10/11	Low
Hou et al. 2012[29]	PCS	1	1	1	1	1	1	1	1	0	0	1	X	X	9/11	Low
Hou et al. 2008[30]	PCS	1	1	0	1	1	1	1	1	1	X	1	X	X	10/11	Low
Huijs et al. 2012[62]	PCS	1	1	1	1	1	1	1	1	0	0	1	X	X	9/11	Low

Table 1. Continued

Study	Study design	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Quality score /total	Risk of bias
Huijs et al. 2017[63]	PCS	1	1	1	1	1	0	1	1	0	0	1	X	X	8/11	Moderate
Hystad and Bye 2012[49]	PCS	1	1	1	1	1	0	1	1	1	X	1	X	X	10/11	Low
Iakova et al. 2012[31]	PCS	1	1	1	1	1	0	1	1	0	0	1	X	X	8/11	Moderate
Jensen et al. 2013[32]	PCS	1	1	0	1	1	1	1	1	1	X	1	X	X	10/11	Low
Johansson et al. 2010[33]	PCS	1	1	1	1	1	0	1	1	1	X	1	X	X	10/11	Low
Karels et al. 2010[121]	PCS	1	1	1	1	1	0	1	1	0	0	1	X	X	8/11	Moderate
Karoly et al. 2013[93]	CSS	1	1	1	0	1	1	0	1	X	X	X	X	X	6/8	Moderate
Kovacs et al. 2007[122]	PCS	1	1	1	1	1	0	1	1	1	X	1	X	X	10/11	Low
Krause et al. 2013[94]	CSS	1	1	1	1	0	0	0	1	X	X	X	X	X	5/8	Moderate
Kuijer et al. 2016[127]	RCS	1	1	1	1	1	1	1	1	0	0	1	X	X	9/11	Low
Lagerveld et al. 2016[64]	PCS	0	0	1	1	1	1	1	1	0	0	1	X	X	7/11	Moderate
Lindell et al. 2010[34]	PCS	1	1	1	1	1	1	0	1	1	X	1	X	X	10/11	Low
Luk et al. 2010[115]	PCS	1	1	1	1	1	1	0	1	1	X	1	X	X	9/11	Low
Lundqvist and Sumuelsson 2012[54]	QS	1	1	1	1	1	0	0	1	1	1	X	X	X	8/10	Moderate
Lydell et al. 2011[50]	PCS	1	0	0	0	0	1	1	1	1	X	1	X	X	7/11	Moderate
Magnussen et al. 2007a[80]	QS	1	1	1	1	1	0	1	1	0	1	X	X	X	8/10	Moderate
Magnussen et al. 2007b[35]	RCT	1	1	1	0	0	0	1	1	0	1	1	1	0	8/13	Moderate
Mangels et al. 2011[65]	PCS	1	1	1	0	0	1	0	1	1	X	1	X	X	8/11	Moderate
Mannion et al. 2009[123]	CSS	0	1	1	0	1	1	1	1	X	X	X	X	X	6/8	Moderate
Martins 2015[66]	CSS	1	1	1	1	0	0	0	1	X	X	X	X	X	5/8	Moderate
Morris and Watson 2011[124]	CSS	1	1	1	1	1	1	1	1	X	X	X	X	X	8/8	Low
Morrison et al. 2016[108]	PCS	1	0	0	1	1	0	1	1	0	0	1	X	X	6/11	Moderate
Murgatroyd et al. 2016[36]	PCS	1	1	1	1	1	0	1	1	0	0	1	X	X	8/11	Moderate

Table 1. Continued

Study	Study design	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Quality score /total	Risk of bias
Murphy et al. 2011[67]	PCS	1	1	0	0	0	0	1	1	1	X	1	X	X	7/11	Moderate
Nielsen et al. 2012[109]	PCS	1	0	0	1	1	1	1	1	1	X	1	X	X	9/11	Low
Nieuwenhuijsen et al. 2013[37]	RCS	0	1	1	1	1	1	1	0	0	0	1	X	X	7/11	Moderate
Norlund et al. 2011[116]	PCS	1	1	1	1	1	1	1	1	1	X	1	X	X	11/11	Low
Opsahl et al. 2016[38]	PCS	1	1	1	1	1	1	0	1	1	X	1	X	X	10/11	Low
O'Sullivan et al. 2012[68]	CSS	1	1	1	1	1	1	0	1	X	X	X	X	X	7/8	Low
Øyeflaten et al. 2008[51]	PCS	1	1	1	1	1	1	1	1	0	0	1	X	X	9/11	Low
Øyeflaten et al. 2016[117]	PCS	0	1	1	0	0	1	1	1	1	X	1	X	X	8/11	Moderate
Poulain et al. 2010[125]	PCS	1	1	1	1	1	1	1	1	0	1	1	X	X	10/11	Low
Puolakka et al. 2008[86]	PCS	1	1	1	1	1	1	0	1	1	X	1	X	X	10/11	Low
Ramel et al. 2013[110]	PCS	1	1	1	1	1	1	0	1	1	X	1	X	X	10/11	Low
Reme et al. 2009[39]	PCS	1	1	1	1	1	1	1	1	1	0	1	X	X	10/11	Low
Richard et al. 2011[69]	PCS	1	1	1	1	1	1	1	1	0	0	1	X	X	9/11	Low
Richter et al. 2011[40]	PCS	1	1	0	1	1	1	1	1	1	X	1	X	X	10/11	Low
Roesler et al. 2013[70]	PCS	1	1	1	1	1	1	1	1	1	X	1	X	X	11/11	Low
Rönnberg et al. 2007[41]	PCS	1	1	1	0	0	1	1	1	0	0	1	X	X	7/11	Moderate
Sampere et al. 2012[42]	PCS	1	1	1	1	1	1	1	1	0	0	1	X	X	9/11	Low
Saperstein et al. 2011[87]	CSS	1	1	1	1	0	0	1	1	X	X	X	X	X	6/8	Moderate
Sarda et al. 2009[71]	CSS	1	1	1	1	1	1	0	1	X	X	X	X	X	7/8	Low
Selander et al. 2007[95]	PCS	1	1	1	1	1	0	1	1	1	X	1	X	X	10/11	Low
Shaw et al. 2011[72]	PCS	1	1	0	1	1	0	1	1	0	0	1	X	X	7/11	Moderate
Sivertsen et al. 2013[111]	CSS	1	1	0	1	1	1	1	1	X	X	X	X	X	7/8	Low
Sluiter and Frings-Dresen 2008[43]	CSS	1	1	1	1	1	1	1	1	X	X	X	X	X	8/8	Low
Spector et al. 2012[44]	PCS	1	1	1	1	1	0	1	1	1	1	1	X	X	10/11	Low

Table 1. Continued

Study	Study design	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Quality score /total	Risk of bias
Steenstra et al. 2010[126]	CSS	1	1	1	1	1	1	1	1	X	X	X	X	X	8/8	Low
Strauser et al. 2010[73]	CSS	1	1	1	1	1	1	0	1	X	X	X	X	X	7/8	Low
Strober and Arnett 2016[118]	CSS	1	1	1	1	0	0	1	1	X	X	X	X	X	6/8	Moderate
Stulemeijer et al. 2008[74]	PCS	1	1	1	1	1	1	1	1	0	0	1	X	X	9/11	Low
Tamminga et al. 2012[81]	QS	1	1	1	1	1	1	0	1	1	1	X	X	X	9/10	Low
Torres et al. 2009[96]	PCS	1	1	1	1	1	0	1	1	1	X	1	X	X	10/11	Low
Truchon et al. 2010[97]	PCS	1	1	1	1	1	1	0	1	0	0	1	X	X	8/11	Moderate
Truchon et al. 2012[45]	PCS	1	1	0	0	0	1	0	1	0	0	1	X	X	5/11	High
Turner et al. 2008[46]	PCS	1	0	0	1	1	1	1	1	1	X	1	X	X	9/11	Low
Van Velzen et al. 2011[91]	QS	1	1	1	1	1	0	0	1	0	1	X	X	X	7/10	Moderate
Vlasveld et al. 2013[98]	CSS	1	1	1	1	1	1	1	1	X	X	X	X	X	8/8	Low
Volker et al. 2015[75]	PCS	1	1	1	1	1	1	1	1	1	X	1	X	X	11/11	Low
Vuistiner et al. 2015[47]	PCS	1	0	1	1	1	1	0	1	1	X	1	X	X	9/11	Low
Waghorn et al. 2007[76]	PCS	1	1	0	1	1	0	0	1	1	X	1	X	X	8/11	Moderate
Wåhlin et al. 2012[48]	PCS	1	1	1	1	1	1	1	1	1	X	1	X	X	11/11	Low
Wan Kasim et al. 2014[88]	CSS	1	1	0	1	1	1	1	1	X	X	X	X	X	7/8	Low
Waynor et al. 2016[77]	PCS	1	1	1	0	0	1	0	1	0	1	1	X	X	7/11	Moderate
Wijnhoven et al. 2007[129]	CSS	1	1	1	0	1	1	0	1	X	X	X	X	X	6/8	Moderate
Wilbanks and Ivankova 2015[92]	QS	1	1	1	1	1	1	1	1	1	1	X	X	X	10/10	Low

RCT: Randomized controlled trial, PCS: Prospective cohort study, RCS: Retrospective cohort study, CSS: Cross-sectional study, QS: Qualitative study

X: Item not applicable; 1: Description in study meets criterion; 0: Description in study does not meet criterion

CHAPTER 3

Physicians' perspectives on person-related factors associated with work participation and methods used to obtain information about these factors

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Abstract

Objective: Person-related factors influencing work participation of employees with health problems are important. However, the best method to obtain information about them, according to occupational physicians (OPs) and insurance physicians (IPs), is unknown.

Methods: Questionnaires in which OPs and IPs rated the importance of and described methods to obtain information about ten person-related factors: expectations regarding recovery or return to work, optimism/pessimism, self-efficacy, motivation, feelings of control, perceived health, coping strategies, fear-avoidance beliefs, perceived work-relatedness, and catastrophizing.

Results: OPs and IPs perceived all person-related factors, except for optimism/pessimism and perceived health as important for work participation. Information about the factors could best be obtained with use of a topic list during consultations.

Conclusions: OPs and IPs should take person-related factors into account during consultations and it is best to use a topic list when discussing them.

Introduction

Occupational physicians (OPs) and insurance physicians (IPs) play an important role in the guidance and the assessment of work disability of employees with all kinds of mental and physical health problems, who experience work limitations. To prevent sick leave or decrease the duration of sick leave of employees with health problems, it is important for these physicians to intervene on factors that influence work participation.[1, 2] Among these factors are person-related factors, such as employees' cognitions and perceptions.[3, 4] Employees with different health problems mentioned that such factors as motivation, perception of control, and positive coping strategies can facilitate return to work (RTW).[5-7] Different RTW stakeholders, for example employers, insurers, lawyers and healthcare providers, also acknowledge the importance of such factors as self-efficacy, coping with pain or injury, and recovery expectations for RTW.[8] The results of several qualitative studies indicate that occupational health professionals also acknowledge the importance of person-related factors for work participation.[1, 9, 10] Vocational rehabilitation professionals considered factors such as work motivation, positive expectations about recovery, and self-esteem as promoting factors for RTW.[9] In addition, IPs agreed that motivation, coping, and negative perceptions are relevant factors for RTW and should be included in the assessment of the work ability of employees on long-term sick leave.[1] IPs already take into account employees' expectations, motivation, and coping strategies when assessing the work disability of cancer survivors.[10] A recent review of literature confirmed the association between 10 different person-related factors and work participation.[11] These factors are expectations regarding recovery or RTW, optimism/pessimism, self-efficacy, motivation, feelings of control, perceived health, coping strategies, fear-avoidance beliefs, perceived work-relatedness and catastrophizing.

Because of the importance of person-related factors, OPs and IPs should take them into account during their consultations with employees.[11] However, no systematic methods are available for OPs and IPs to obtain information about the ten person-related factors from employees. Information about these factors could give OPs and IPs more insight into which factors require intervention to increase the work participation of employees with health problems.[1]

To develop a new and efficient method for obtaining information about person-related factors, it is important to know which of these factors OPs and IPs, the physicians who might use this new method in the future, consider important. Furthermore, it is important to know how physicians obtain information about

person-related factors and which method is, in their view, the best for obtaining this information.[11] Therefore, we conducted a questionnaire study, with the following research questions: Which of the 10 selected person-related factors are deemed important by OPs and IPs to take into account during consultations? How do OPs and IPs currently assess person-related factors and which method is, in their view, the best for obtaining information about these factors?

Methods

The Medical Ethics Review Committee of the Academic Medical Center (AMC), University of Amsterdam, confirmed that the Medical Research Involving Human Subjects Act (WMO) did not apply to this study and that an official approval by this committee was therefore not required (W 17_373 # 17.437).

Participants

Participants in the present study were OPs and IPs in the Netherlands. The main role of OPs in the Netherlands is to prevent work-related health problems and to guide employees with health problems on sick leave back to work. OPs are consulted by employees who are on (partial) sick leave for less than two years. The main task of IPs in the Netherlands is to evaluate the disabilities and functional abilities of employees, and to assess whether they should receive a work disability benefit. IPs are mostly consulted by employees who are on sick leave for over 2 years.

The OPs and IPs that participated in this study were recruited from three professional associations in the Netherlands: the Netherlands Society of Occupational Medicine (NVAB), the Dutch Association for Insurance Medicine (NVVG), and the Dutch Association of Medical Advisers in Private Insurance (GAV). More than 80% of the OPs and IPs in the Netherlands are member of one of these associations, which makes them representative for the OPs and IPs in the Netherlands. All physicians who were members of these associations were invited by email in November to December 2017 to complete an anonymous online questionnaire. Physicians were excluded from analyses in this study if they did not have direct contact with patients or if they did not complete the question about the importance of different person-related factors.

Procedure

The email was sent to 1350 OPs who were members of the NVAB, 231 IPs who were members of the GAV, and 668 IPs who were members of the NVVG. Three weeks after the first invitation, the professional associations sent a second email to all the OPs and IPs as a reminder asking the physicians to complete the questionnaire. The first email and the second email both contained a link to the online survey tool. Before completing the questionnaire, the physicians had to sign an informed consent form. The questionnaire could be completed within 30 minutes. Although participants were encouraged to complete the questionnaire in one sitting, they could pause the questionnaire and complete it at another time. The IPs and OPs did not receive a reward in return for their participation in this study.

Measures

The questionnaire was developed by researchers from the department Coronel Institute of Occupational Health of the Amsterdam University Medical Centers (Amsterdam UMC) and researchers from the department of Health Sciences, Community and Occupational Medicine of the University Medical Center Groningen (UMCG) using Qualtrics survey software (Qualtrics, www.qualtrics.com). The researchers developed a first version of the questionnaire in Qualtrics that was piloted by five occupational health professionals (both OPs and IPs). After they completed the online questionnaire, they were interviewed by one researcher (NS) about the content of the questionnaire, the readability of the questionnaire, their experience with completing the questionnaire, and suggestions for improvement of the questionnaire. Based on their feedback and suggestions, the questionnaire was adapted.

The final questionnaire contained questions about demographic variables (age, sex, current job, work experience) and ten person-related factors. The selected person-related factors were ten person-related factors that were identified as possibly important for work participation by a small group of OPs and IPs and that were confirmed to be associated with work participation in a previously performed systematic review.[11] The perceived importance of the factors was measured on a 5-point scale (1 = not important at all; 5 = extremely important). For rating the importance of the factors, five factors were presented at one time, which made it easier for the physicians to compare the importance of the factors. It was possible for the physicians to go back and rerate the factors. In open questions, the physicians were asked to describe how they obtain information about the factors they had rated with a score of 4 (very important) or 5 (extremely

important). They were also asked about the best method for obtaining information: "What do you think is the best method for obtaining information about the person-related factors?" The participants could choose one of three answer options (1, The employee completes a questionnaire about the factors before the start of the consultation; 2, The employee completes a questionnaire during the consultation; 3, The professional discusses the factors with the employee during the consultation with the use of a topic list) or could describe another method. The questionnaire also contained questions regarding cognitions and perceptions of significant others of employees. However, the answers to these questions were not analyzed for this study.

Data analyses

Statistical analyses of the closed questions were performed using SPSS statistics 24.0. The data of physicians was analyzed separately for OPs and IPs because OPs and IPs in the Netherlands differ in their tasks and employees they see during consultations. Descriptive statistics were computed for each variable. The answers concerning the importance of the factors were presented as relative frequencies. If at least 60% of the professionals gave a factor a score of 4 (very important) or 5 (extremely important), the factor was regarded as important to take into account during consultations. The answers to the question about the best method for obtaining information about the person-related factors were also presented as percentages. The other methods for obtaining information as described in the open option in this question and the answers to the open questions about the methods the physicians use to gain insight into the person-related factors were summarized by one researcher (MdW) and checked by a second researcher (HW or CH). Disagreements about the summaries were resolved by discussion and consensus.

Results

Participant characteristics

In total, 172 OPs and 69 IPs signed the informed consent form to participate in this study. Of the 172 OPs, three OPs with a mean age of 58 years (SD = 10.4), among which one female (33%), were excluded because they did not have direct contact with patients. One OP was excluded because he did not answer the question about having direct contact with patients. Thirteen OPs with a mean age of 56 years (SD = 2.9), among which six females (41%) did not complete the question about the importance of the factors and were excluded from this study.

Of the 69 IPs, nine IPs with a mean age of 52 years (SD = 9.0) and among which five females (56%) were excluded because they did not have direct contact with patients. Four IPs did not complete the questions about the importance of the factors and were excluded. Among them were two females (50%) and the mean age of these IPs was 54 years old (SD = 9.1).

In total, 155 OPs of the 1350 OPs from the NVAB (response rate 11%) and 56 IPs of the 899 IPs from the GAV and the NVVG (response rate 6%) met the inclusion criteria and completed the questions about the importance of the factors in this study. The demographics of these participants are presented in Table 1.

Table 1. Demographic variables (sex, age, work experience, work situation)

Variables	**Occupational physicians (*N* = 155), *n* (%)**	**Insurance physicians (*N* = 56), *n* (%)**
Sex		
Male	92 (59)	31 (55)
Female	63 (41)	25 (45)
Age (M, SD)	56 (6.4)	54 (10.4)
Work experience, years		
< 5	2 (1)	7 (13)
5-10	2 (1)	7 (13)
11-15	12 (8)	2 (4)
16-20	33 (21)	9 (16)
> 20	106 (68)	31 (55)
Work situation		
Self-employed	68 (44)	6 (11)
Paid-employment in occupational health service	81 (52)	48 (86)
Both	6 (4)	2 (4)

Importance of person-related factors

Table 2 and Table 3 show the importance of the person-related factors as perceived by OPs and IPs, including the minimum and maximum given scores. The five most important and the five least important person-related factors were the same for the two vocational groups. According to our criteria, all person-related factors, except perceived health, were regarded by OPs as important (Table 2). Especially expectations regarding recovery or RTW, coping strategies, and motivation were

perceived as important: at least 80% of physicians deemed these factors very or extremely important. IPs thought that all factors, except perceived health and optimism/pessimism, were important to take into account during consultations (Table 3). They perceived especially coping strategies and fear-avoidance beliefs as very or extremely important.

Table 2. Number and percentage of OPs who rated individual person-related factors as very or extremely important to take into account during consultations and minimum and maximum given scores (*N* = 155)

Factor	OPs who rated factor with a score of 4 (very important) or 5 (extremely important), *n* (%)	Minimum and maximum scores given by OPs
Expectations regarding recovery or return to work	125 (81)	3 - 5
Coping strategies	125 (81)	3 - 5
Motivation	124 (80)	3 - 5
Fear-avoidance beliefs	120 (77)	2 - 5
Feelings of control	116 (75)	2 - 5
Catastrophizing	114 (74)	2 - 5
Perceived work-relatedness	106 (68)	2 - 5
Self-efficacy	105 (68)	2 - 5
Optimism/pessimism	95 (61)	1 - 5
Perceived health	77 (50)	2 - 5

OPs: Occupational physicians

Methods to obtain person-related information

In total, 122 OPs and 41 IPs answered the open question about the methods they use to obtain information about each of the person-related factors that they regard as very or extremely important. There were no notable differences between the methods used to obtain information between OPs and IPs. Most physicians reported that they discuss the factors during consultations in which they ask employees direct and indirect questions. Some of these physicians also reported examples of specific questions they ask for obtaining information about each factor during these consultations. Examples of these reported questions regarding each factor are given in Table 4. Some physicians reported that they do not directly ask questions about the factors, but just listen to and observe the employees to obtain information.

Table 3. Number and percentage of IPs who rated individual person-related factors as very or extremely important to take into account during consultations and minimum and maximum given scores (*N* = 56)

Factor	IPs who rated factor with a score of 4 (very important) or 5 (extremely important), *n* (%)	Minimum and maximum scores given by IPs
Coping strategies	46 (82)	3 - 5
Fear-avoidance beliefs	45 (80)	2 - 5
Motivation	41 (73)	2 - 5
Feelings of control	41 (73)	2 - 5
Expectations regarding recovery or return to work	38 (68)	2 - 5
Catastrophizing	38 (68)	2 - 5
Perceived work-relatedness	35 (63)	2 - 5
Self-efficacy	35 (63)	2 - 5
Perceived health	32 (57)	2 - 5
Optimism/pessimism	31 (55)	2 - 5

IPs: Insurance physicians

Some physicians reported asking significant others, employers, or treating physicians for information about the person-related factors of employees. For example, OPs reported that they ask employees' partners for more information about the motivation or the expectations of their partners regarding recovery or RTW. IPs reported that information about the perceived work-relatedness of the disease and the motivation of the employee to RTW could be obtained from employers.

Finally, physicians reported using questionnaires to obtain information about person-related factors. For example, the Dutch Four-Dimensional Symptom Questionnaire was reported to be used to assess fear-avoidance beliefs and optimism/pessimism.[12]

Table 4. Examples of questions OPs and IPs ask to obtain information about the person-related factors

Factor	Questions from OPs and IPs
Expectations regarding recovery or return to work	How long do you think will it take to recover?
	When do you expect to return to work?
	In which way do you think you will return to work?
	What could promote your return to work?
	What is your goal regarding reintegration into work?
	What are your thoughts regarding return to work?
Motivation	Do you enjoy your work?
	How is your contact with colleagues?
	How important is your work to you?
	How do you think about returning to work?
	What are you doing to promote your return to work?
	What hinders your return to work?
Coping strategies	What activities do you do during the day?
	What activities are you able to do at home, despite your limitations?
	How do you cope with your limitations in your daily life?
	What would help to reduce your limitations?
	In which way do you think you will return to work?
	What have you done to promote your recovery?
Fear-avoidance beliefs	Do you think that your complaints will persist, increase or disappear when you return to work?
	Which factors exacerbate your complaints?
	What hinders your return to work?
	What do you think will happen if you return to work?
Feelings of control	What do you do to try to alleviate your complaints or limitations and promote your recovery?
	Do you think that you can influence your limitations or recovery?
	What can you do to promote your recovery?
	What would help promote your recovery?
Optimism/pessimism	What are your expectations regarding your recovery?
	How do you see your future regarding your limitations?
Catastrophizing	What do you think is the reason why you are not able to perform certain activities?
	What do you think will worsen your complaints?
	What do you think will happen if you return to work?
	What are your expectations regarding your recovery?

Table 4. Continued

Factor	Questions from OPs and IPs
Self-efficacy	Do you think you will reach your goals regarding recovery?
	In which way do you think you will reach the goals regarding your recovery or return to work?
	How high do you think your chances are of returning to work?
	How do you see your future?
Perceived health	How do you rate your health on a scale of 1 to 10?
	What do you think about your health in general?
Perceived work-relatedness	Do you think that your job was the cause of your complaints?
	Do you think your complaints will persist, increase or decrease when you return to work?
	Which work factors do you think could influence your complaints?

IPs: Insurance physicians, OPs: Occupational physicians

Best method to obtain person-related information

In total, 134 OPs and 51 IPs answered the question about the best method for obtaining information about the person-related factors. The OPs and IPs agreed about the best methods to obtain information. Sixty-eight OPs (51%) and 26 IPs (51%) said that discussing them with the employee during the consultation with the use of a topic list was the best method. Twenty OPs (15%) and six IPs (12%) preferred a questionnaire to be completed before the consultation. None of the physicians thought that it was best to let the employee complete a questionnaire during a consultation. Forty-six OPs (34%) and 19 IPs (37%) reported preferring other methods. For example, 18 OPs (13%) and eight IPs (16%) said that they preferred combining questionnaires with discussing the factors during the consultation. One of the OPs answered: *"A combination of the first option and the third option: a questionnaire could be used as a guideline for the conversation, with the possibility to ask for more explanation during the conversation."* In addition, one of the IPs answered: *"Employees could complete a questionnaire before the consultation, and afterwards, during personal contact, an IP could ask more about the factors."* However, there were also physicians who thought that information could be obtained during the consultation without the use of a topic list. One of the OPs answered: *"One could gain information about the factors during the consultation. However, if you discuss these factors with fixed topics, you could create the impression that you just follow the protocols instead of really getting into a conversation with the sick employee."* In addition, an IP answered: *"An open conversation with room for discussing these factors works better than a conversation with a strict structure and lists."* Another method that

was perceived as the best was to ask for additional information about the factors from the employee's other treating physician, employer or significant other. One OP answered: *"During the consultation, these kinds of factors will come up easily during interaction, and sometimes the presence of a partner or family member can be really helpful."* One IP answered: *"If necessary, additional information about these factors could be obtained from practitioners or OPs."*

Discussion

The results of this study indicate that according to our criteria, OPs regarded all person-related factors, except for perceived health, as important to take into account during consultations. IPs perceived all person-related factors, except perceived health and optimism/pessimism, as important. The physicians use various methods to obtain information about the factors, but most obtain information by discussing the factors during consultations and think it is best to do this with the use of a topic list.

Especially the factors expectations regarding recovery or RTW, coping, and motivation were often deemed as very or extremely important by OPs. The importance of these factors was also recognized by occupational health professionals in previous studies.[1, 9, 10] IPs in our study also regarded fear-avoidance beliefs as a very important factor. These results are congruent with previous research in which negative beliefs, which could elicit avoiding behaviour, were perceived as important by IPs.[1]

The factor that was seen as less important by IPs in our study was optimism/pessimism. Various studies indicate that employees themselves regard this factor as important for work participation,[7, 13, 14] so the perception of the importance of this factor might differ between employees and physicians. In our study, both IPs and OPs identified perceived health as a factor that is less important. This is in contrast with the results of previous studies which indicated that an association between perceived health and work participation exists.[15, 16] These results suggest that although perceived health is associated with work participation, employees' perceived health might have less influence on the way the OPs guide them or the way IPs assess their disability. A possible reason why physicians regarded perceived health as a factor that is less important, is that perceived health is a broad factor that coheres with other person-related factors in this study.

In accordance with the second aim of our study, we explored the methods that OPs and IPs use to obtain information about person-related factors. The physicians obtain such information by asking questions and listening to employees during consultations, using questionnaires and asking third parties. The best method from the perspective of OPs and IPs would be to discuss the factors with the help of a topic list. Previous studies also recognize the importance of structuring interviews by, for example, using a list of the most crucial interview topics to decrease variation in outcomes of disability assessments by IPs.[17, 18] What is notable is that the method the physicians reported using was not always the method they think is best for obtaining information. A possible reason for this is that a topic list, which according to most physicians in this study would help them to discuss all the person-related factors, does not exist. This could be an indication that there is a need for such a topic list.

This study confirms the importance of considering person-related factors during consultations from the perspective of OPs and IPs. A strength of this study is that it explored the methods that OPs and IPs actually use and the methods they consider the best for obtaining information about person-related factors. This provides input for developing a method for systematically taking these important factors into account during consultations. We decided to analyze the answers of OPs and IPs separately because OPs and IPs in the Netherlands see different selections of employees and have different functions. Because their clients and tasks differ, the factors they think are important and the questions they ask could differ. The results of our analyses suggest, however, that there are no notable differences between the opinions of OPs and IPs about which factors are important. Although the sequence of importance differed slightly between OPs and IPs, the five factors that both vocational groups most often rated as very or extremely important are the same. There were also no notable differences in the methods they use or the questions they ask to obtain information. A possible reason why there were no notable differences between the professionals could be that although the work they perform differs, they have comparable experiences and education. So in further research and in developing a method for obtaining person-related information, making a distinction between IPs and OPs might not be necessary when it comes to these factors.

A limitation of our study is that the overall response rate was low. Because we knew from previous studies that in general the overall response rate of physicians in questionnaire studies is limited,[19] we aimed to reach as many OPs and IPs in the Netherlands as possible with the questionnaire, by recruiting them via

professional associations. Although the response rate is still limited, we think that the number of responses was sufficient to draw conclusions in this explorative study. In addition, our sample seems representative for the OPs and IPs in the Netherlands. The high mean age of the OPs (56 years) and IPs (54 years) in this study seems comparable with the ages of the whole population OPs and IPs in the Netherlands. In 2016, approximately 50% of the registered and working IPs and OPs in the Netherlands was between 55 and 65 years old, according to data of the Medical Specialists Registration Committee (Royal Dutch Medical Association, KNMG).[20] According to the same data, 36.2% of the registered and working OPs was female and 40.1% of the registered and working IPs was female, which is comparable to the percentage of females in this study.[20] Summarized, although the response rate was low, the sample of OPs and IPs who participated in this study appears to be a good representation for all registered OPs and IPs in the Netherlands.

Another limitation is that the factors discussed in this study are person-related factors that were selected before the start of our study, based on the results of a recent systematic review.[11] The factors were in that systematic review selected by two experts in occupational and insurance medicine and discussed with two additional OPs and three IPs. It is possible that other person-related factors of importance were not included in this study. An example of another person-related factor that could possibly be important for work participation, is pain acceptance which was in a previous study associated with better health outcomes, such as less increase in pain intensity and improvement in depressive symptoms.[21] However, the IPs and OPs in the present study had the opportunity to comment on the questionnaire or on other aspects that were of importance for our study at the end of the questionnaire, but none of the physicians mentioned the absence of any important person-related factors. We therefore believe that all relevant person-related factors were included in this study.

Conclusions

The results of this study confirm the importance of considering person-related factors during consultations. Both OPs and IPs regarded 8 of the 10 factors important enough to take into account during consultations. The factors optimism/pessimism and perceived health were seen as less important, and could possibly be disregarded in further research about person-related factors. The results indicate that OPs and IPs do not use just one method to obtain person-related information, but use various methods. However, OPs and IPs agree that it would be best to use a topic list during consultations. The different methods to obtain

person-related information that are described in this study and the reported example questions for obtaining information about the person-related factors, are relevant and could be helpful for occupational health professionals worldwide to obtain person-related information during their consultations with employees. The findings from this study and the examples of questions the physicians ask during the consultations, could also be used as input for the development of a new method for obtaining information about the important person-related factors, which could help OPs and IPs to increase the work participation of employees with health problems.

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CHAPTER 4

Obtaining person-related information from employees with chronic health problems: a focus group study

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Abstract

Purpose: The objective of this focus group study is to assess how occupational physicians (OPs) and insurance physicians (IPs) can best obtain information concerning person-related factors from employees. The research question was: what is the most effective way for OPs and IPs to obtain information concerning person-related factors, in the opinion of employees with chronic health problems?

Methods: Three focus group discussions were conducted comprising of a total of 23 employees with work limitations due to chronic health problems. Employees discussed how physicians could best obtain information related to ten person-related cognitions and perceptions that are associated with work participation. The discussions were recorded, transcribed verbatim and analyzed through qualitative content analysis.

Results: Employees indicated that information addressing person-related factors could best be obtained through discussing them directly during consultations, as opposed to the use of questionnaires or diaries. Important prerequisites to having fruitful conversations include a mutual trust between employee and physician, a sense of genuine physician interest, and the understanding of the physician of employees and their health concerns. Employees described various factors that influence these conversations, including the knowledge and communication skills of physicians, employee anxiety, and the atmosphere and time frame of the consultation.

Conclusions: Information concerning the person-related factors of employees can best be obtained by discussing them during consultations. However, there has to be mutual trust, interest and understanding before employees feel comfortable to talk about these factors with a physician. OPs and IPs should consider these, and other identified factors, when asking about person-related factors during consultations.

Introduction

Having a chronic disease can negatively impact participation in work.[1, 2] Occupational physicians (OPs) and insurance physicians (IPs) can play an important role in increasing work participation and limiting sickness absence under employees with a chronic disease, by intervening on factors which influence work participation.[3, 4] Certain perceptions and cognitions—such as motivation, self-efficacy, and expectations regarding recovery or return to work (RTW)—are important person-related factors that influence work participation.[5-7] A systematic review by De Wit et al.[8] demonstrated an association between work participation and ten person-related factors: expectations regarding recovery or RTW, optimism/pessimism, self-efficacy, motivation, feelings of control, perceived health, coping strategies, fear-avoidance beliefs, perceived work-relatedness and catastrophizing. For example, catastrophizing and fear-avoidance beliefs were associated with an increased time until RTW, whereas having positive expectations concerning RTW or recovery was a predictor of a shorter time until RTW.[8] Previous qualitative research has shown that both employees and physicians view person-related factors as important in work participation,[3, 9-12] making these factors key targets for interventions to increase work participation.

To intervene effectively on these factors, it is imperative that OPs and IPs are able to obtain information concerning those person-related factors that encourage or hinder work participation in employees. This can be achieved through physician-patient interaction during consultations. However, to obtain information concerning these factors, it is crucial that employees disclose information about these factors. Physician use of specific communication skills, such as asking open-ended questions and active listening, can encourage patients to share information about themselves.[13-15] It is possible that these techniques may also encourage employees to disclose more information concerning person-related factors during consultations.

This is, however, dependent on the communication skills of the individual physician. Physicians and patients can differ in their interpretation of physician communication skills; physicians who think they are communicating well may not always be perceived as good communicators by their patients.[16] These discrepancies can further limit the disclosure of important patient information, such as that concerning person-related factors. To enhance physician-patient communication and facilitate the disclosure of information regarding relevant person-related factors, it is important to evaluate patients' opinions concerning

how these factors should be discussed. The opinion of employees regarding how physicians should obtain person-related information is, however, yet unstudied. This study, therefore, poses the research question: what is the most effective way for OPs and IPs to obtain information concerning person-related factors, in the opinion of employees with chronic health problems?

Method

This qualitative study utilizes three focus group discussions (FGDs). We chose this study method because FGDs allow for the collation of a diverse range of participants and opinions: for example, through the inclusion of employees with different disabilities and different experiences with OPs and IPs. The moderator of a FGD can respond to questions from participants about complex or academic subjects (e.g. person-related factors) and can request more detailed responses from participants when clarification of their responses is needed.[17] The consolidated criteria for reporting qualitative research (COREQ) were used to comprehensively report the focus group process.[18]

Participants

FGD participants were recruited via a panel of more than 23,500 patients from the Patient Federation in the Netherlands, an association representing 170 patient and consumer organisations. In February 2018, members of the panel were invited by email to participate in one of the focus groups. In addition, four consumer organisations affiliated with the Patient Federation (Lung Foundation Netherlands, Heart Council, Kidney Patients Association Netherlands and Care Importance Brabant) were approached and agreed to send invitations to their members. Individuals were eligible to participate if they were employees who had experienced limitations during paid work due to chronic health problems, spoke Dutch fluently and were between 18 and 67 years of age. Employees who expressed interest in participating received information by email detailing the purpose of the FGDs, the person-related factors that would be discussed, the professional background of the interviewers, and possible dates for the FGDs.

Thirty employees agreed to participate in the study. Participants were assigned to one of the three focus groups, with the aim of achieving an equal spread of gender, age and disabilities over the groups. Three of the 30 employees who agreed to take part in the study were unable to participate due to other appointments or due to health problems. Four employees did not attend for reasons unknown. In total,

23 employees participated in the study, divided between the three focus groups (focus group A and B both had seven employees, and focus group C consisted of nine employees). Demographics of the participants are presented in Table 1.

Table 1. Demographic variables (gender, age, disability)

	Focus group A	**Focus group B**	**Focus group C**	**Total**
	n/N	***n/N***	***n/N***	***n/N***
Gender				
Male	3/7	4/7	4/9	11/23
Female	4/7	3/7	5/9	12/23
Age, mean (SD)	57.0 (5.7)	57.1 (4.6)	51.1 (8.2)	54.7 (7.1)
Disability				
Physical disability	6/7	4/7	4/9	14/23
Mental disability	-	2/7	4/9	6/23
Physical and mental disability	1/7	1/7	1/9	3/23

Procedure

The three FGDs were conducted between March and April 2018 at the Amsterdam UMC, location Academic Medical Center in Amsterdam. The moderator for each FGD was one of two male authors (CH or HW), respectively OP and IP. Both are employed at the Coronel Institute of Occupational Health, have a Doctorate of Medicine and of Philosophy and have previous experience in qualitative research and conducting FGDs. The discussions were recorded with an audio recorder, and field notes were taken by another author (MdW). The authors did not know the participants before the FGDs. Apart from the researchers and participants, no-one else was present during the FGDs.

Before the start of each two-hour FGD—all of which were conducted in Dutch—each participant signed an informed consent form. The FGDs started with an explanation of the purpose of the discussion, a brief introduction of the participants and an explanation of the structure of the FGD by the moderator. During the discussion that followed, the primary question addressed was: what is the most effective way for OPs and IPs to obtain information concerning person-related factors? The person-related factors defined were ten factors identified in a preceding systematic review.[8] The person-related factors were explained through ten case descriptions, presenting fictional situations in which the factor in question influenced the work participation of an employee with chronic health problems. During the discussion, the participants were encouraged to speak openly about their views and thoughts. When needed, the moderator asked the

participants to clarify their answers. At the end of each FGD, participants received a travel allowance and a gift card of 25 euros in return for their participation.

Data analysis

The recordings of the discussions were transcribed verbatim and anonymized. We did not send the transcripts back to the participants for comments or correction, and we did not ask for feedback on the findings. For data analysis purposes, we used qualitative content analysis.[19] The transcripts from the FGDs were coded using MAXQDA 12 Software.[20] Codes were assigned by one author (MdW) to segments of the transcript of the first two FGDs. These were then checked by a second author (HW). Disagreements about the coding were resolved by discussion. A coding framework consisting of main themes and subthemes was built by categorizing the codes. The main themes and subthemes were discussed between all authors until a consensus about the framework was reached. Following author consensus regarding the codes and coding framework, the transcript of the third FGD was coded using the coding framework by one author (MdW). The different themes of the coding framework are described in the "Results" section. To illustrate our findings, we have included quotations of participant discussions from the focus groups. A native English speaker translated these from Dutch into English.

Results

Coding framework

Four primary themes of discussion were identified from the FGD transcripts. They were defined as the main categories for the coding framework: (1) methods to obtain information concerning person-related factors, (2) prerequisites for talking about person-related factors during consultations, (3) positive influences on conversations concerning person-related factors, and (4) negative influences on conversations concerning person-related factors.

Methods to obtain information concerning person-related factors

Participants largely acknowledged the importance of obtaining person-related information and talked about three different ways to do this. In Table 2, the methods identified with the corresponding quotations of participants are presented.

Table 2. Identified methods to obtain person-related information

Method	Citation examples
Diary	Participant B3: "When you have those invisible consequences and, as a doctor, you want to find out: what is it? Fellow sufferers I know have sometimes compiled a weekly schedule. Every half hour. With a lot of gaps. Then the doctor asks: what are the gaps? They are the rest breaks I need. This could help you to find out what the weekly schedule of that man or woman is roughly like. And draw conclusions from that."
Questionnaire	Participant A6: "A checklist is also always dangerous, because it only lists the answers that you have never thought of before, but you never have room, or often don't have room, to write down what you are experiencing or what you have not thought of."
	Participant A5: "(…) And who reads it? I'm not going to write everything down if I don't know who will read it."
Discussing factors within consultations	Participant A5: "(…) So if I have a good contact with someone and feel that I'm able to speak out, that also gives you a sense of security."

One method for the physician to obtain information, according to the FGD participants, is to ask the employee to keep a diary and to discuss this during consultations. Employees may thereby record information such as their activities or feelings. In the opinion of some of the participants, discussing this diary with employees can help physicians to gain insight into the limitations the patient faces during the day and into the patient's cognitions and perceptions around this.

A second method described by participants was the use of a checklist or questionnaire. But participants expressed skepticism about using this method. They voiced concern that using a standardised preformat or checklist may limit the comprehensiveness of the answers an employee provides. Some participants felt that employees may not always give honest answers due to a fear that other people than the physician may read their answers.

Partially due to these limitations of checklists and questionnaires, most employees preferred to discuss the factors directly during their consultations with the physician. In contrast to keeping a diary and completing questionnaires, all participants had experience with consultations; this method, therefore, provided the bulk of discussion during the FGDs. Different factors were identified that could influence the effectiveness and development of conversations pertaining to person-related factors.

Prerequisites for obtaining information during consultations

Before effective questions can be asked by physicians about person-related factors during consultations, FGD participants defined a set of prerequisites they felt to be of importance. Table 3 shows these identified prerequisites, with corresponding quotations from the participants.

The most important prerequisite was a mutual trust between the employee and the physician. Trust is an important factor that can facilitate the disclosure of information. All participants agreed that without this trust, a meaningful conversation about person-related factors was not possible.

A second prerequisite was that the physician shows interest or demonstrates involvement with the employee. Participants agreed that it is important that employees feel they are being heard by the physician, and that, subsequently, obtaining information about person-related factors would be facilitated during the conversation when the physician shows a genuine interest in their situation and makes the employees feel like an individual.

The last described prerequisite was the understanding of the physician. Participants felt that it was important that the physician understands the employee's feelings and cognitions and acknowledges that these are not unusual.

Table 3. Prerequisites for discussing person-related factors during consultations

Prerequisites	Citation examples
Mutual trust between employee and physician	Participant B5: "(…) I agree with you: there needs to be an element of trust in the first instance and only then you can engage in discussion. Otherwise you can't."
	Participant C5: "So when it comes to the point where you are discussing personal factors, things really close and personal, then there needs to be a bond of trust."
Showing interest and involvement	Participants B4 and B2: "You want to be seen as a human being and not…" "…Just as a number."
Understanding	Participant C5: "(…) And that he acknowledges that you have those fears. That it's normal and that you can talk about it. I think that really helps a lot."

Positive influences on the development of conversations concerning person-related factors

Over the FGDs, it became apparent that a number of factors can positively influence the instigation and development of a conversation about person-related factors. These factors can be broadly divided into three different subthemes: (1) communication skills of the physician, (2) context of the conversation, and (3) knowledge of the physician, and are detailed in Table 4 along with corresponding quotations from participants.

Communication skills of the physician

Participants viewed it as very important that physicians listened carefully to employee responses, to prevent misinterpreting information about certain person-related factors. Furthermore, physicians should avoid closed questions and ask open questions to facilitate discussion around person-related factors during consultations. Such open questions may be focused on a variety of topics. Important themes to ask about included the work of the employee (e.g. "What adaptations have already been made?"), the employee's private situation (e.g. "What do you do on a day?"), the future of the employee (e.g. " How do you think you will continue in the future?"), the employee's complaints or concerns and what had been done to address them (e.g. "What are you struggling with?" and "What process have you started to recover?") and how the physician could help the employee (e.g. "What do you need to be able to resume part of your work?"). Some participants felt that it was important to end the conversation with a question about how the employee experienced the current consultation with the physician (e.g. "How did you find this consultation?"), in order for the physician to be able to improve future conversations concerning person-related factors with employees.

It is crucial that the physician makes the employee aware of what improvements are realistic and defines boundaries for the activities of the employee. The physician should focus on regaining health rather than returning to work. The consultation was felt to run more smoothly when the physician adopted the role of a coach. The physician should give tips for the employee to improve the current situation, should set small goals for the employee and should show appreciation when small goals are reached, or progress is made.

Context of the conversation

FGD participants emphasized the value of leaving enough time in consultations to discuss person-related factors and structuring successive consultations accordingly. Some participants felt that physicians should not address these

factors immediately but should wait until sufficient rapport is established between physician and employee to allow the employee to feel comfortable to discuss them. Some employees even thought that a physician should not begin to address the factors until the second or third consultation. It is essential that the overall atmosphere of the conversation is pleasant before the physician starts to talk about the factors.

Knowledge of the physician

Participants agreed that a physician would obtain more information about person-related factors if they developed greater personal knowledge of the employee. Physicians need to be aware of the intellectual level of the employee, therefore, they can adapt their way of talking accordingly. Also paramount was that the physician had sufficient information about the disease or disorder of the employee and the (invisible) impairments that might exist as a result of this. The physician needs to be aware that the employee complaints and corresponding cognitions and perceptions may differ between individuals and can change over time. In addition to this, discussions around patient-related factors were described to be more effective when the physician knew something of the company, the employer and the corporate culture in which the employee works.

Negative influences on the development of conversations concerning person-related factors

Aside from positive factors, participants also discussed issues that negatively influenced the instigation and development of a conversation. These negative influences described were diverse, but can be broadly divided into four different subthemes: (1) negative influences of the occupational health and social security systems, (2) negative influences of the physician, (3) negative influences of the employee, and (4) negative influences of the employer. Table 5 summarises the different negative influences and provides some corresponding quotations from participants.

Table 4. Positive influences on the development of conversations concerning person-related factors

Positive influences	Citation examples
Communication skills of physician	
Listening	Participant B1: "That people judge instead of remaining open and listening, because if they listen to you they'll soon hear that you would very much like to go to work. "
Asking open questions	Participant B6: "Don't ask closed questions."
Explaining what is realistic and defining boundaries	Participant A5: "(…) I think it's good if the occupational physician makes an effort to.. yes, generate some kind of awareness in someone. About what is genuinely realistic."
Focusing on getting better instead of returning to work	Participant A2: "(…) The patient's first priority is recovery. And... I think that that should also be something that the occupational physician focuses on. The first priority is to get better or if you can't get better to learn to deal with the situation you're in."
Coaching and offering help	Participant A5: "I don't need to hand over control, I consider it my responsibility, but coach me, I'm very willing."
Setting small goals	Participant C6: "If the occupational physician maybe looks at his home situation, what he's doing at that moment and then sets small targets to see what progress can be made and what problems he faces. Then you can also see, yes, whether there is progress and whether he can take on certain things. And also where his problems lie, what's going wrong."
Expressing appreciation	Participant B5: "(…) But it's important to keep hearing that you're on the right track. That's good."
Context of conversation	
Taking enough time	Participant A3: "Particularly here I think, that's why I feel that it's so important to invest time at the start, because you don't usually discuss it in the first meeting but if you actually invested time in the first meeting, it might be easier to broach in the third or fourth meeting (…)"
Atmosphere of the conversation	Participant C1: "But the first thought that came to mind was: it really makes a difference what atmosphere you are entering."
Knowledge of the physician	
Having knowledge about the employee	Participant B5: "The better you know the person sitting opposite you, and that it's great if you know who is sitting opposite you. What are your hobbies? Because if you can't work, but you do walk to your vegetable patch every day, so to speak. It must be possible to make some kind of link and then you can connect it back to your work."
Having knowledge about problems/ complaints of the employee	Participant B3: "(…) Try to get to the bottom of what that person is really suffering from."
Having knowledge about the working environment of the employee	Participant A3: "I think it may be easier to engage in discussion with an occupational physician if they make it clear that they understand the company and your working environment."

Negative influences of occupational health and social security systems

A significant negative influence on conversations described by participants was a low frequency of contact between employees and physicians. Physicians were often not accessible and getting in touch with them could prove very difficult. FGD participants sometimes did not have any direct contact with OPs, and only had contact with a designated case manager. This makes discussing person-related factors with OPs impossible. In contrast, other participants stated that discussions around person-related factors could be impeded by continually changing the physician they had contact with, and so, despite multiple consultations, they would never see the same physician twice.

Another factor described as negatively influencing employee-physician conversations was that participants felt that social security organisations and employers were often focused on financial issues, rather than the wellbeing of employees. Participants stated that sometimes economic interests would seem to be more important than human interests. Other participants felt that the physician's role was merely to limit the costs of the employer, instead of helping employees to get better. Despite this perceived overemphasis regarding money, many participants felt that physicians did not always take the reduced income of the employee into account. Feelings such as this lead to distrust towards the physician and this can disrupt and impede conversations about person-related factors.

A final negative influence of the occupational health and social security systems is that employees often have little knowledge of the working practices of OPs and IPs, and about the disability assessment. Participants described that it is not always clear when they need to talk to physicians and where employees should go to get more information regarding this. This lack of adequate information can lead to uncertainty and anxiety in employees, which in turn can have negative consequences in developing conversations concerning person-related factors.

Negative influences of the physician

Participants also described that the physician could exert a negative influence on conversations pertaining to person-related factors. A lack of time on the part of the physician—specifically not taking the time to ask about person-related factors—will limit the possibility of obtaining person-related information. Some participants felt that physicians sometimes put too much pressure on employees to return to work, which may in turn have a negative influence on the development of the conversation.

Table 5. Negative influences on the development of conversations concerning person-related factors

Negative influences	Citation examples
Negative influences of the occupational health and social security systems	
Physician not being accessible	Participant C3: "Here, things are arranged in such a way that you're obliged to make an appointment with the occupational physician via the consultant. Otherwise, you just don't have access."
Lack of contact with physicians	Participant C2: "(…) After six months or a year, I was still ill and then had completely different occupational physicians again, and I didn't have to go to the labor expert anymore because they said the situation was clear. And then suddenly I don't hear anything anymore."
Employees being allocated different physicians	Participant C2: "(…) That's right, because I never spoke to the same doctor again throughout the entire process. (…) I'm always dealing with different people, so I, I just don't know them."
Focus on money	Participant C1: "Putting the employee first—I have the feeling that it is more about putting costs first."
Not taking into account the reduced income of the employee	Participant C8: "Everyday aspects of life are often forgotten. That you have a loss of income and a family to support and have to get by on 70% and it often gets forgotten what all that involves (…)"
Employees not receiving adequate information about the process	Participant C1: "I have no idea who I'm going to speak to or when."
Negative influences of the physician	
Lack of physician time	Participant C2: "(…) I don't know if they'll manage it in the time that he has."
Not asking about person-related factors	Participant C1: "Some questions aren't even asked by the occupational physician."
Exerting too much pressure to return to work	Participant A2: "(…) Yes, all that guy ever does is try to get me back to work as soon as possible… I say nothing, because he may actually be able to find a gap that (…)"
Negative influences of the employee	
Anxiety in general	Participant A7: "(…) I do feel anxious in one-to-one discussions with the occupational physician."
Anxiety about disability assessment	Participant C2: "(…) But now I find I'm bracing myself for the UWV (Employee Insurance Agency) doctor who will assess me."
Anxiety about disclosing information	Participant B7: "I'm not honest about that. I pretend there's nothing wrong with me."
Negative influences of the employer	
Communication/cooperation between employer and physician	Participant C1: "And I think that an occupational physician if he would have an independent position, and not be paid by the employer or the UWV. But genuinely independent, just like a general practitioner."

Table 5. Continued

Negative influences	Citation examples
Conflicts between employer and employee	Participant C2: "(…) And before that I had a job with a manager who was an absolute monster. I would have preferred to have reported sick back then, something along the lines of: I've got you, than at the place where I was working at the time I reported sick."

Negative influences of the employee

Almost all FGD participants agreed that employee feelings of anxiety could negatively impact conversations concerning person-related factors. Most of this anxiety appeared to be centered around the disability assessment by the IPs, with employees reticent to disclose too much information for fear of negative consequences for the disability assessment. Other participants described anxiety around disclosing too much or too little information towards colleagues and employers concerning their health problems.

Negative influences of the employer

The employer can also have a negative impact on the conversation between employee and physician. Owing to the communication between the employer and physician, FGD participants felt that the confidentiality usually afforded to doctor-patient interactions was not present, leading employees to lack the feeling of trust needed to open up in conversations. These feelings of distrust can be increased when there are conflicts between the employee and employer.

Discussion

Key findings

Employees with work limitations due to chronic health problems acknowledge the importance of person-related factors in their management and are most comfortable sharing these factors with OPs and IPs directly in consultations. Trust, understanding and interest were considered essential to allow effective discussion or conversations concerning person-related factors. Aside from these prerequisites, issues pertaining to the communication skills of the physician, the knowledge of the physician, and the context of the consultation were identified being able to impact the development of the conversation positively. Employees identified issues related to occupational health and social security systems, the physician, the employer and the employee which can negatively influence the instigation and development of such conversations.

Trust between employee and physician was perceived as the most important prerequisite for obtaining person-related information during consultations. This is in accordance with previous studies that describe the importance of trust for patients in disclosing information during conversations about medical issues.[21-23] An interview study by Julliard et al.[21] identifies trust, compassion and respect, as prerequisites for patients sharing health information with their physician. Studies by Main et al.[22] and Kelak et al.[23] also emphasize the importance of trust for disclosing information during consultations.

According to Ridd et al.[24] and Skirbekk et al.[25], trust arises when patients and physicians spend more time with each other in consultations. This is consistent with our findings that employees valued physicians taking time to develop a mutual trust before addressing person-related factors. This association between spent time in consultations and trust could also help to explain why a lack of contact with the physician and limited accessibility were perceived as negative influences on the development of conversations concerning person-related information. In addition, employees described the negative influence of seeing different physicians each time. All of these factors limit the time that employees spend with the same physician, potentially disrupting the process of building trust.[24, 25] Appropriate timing of conversations about personal-related factors—as well as taking enough time to discuss them—are essential for obtaining reliable person-related information during consultations.

Other prerequisites for obtaining information about person-related factors involved the physician showing interest, being involved and understanding. This is consistent with results of a review by Ridd et al.[24] showing that patients value doctors who appear interested during consultations, and results of a study by Kelak et al.[23] in which involvement of the physician was identified as a critical component for patients to disclose information. The results are also supported by a study by Mazzi et al.[26], in which taking the patient seriously and treating the patient as a person were identified as two of the five most important recommendations from patients for physicians in order to make consultations more effective.

Participants of the FGDs identified, in addition, a number of different factors that may influence the development of the conversation about person-related factors. Several factors, such as listening, asking open questions, and having knowledge about the patient's complaints have also been identified in other studies as important factors for the development of medical consultations.[13, 21-23, 26, 27] Other studies also identified factors which were important for the development of the consultation,

that were not mentioned by our participants, such as the importance of non-verbal signals from physicians, like keeping eye contact with the patient.[22, 28, 29]

Strengths and limitations

A strength of our study is that the focus groups consisted of participants with different types of disabilities, making the findings generalizable to employees with various health problems. Another strength is that the experiences of the patients with physicians diverged from positive to very negative, providing information about both facilitators and barriers to obtaining information about person-related factors.

A limitation of this study is the participants had difficulty answering some of the questions asked during the FGDs. Instead of talking about how to obtain information about cognitions and perceptions, participants had the tendency to talk about different ways to change the cognitions and perceptions of the employee. Although this information can be useful in future research, it was not included in this study because it did not help us in answering our research question.

Implications for practice and future research

We recommend that physicians consider person-related factors during their consultations to increase work participation in employees with health problems. Physicians should be especially aware that trust, understanding and showing interest are essential in order for an employee to feel comfortable to disclose person-related information during these conversations. Physicians need to be accessible for employees and need to be aware that time frames are crucial when talking about person-related factors. During the conversation, we recommend that physicians listen to the employee and ask open questions regarding different subjects, such as the employee's work, thoughts about the future, complaints, and about possible ways to help the employee. This increases the knowledge of the physician about the employee and the employee's situation and can prove to be beneficial in the development of conversations addressing person-related factors.

This study indicated that—from employees perspective—the most crucial prerequisite for discussing person-related factors during consultations is trust. Therefore, it is important that future research examines how mutual trust between physician and employee can arise, be maintained, or be increased. However, numerous factors were identified which can negatively influence the conversation

about person-related factors, making discussing these factors a complex process. This might be one of the reasons why some physicians, according to the participants, do not always ask about all these person-related factors. Future research might be needed to examine the reasons why physicians do not always discuss all person-related factors, or to study the factors that make discussing these factors difficult from the perspective of physicians. Despite the complexity of conversations concerning person-related factors, as far as we know, there is no tool or training available to help OPs and IPs structure these conversations. We recommend that researchers use the information from this study to develop such a tool or training program. Additionally, considering all person-related factors during consultations is time-consuming for the physician. Therefore, it is also of importance that future researchers determine whether considering person-related factors during consultations really improves the practices of OPs and IPs to increase work participation of employees with health problems.

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CHAPTER 5

Interventions on cognitions and perceptions that influence work participation of employees with chronic health problems: a scoping review

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Abstract

Background: Cognitions and perceptions, such as motivation and return to work (RTW) expectations, can influence work participation of employees with chronic health problems. This makes these cognitions and perceptions important factors for occupational health professionals to intervene upon in order to increase work participation. There is, however, no overview of interventions that influence these factors and are aimed at increasing work participation. Therefore, the purpose of this scoping review is to explore available interventions that are focused on cognitions and perceptions of employees with chronic health problems and aimed at increasing work participation.

Methods: A scoping review was carried out following the framework of Arksey and O'Malley. Ovid MEDLINE and PsycINFO were searched for original papers published between January 2013 and June 2020. We included studies that describe interventions that focus on at least one of ten cognitions and perceptions and on work participation. The risk of bias of the studies included was assessed using quality assessment tools from the Joanna Briggs Institute.

Results: In total, 29 studies were identified that studied interventions aimed at changing at least one of ten cognitions and perceptions in order to change work participation. The interventions that were included mainly focused on changing recovery and RTW expectations, self-efficacy, feelings of control, perceived health, fear-avoidance beliefs, perceived work-relatedness of the health problem, coping strategies and catastrophizing. No interventions were found that focused on changing motivation or on optimism/pessimism. Four interventions were judged as effective in changing coping, self-efficacy, fear-avoidance beliefs, or perceived work-relatedness and work participation according to results of randomized controlled trials.

Conclusions: This review provides an overview of interventions that focus on changing cognitions and perceptions and work participation. Evidence was found for four effective interventions focused on changing these factors and increasing work participation. Occupational health professionals may use the overview of interventions to help employees with chronic health problems to increase their work participation.

Background

Occupational health professionals (OHPs) play an important role in increasing work participation in employees with chronic health problems. By OHPs, we refer to all professionals who make decisions about work participation or about receiving benefits for employees with health problems. In their practice it is important for them to focus on factors that may influence the work participation of these employees.

According to the International Classification of Functioning, Disability and Health (ICF model) different domains of factors can influence a person's work ability: disease-related factors, external factors and personal factors.[1] Personal factors that can influence work participation are cognitions and perceptions of employees.[2-4] In contrast to some other factors, cognitions and perceptions of employees are not always easy to recognize by OHPs. In addition, some employees may not even be aware that they have cognitions and perceptions that limit their work participation. In a study by De Wit et al.[2], six cognitions and perceptions were identified that were positively associated with work participation: positive recovery and return to work (RTW) expectations, optimism, self-efficacy, motivation, feelings of control, and perceived health. Four cognitions and perceptions were negatively associated with work participation: fear-avoidance beliefs, perceived work-relatedness of the health problem, limiting coping strategies and catastrophizing.[2] The association between these ten cognitions and perceptions and work participation makes them important targets for intervention.

To promote work participation in employees with chronic health problems, relevant cognitions and perceptions should be identified. Next, the hindering cognitions and perceptions should be limited and the positive cognitions and perceptions fostered.[2]

To help employees who have cognitions and perceptions that can negatively influence work participation or to foster positive cognitions and perceptions, it is important for OHPs to get an overview of available interventions that may help to influence these factors. OHPs can recommend these interventions in order to increase work participation. However, as far as we know, no such a review about these interventions exists. Therefore, the purpose of this scoping review is to explore available interventions that are focused on at least one of the cognitions and perceptions and aimed at increasing work participation of employees with chronic health problems. The main question for this study is: Which interventions

are available that are focused on cognitions and perceptions and aimed at increasing work participation of employees with chronic health problems?

Methods

Methodology

To answer our research question, we conducted a scoping review. We chose for a scoping review, because in contrast to a systematic review we do not have a focused research question on finding evidence for an association between variables. Instead, we have a broad and explorative research question about available interventions. In addition, we aim to summarize and disseminate our research findings to physicians and to consult physicians and patient representatives to get feedback on our findings, which is an essential component of scoping reviews.[5]

We used the Joanna Briggs Institute Reviewers' Manual for methodology for Scoping Reviews[6] and the scoping review framework of Arksey and O'Malley[7] for conducting the review. This framework consists of six stages for conducting a scoping review: 1) identifying the research question, 2) identifying relevant studies, 3) study selection, 4) charting the data, 5) collating, summarizing and reporting the results, and 6) consultation. We used the PRISMA Extension for Scoping Reviews (PRISMA-ScR) Checklist for making sure that we reported all the relevant components of this scoping review.[8]

Identifying the research question

The main question of this scoping review, as identified in the introduction is: Which interventions are available that are focused on cognitions and perceptions and aimed at increasing work participation of employees with chronic health problems?

Identifying relevant studies

The search strategy was developed with the help of a research librarian (JD). In order to find relevant words in titles and abstracts that can be used in the full search strategy, we first performed a limited search in Ovid MEDLINE to identify relevant articles. The complete search strategy consists of terms related to three elements of the PICO. In this review the population (P) are employees of working age (18-67 years) with chronic health problems. We defined chronic health problems according to the definition of the World Health Organization: Diseases with long

duration and generally slow progression.[9] The interventions (I) in this review are interventions that focus on at least one of the ten cognitions and perceptions that are associated with work participation: expectations regarding recovery or RTW, optimism/pessimism, self-efficacy, motivation, feelings of control, perceived health, fear-avoidance beliefs, perceived work-relatedness, catastrophizing and coping strategies.[2] In this review, work participation is the outcome (O), and this covers concepts such as RTW, sickness absence and current work status. With the full search strategy we looked for relevant articles in Ovid MEDLINE and PsycINFO. The two search strategies are presented in Appendix 1.

Inclusion criteria

Only studies recently published, between January 1st 2013 and June 15th 2020, in peer-reviewed journals were included. Cohort studies, (randomized) controlled trials, and studies with pre-test post-test designs were included. Reference lists from relevant reviews and meta-analyses we found were screened for additional relevant studies. Articles were only considered eligible for inclusion if they were available in English or Dutch.

Exclusion criteria

Case studies and qualitative studies were excluded from this review. We also excluded articles in which participants are younger than 18 or older than 67 years, are students, are military personnel or veterans, are volunteers (no paid job) or are employees with substance abuse problems.

Study selection

For identifying and selecting relevant studies, we used the web application Rayyan.[10] The title and abstract of all records were independently screened on relevance based on previously identified inclusion and exclusion criteria by two reviewers (MdW and HW, MdW and CH, MdW and AdB or MdW and BH). For every excluded article, at least one reason for exclusion was reported by the researchers. If there was disagreement about possible relevance of these studies, the reasons for exclusion were discussed by the researchers until consensus was reached about inclusion or exclusion. If the researchers thought the article was potentially relevant, the full article was read and independently screened for relevance by two reviewers (MdW and BH). Disagreements about inclusion of the studies after reading the full text were discussed with all researchers until consensus was reached about inclusion or exclusion. The reference lists of reviews and meta-analyses that were found were independently screened for additional relevant studies by two reviewers and possible relevance of these studies was discussed (MdW and BH).

Charting the data

For data charting we used a charting table drawn up by the research team. In this table, the following characteristics of the studies included in the review were described: first author, year of publication, country, study design, characteristics of study population (number of participants, mean age, gender, health status) and intervention types (duration, number and type of sessions, providers of the intervention, main components of the intervention). In addition, we described the cognitions and perceptions in that study, how they are measured and the follow-up period. Finally, we described the effect of the intervention on the cognition or perception of interest and on work participation. The data were charted by two researchers (MdW and BH). All data charting was discussed between the two researchers until consensus was reached. After this, the other researchers (AdB, HW, CH) each checked one third of the data-extraction, so that all data were ultimately checked.

Collating, summarizing and reporting the results

We assessed the quality of the studies with the assessment instruments of the Joanna Briggs Institute, which has different criteria for different study types, and we presented the scores in tables.[11] The detailed characteristics of the studies are presented in the Appendix. We presented the effects of the interventions from the eligible studies per factor in two tables, one table for interventions that were studied in randomized controlled trials (RCTs) and one table for interventions that were studied with other study designs. In these tables we presented the health problems of the study population, the name and type of the intervention of interest, and the effect of the intervention on the cognition or perception and on work participation. We also reported whether, based on the findings in our review, the intervention should be recommended by OHPs.

Consultation

The last stage in the framework of Arksey and O'Malley[7] is the consultation of stakeholders. We consulted OHPs and a patient representative by e-mail or in a face-to-face meeting to obtain feedback on the findings. In the Netherlands the two important groups of OHPs are occupational physicians (OPs) and insurance physicians (IPs). OPs focus particularly on prevention of work-related diseases, health promotion, and in guiding employees with health problems in their RTW or in retaining work. IPs try to help to increase work participation in these employees by evaluating the functional abilities of the employee and by determining whether employees should receive a work disability benefit. We asked the OPs, IPs and patient representative about their experience with the interventions or

components of the interventions and what to consider when a physician wants to recommend the interventions in daily practice. During the face-to-face meeting notes were made by the researcher (MdW). The most important notes and the answers by email were summarized by one researcher (MdW) and checked by the other researchers (AdB, CH, and HW). We used the feedback from the OPs, IPs and patient representative to describe the implications for practice in order to make the results of this study more practical for OHPs.

Results

Studies selected

The search process is presented in Figure 1. In total, 4429 studies were found in PsycINFO and 5520 studies in Ovid MEDLINE. Twenty-nine studies were included in this review. The final sample consisted of sixteen RCTs, nine cohort studies, three studies with a single group pre-test post-test design and one non-randomized experimental study.

Table 1 and Table 2 describe the effect of the interventions in question on cognitions and perceptions and on work participation. They also indicate whether OHPs should recommend the intervention to employees—a matter that remains unclear for a couple of interventions because the effects of the interventions are not compared between an intervention and a control group. Detailed characteristics of the final studies that were included in this review are presented in Appendix 2.

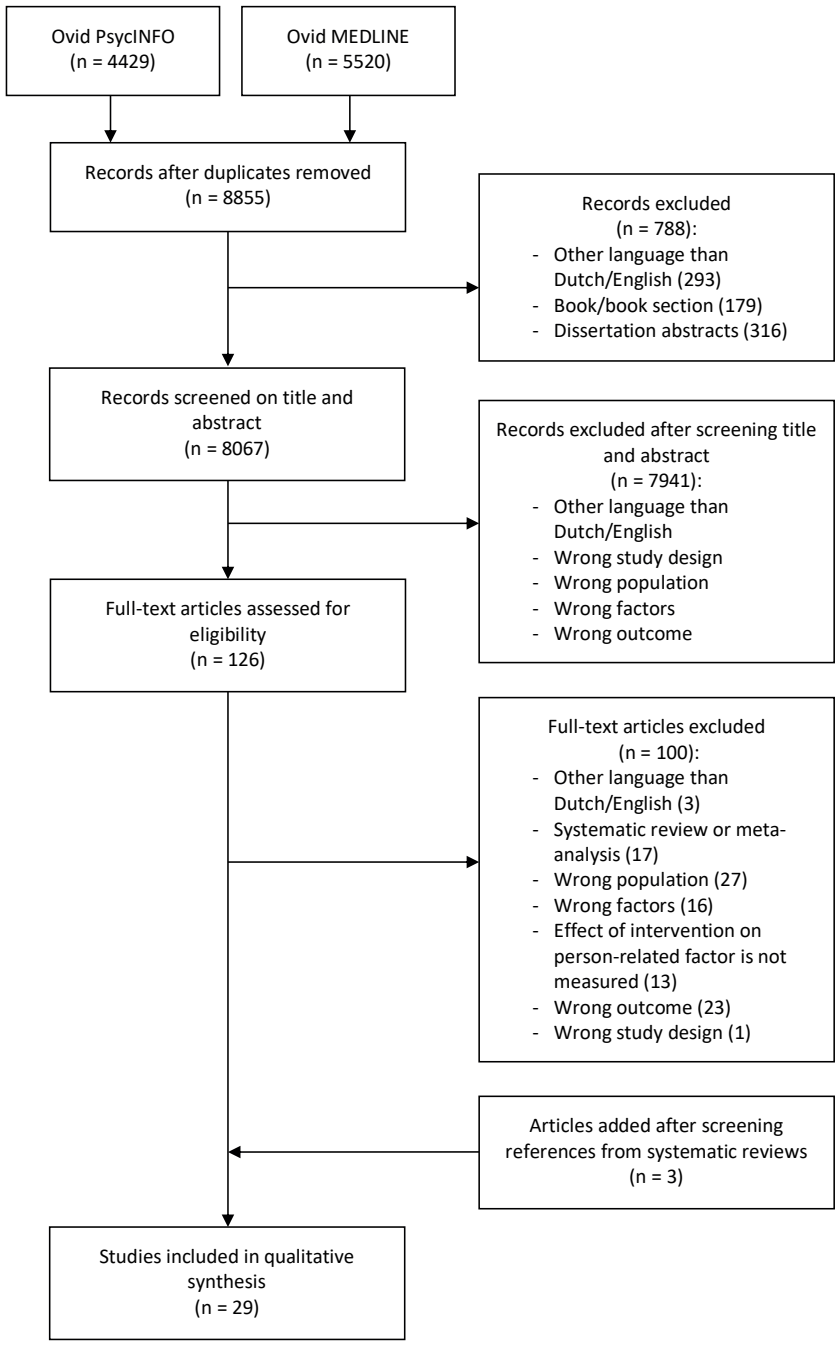

Figure 1. Flowchart of the search process

Table 1. Effect of interventions studied in randomized controlled trials

Study	Health problem population	Name of intervention	Intervention type	Significant positive effect on cognition or perception compared to control group	Significant effect on work participation compared to control group	Should OHPs recommend this intervention?
Self-efficacy						
Hampel et al. 2019[12]	Chronic low back pain	Combined cognitive behavioral pain competence and depression prevention training	Intervention including standard multidisciplinary rehabilitation, pain competence training, depression prevention training and homework assignments	**Yes**[a]	**Yes**	**Yes**
Hees et al. 2013[13]	Major depressive disorder	Occupational therapy	Intervention focused on problem clarification, coping with stressors and making a re-integration plan	No	No	No
Hutting et al. 2015[14]	Chronic non-specific complaints of the arm, neck or shoulder	Self-management intervention	Intervention focused on setting targets for behavior and making action plans including an eHealth module about self-management	No	No	No

Table 1. Continued

Study	Health problem population	Name of intervention	Intervention type	Significant positive effect on cognition or perception compared to control group	Significant effect on work participation compared to control group	Should OHPs recommend this intervention?
Muschalla et al. 2016[15]	Orthopedic disorders, cardiologic disorders, neurological disorders	Cognitive behavioral group intervention on work-anxiety	Intervention focused on problem solving, situation and behavior analysis and developing and training coping strategies	No	Yes[a]	No
Wormgoor et al. 2020[16]	Common mental complaints	Brief psychotherapy	Intervention focused on normalizing, accepting and coping with mental health complaints and their hindrance for work participation	No	Yes[b]	No
Perceived health						
Fauser et al. 2019[17]	Cancer	Conventional medical rehabilitation plus additional work-related modules	Intervention including exercise therapy, occupational therapy, psychological counseling and work-related functional capacity training	No	No	No
Pedersen et al. 2015[18]	Anxiety, depression, other mental illness, stress and burnout, musculoskeletal disorders	Psychoeducation	Intervention with lectures and discussions about problem solving techniques and coping strategies and sessions with relatives	No	No	No

Table 1. Continued

Study	Health problem population	Name of intervention	Intervention type	Significant positive effect on cognition or perception compared to control group	Significant effect on work participation compared to control group	Should OHPs recommend this intervention?
Van Eijk-Hustings et al. 2013[19]	Fibromyalgia	Multidisciplinary intervention with aftercare	Intervention consisting of sociotherapy, physiotherapy, psychotherapy, creative therapy and an aftercare program	No	No	No
Feelings of control						
Muschalla et al. 2016[15]	Orthopedic disorders, cardiologic disorders, neurological disorders	Cognitive behavioral group intervention on work-anxiety	Intervention focused on problem solving, situation and behavior analysis and developing and training coping strategies	No	Yes[a]	No
Pedersen et al. 2015[18]	Anxiety, depression, other mental illness, stress and burnout, musculoskeletal disorders	Psychoeducation	Intervention with lectures and discussions about problem solving techniques and coping strategies and sessions with relatives	Yes[c]	No	No
Catastrophizing						
Hutting et al. 2015[14]	Chronic non-specific complaints of the arm, neck or shoulder	Self-management intervention	Intervention focused on setting targets for behavior and making action plans including an eHealth module about self-management	No	No	No

Table 1. Continued

Study	Health problem population	Name of intervention	Intervention type	Significant positive effect on cognition or perception compared to control group	Significant effect on work participation compared to control group	Should OHPs recommend this intervention?
Rolving et al. 2015[20]	Degenerative disc disease or spondylolisthesis	Cognitive behavioral therapy	Intervention with group discussions about pain perception, coping, pacing principles and RTW including homework assignments about thoughts and feelings in relation to stressful situations, coping strategies, and setting goals	Yes[d]	No	No
Fear-avoidance beliefs						
Aasdahl et al. 2019[21]	Musculoskeletal, psychological or general and unspecified diagnosis	Short inpatient program	Intervention including acceptance and commitment therapy, physical training, mindfulness, psychoeducation, meetings with an employer and making a RTW plan	No	-	No
Aasdahl et al. 2019[21]	Musculoskeletal, psychological or general and unspecified diagnosis	Long inpatient program	Intervention including acceptance and commitment therapy, physical training, mindfulness, psychoeducation, outdoor activities, a network day and making a RTW plan	No	-	No

Table 1. Continued

Study	Health problem population	Name of intervention	Intervention type	Significant positive effect on cognition or perception compared to control group	Significant effect on work participation compared to control group	Should OHPs recommend this intervention?
Granviken et al. 2015[22]	Subacromial impingement	Supervised exercise intervention	Intervention with a theory lesson about rehabilitation, supervised exercise therapy focused on movement patterns and home exercises	No	No	No
Harris et al. 2017[23]	Non-specific low back pain	Group physical exercise	Intervention with physical exercise in groups and sessions about coping, chronic pain and ergonomics	No	No	No
Harris et al. 2017[23]	Non-specific low back pain	Group cognitive behavioral therapy	Intervention with homework consisting of exposure to pain-provoking physical activity and group discussions to change dysfunctional thoughts	No	No	No
Marchand et al. 2015[24]	Neck and/or back pain	Work-focused intervention	Intervention including contact with a caseworker about work and obstacles to RTW and creating a RTW schedule	No	No	No
Ronzi et al. 2017[25]	Non-specific chronic low back pain	Ambulatory individual physiotherapy	Intervention with individual sessions with active exercises supervised by a physiotherapist and home exercises	No	No	No

Table 1. Continued

Study	Health problem population	Name of intervention	Intervention type	Significant positive effect on cognition or perception compared to control group	Significant effect on work participation compared to control group	Should OHPs recommend this intervention?
Ronzi et al. 2017[25]	Non-specific chronic low back pain	Mixed strategy	Intervention with individual and group sessions with physiotherapy and discussions about beliefs and meetings with a psychologist	No	No	No
Vibe Fersum et al. 2013[26]	Non-specific chronic low back pain	Classification-based cognitive functional therapy	Intervention with focus on outlining the vicious cycle of pain based on examination findings, movement exercises and tailored physical activity	**Yes**	**Yes**	**Yes**
Perceived work-relatedness						
Muschalla et al. 2016[15]	Orthopedic disorders, cardiologic disorders, neurological disorders	Cognitive behavioral group intervention on work-anxiety	Intervention focused on problem solving, situation and behavior analysis and developing and training coping strategies	**Yes**	**Yes**[a]	**Yes**
Coping strategies						
Arends et al. 2014[27]	Common mental disorders	Stimulating healthy participation and relapse prevention at work intervention	Intervention focused on the process of problem solving including inventory of problems, brainstorming about solutions and making an action plan	**Yes**[c, d]	**Yes**	**Yes**
Fauser et al. 2019[17]	Cancer	Conventional medical rehabilitation plus additional work-related modules	Intervention including exercise therapy, occupational therapy, psychological counseling and work-related functional capacity training	No	No	No

Table 1. Continued

Study	Health problem population	Name of intervention	Intervention type	Significant positive effect on cognition or perception compared to control group	Significant effect on work participation compared to control group	Should OHPs recommend this intervention?
Harris et al. 2017[23]	Non-specific low back pain	Group physical exercise	Intervention with physical exercise in groups and sessions about coping, chronic pain and ergonomics	No	No	No
Harris et al. 2017[23]	Non-specific low back pain	Group cognitive behavioral therapy	Intervention with homework consisting of exposure to pain-provoking physical activity and group discussions to change dysfunctional thoughts	No	No	No
Hees et al. 2013[13]	Major depressive disorder	Occupational therapy	Intervention focused on problem clarification, coping with stressors and making a re-integration plan	No	No	No
Muschalla et al. 2016[15]	Orthopedic disorders, cardiologic disorders, neurological disorders	Cognitive behavioral group intervention on work-anxiety	Intervention focused on problem solving, situation and behavior analysis and developing and training coping strategies	**Yes[c]**	**Yes[a]**	**Yes**

RTW: Return to work, OHPs: Occupational health professionals

Underlined studies had a low risk of bias, bold studies describe interventions that should be recommended by OHPs

[a] Depends on population characteristics; [b] Not for every moment on which the outcome is measured; [c] Depends on the form/subscale of the factor; [d] Not for every moment on which the cognition or perception is measured

Table 2. Effect of interventions studied in cohort studies, non-randomized experimental studies and pre-test post-test studies

Study	Health problem population	Name of intervention	Intervention type	Significant positive effect on cognition or perception over time	Significant positive effect on work participation over time	Significant positive effect on work participation through change in cognition or perception	Should OHPs recommend this intervention?
Self-efficacy							
Chu et al. 2015[28]	Chronic non-cancer pain	Comprehensive outpatient pain engagement program	Intervention with education about pain pathophysiology, behavioral training, exercises, thought management and activity planning	Yes	Yes	-	Unclear
Jensen 2013[29]	Mental illness, musculoskeletal illness, mental and musculoskeletal illness	RTW intervention	Intervention including making an individually tailored rehabilitation plan, physical exercises, an ergonomic course and cognitive therapy	No	Yes[a]	Yes	No
Leensen et al. 2017[30]	Cancer	Multidisciplinary rehabilitation program	Intervention with supervised interval and resistance exercises and counseling sessions with advice on work resumption	Yes[b]	Yes	-	Unclear
Salzwedel et al. 2020[31]	Cardiovascular diseases	Standardized comprehensive cardiac rehabilitation	Intervention including risk-factor modification, exercise training, psychosocial interventions, vocational assessment and counseling	Yes	NR	-	Unclear

Table 2. Continued

Study	Health problem population	Name of intervention	Intervention type	Significant positive effect on cognition or perception over time	Significant positive effect on work participation over time	Significant positive effect on work participation through change in cognition or perception	Should OHPs recommend this intervention?
Perceived health							
Chu et al. 2015[28]	Chronic non-cancer pain	Comprehensive outpatient pain engagement program	Intervention with education about pain pathophysiology, behavioral training, exercises, thought management and activity planning	Yes	Yes	-	Unclear
Haiduk et al. 2017[32]	Chronic neck pain	The 4 interdisciplinary pain program	Intervention with physiotherapy, strength training, occupational therapy, cognitive behavioral and coping therapy and relaxation	Yes[b]	NR	-	Unclear
Jensen 2013[29]	Mental illness, musculoskeletal illness, mental and musculoskeletal illness	RTW intervention	Intervention including making an individually tailored rehabilitation plan, physical exercises, an ergonomic course and cognitive therapy	No	Yes[a]	Yes	No

Table 2. Continued

Study	Health problem population	Name of intervention	Intervention type	Significant positive effect on cognition or perception over time	Significant positive effect on work participation over time	Significant positive effect on work participation through change in cognition or perception	Should OHPs recommend this intervention?
Pietilä-Holmner et al. 2020[33]	Chronic musculoskeletal pain	Multimodal rehabilitation program	Intervention with physical exercise, relaxation, education in pain management and training in coping strategies based on cognitive behavioral therapy	Yes	Yes	-	Unclear
Recovery or RTW expectations							
Aasdahl et al. 2018[34]	Musculoskeletal, psychological or general and unspecified diagnoses	Short inpatient program, long inpatient program, outpatient program	Interventions including acceptance and commitment therapy, physical training, mindfulness, psycho-education, problem solving sessions and making a RTW plan	Yes	NR	Yes	Unclear
Catastrophizing							
Adams et al. 2017[35]	Major depressive disorder	Risk-targeted activity-reintegration intervention/ Progressive goal attainment program	Intervention focused on goal setting, activity planning and learning techniques for targeting disability beliefs including problem solving challenges and exposing techniques	Yes	NR	Yes	Unclear

Table 2. Continued

Study	Health problem population	Name of intervention	Intervention type	Significant positive effect on cognition or perception over time	Significant positive effect on work participation over time	Significant positive effect on work participation through change in cognition or perception	Should OHPs recommend this intervention?
Chu et al. 2015[28]	Chronic non-cancer pain	Comprehensive outpatient pain engagement program	Intervention with education about pain pathophysiology, behavioral training, exercises, thought management and activity planning	Yes	Yes	-	Unclear
Gagnon et al. 2013[36]	Chronic pain	Interdisciplinary pain management program	Intervention with psychological treatment, occupational therapy, physical therapy and vocational counseling	Yes	Yes	-	Unclear
Haiduk et al. 2017[32]	Chronic neck pain	The 4 interdisciplinary pain program	Intervention with physiotherapy, strength training, occupational therapy, cognitive behavioral and coping therapy and relaxation	Yes	NR	-	Unclear
Pietilä-Holmner et al. 2020[33]	Chronic musculoskeletal pain	Multimodal rehabilitation program	Intervention with physical exercise, relaxation, education in pain management and training in coping strategies based on cognitive behavioral therapy	Yes	Yes	-	Unclear

Table 2. Continued

Study	Health problem population	Name of intervention	Intervention type	Significant positive effect on cognition or perception over time	Significant positive effect on work participation over time	Significant positive effect on work participation through change in cognition or perception	Should OHPs recommend this intervention?
Scott et al. 2014[37]	Whiplash injury	Multidisciplinary rehabilitation program	Intervention with tailored exercises, education and instruction in self-management skills	NR	NR	Yes	Unclear
Sullivan et al. 2017[38]	Post-traumatic stress disorder	Risk-targeted activity-reintegration intervention/ Progressive goal attainment program	Intervention focused on goal setting, activity planning and learning techniques for targeting disability beliefs including problem solving challenges and exposing techniques	Yes	NR	Yes	Unclear
Volker et al. 2017[39]	Chronic musculoskeletal pain	Standardized multidisciplinary team care intervention	Intervention with cognitive behavioral therapy, exercises, relaxation and education	Yes	Yes	-	Unclear
Coping							
Asih et al. 2015[40]	Chronic disabling occupational musculoskeletal disorders	Functional restoration program	Intervention with cognitive behavior therapy, coping skills training, fear-avoidance beliefs training and exercises	Yes	NR	Yes[c]	Unclear

Table 2. Continued

Study	Health problem population	Name of intervention	Intervention type	Significant positive effect on cognition or perception over time	Significant positive effect on work participation over time	Significant positive effect on work participation through change in cognition or perception	Should OHPs recommend this intervention?
Pietilä-Holmner et al. 2020[33]	Chronic musculoskeletal pain	Multimodal rehabilitation program	Intervention with physical exercise, relaxation, education in pain management and training in coping strategies based on cognitive behavioral therapy	Yes	Yes	-	Unclear

RTW: Return to work, OHPs: Occupational health professionals, NR: Statistical significance not reported.
Underlined studies had a low risk of bias.
[a] Not for every moment on which the outcome is measured; [b] Not for every moment on which the cognition or perception is measured; [c] Depends on the form/subscale of the outcome

Risk of bias

Fifteen of the sixteen RCTs had a moderate risk of bias and one had a low risk of bias. Five of the cohort studies had a moderate risk of bias, one had a high risk of bias and three had a low risk of bias. Of the non-randomized experimental studies and single group pre-test post-test studies, there were three with a moderate risk of bias and one with a low risk of bias. Scores on each criterion of the quality assessment tools are presented in Appendix 3.

Factors positively associated with work participation

Self-efficacy

Nine studies, of which five were RCTs, studied the effect of an intervention on self-efficacy and work participation.[12-16, 28-31] The RCT of Hees et al.[13], which was described in detail in Hees et al.[41], the RCT of Hutting et al.[14], the RCT of Muschalla et al.[15] and the RCT of Wormgoor et al.[16] did not show a significant effect on self-efficacy. Only the "Combined cognitive behavioral pain competence and depression prevention training" described in the RCT of Hampel et al.[12] increased self-efficacy in participants with chronic low back pain and high levels of depressive symptoms. This intervention also resulted in a decrease in days of sick leave and had a positive effect on employment status. The intervention consisted of eight group sessions focused on for example treating pain-related beliefs, pain management, enhancement of activities and social skills training. The cohort study by Chu et al.[28] among employees with non-cancer pain and the study of Leensen et al.[30] among employees with cancer both showed a positive effect on self-efficacy and on work participation. These interventions were multidisciplinary interventions, which included exercises from physiotherapists and sessions directed to activity planning or planning for gradually resuming work. The difference between these interventions was that one of them consisted mostly of individual sessions over a longer period of twelve weeks,[30] while the other consisted of group sessions over a shorter period of fourteen days.[28] Although both studies showed a positive effect of the intervention on self-efficacy and on work participation, the researchers of these studies did not study whether change in work participation was caused by the change in self-efficacy. In addition, the intervention described by Salzwedel et al.[31] among employees with a cardiovascular disease had a positive effect on self-efficacy. However, the statistical significance of the effect on work status was not reported. The intervention in the study of Jensen[29] among employees with mental or musculoskeletal illness, which was more precisely described by Jensen[42], showed no effect on self-efficacy.

Perceived health

Seven studies, of which three RCTs, studied the effect of an intervention on perceived health and work participation.[17–19, 28, 29, 32, 33] The interventions of Pedersen et al.[18], Fauser et al.[17] and Van Eijk-Hustings et al.[19] did not have a significant effect on perceived health. The intervention in the cohort study of Chu et al.[28] on thought management and activity planning among employees with chronic non-cancer pain increased perceived health and improved the work status of employees. However, no results were reported regarding whether the increase in perceived health caused the increase in work participation. In addition, the intervention in the cohort of Pietilä-Holmner et al.[33] with physical exercise, education in pain management and training coping strategies, increased perceived health and decreased sick leave among employees with chronic musculoskeletal pain. However, they did not report whether the increase in perceived health caused the increase in work participation either. Also, the intervention in the study of Haiduk et al.[32] among employees with chronic neck pain showed a significant positive effect on perceived health after 60 months. It seemed to increase working capacity, although the statistical significance of this last effect was not reported. This intervention focused on strength training, occupational therapy, cognitive behavioral therapy and coping therapy. The intervention in a cohort study of Jensen[29] did not have a significant effect on perceived health.

Recovery and RTW expectations

One study of Aasdahl et al.[34] studied the effect of an intervention on RTW expectations and work participation among employees with different kinds of chronic diseases. The intervention involved acceptance and commitment therapy, physical training and psycho-education. This intervention significantly improved the expectations of employees regarding RTW. In this study, the improvement in these expectations was associated with sustainable RTW and more work participation days.

Motivation

No studies were found on interventions that were focused on motivation and aimed at increasing work participation.

Optimism

No studies were found on interventions that were focused on optimism or pessimism and aimed at increasing work participation.

Feelings of control

Two RCTs with interventions focused on feelings of control and work participation were found.[15, 18] The intervention of Muschalla et al.[15] did not have an effect on internal and external control perception. However, the intervention studied by Pedersen et al.[18], which was directed to problem solving techniques and coping strategies, did show that internal locus of control was higher for employees in the intervention group at three and six months follow-up in comparison with the control group. There were no differences in other locus of control variables. However, at three months, more participants in the control group than in the intervention group had full RTW, which indicates a negative effect of the intervention on work participation. There were no significant differences in RTW between the intervention and the control group at six or twelve months.

Factors negatively associated with work participation

Catastrophizing

Most of the studies we found which focused on cognitions and perceptions and work participation were aimed at the factor catastrophizing. In total, ten studies were found that focused on this factor and work participation.[14, 20, 28, 32, 33, 35–39] Among these studies there were two RCTs.[14, 20] None of the interventions that were studied in these RCTs had a positive effect on work participation. Only the cognitive behavioral therapy intervention of Rolving et al.[20] on pain perception, coping and pacing principles, among employees with degenerative disc disease or spondylolisthesis, which was further described in the study of Rolving et al.[43], decreased catastrophizing more in the intervention group than in de control group after six months, but not after three months and one-year follow-up. All the interventions in the other studies[28, 32, 33, 35-39] seemed to decrease catastrophizing over time, although the significance of this decrease due to the intervention on self-management skills described by Scott et al.[37], was not reported. The interventions described by Chu et al.[28] among employees with chronic non-cancer pain, Gagnon et al.[36] among employees with chronic pain, Pietilä-Holmner et al.[33] among patients with chronic musculoskeletal pain and Volker et al.[39], which was among employees with chronic musculoskeletal pain as well, significantly increased work participation over time. All these interventions had group sessions with psychological components, such as psychological treatment, thought management and cognitive behavioral therapy, and physical components, such as pool therapy and physical exercises. The interventions of Volker et al.[39], Pietilä-Holmner et al.[33] and Chu et al.[28] contained relaxation exercises as well. The multidisciplinary intervention of Haiduk et al.[32] among employees with chronic neck pain, which contained components of strength training, occupational

therapy, cognitive behavioral therapy and coping therapy, seemed to increase work participation as well, although the statistical significance of this effect is not reported. In addition, the studies of Adams et al.[35], Scott et al.[37], and Sullivan et al.[38], showed that a decrease in catastrophizing was associated with a higher rate of RTW or occupational re-engagement. The "Risk-targeted activity-reintegration intervention" (or "Progressive goal attainment program") described by Adams et al.[35] and Sullivan et al.[38], which was further described in the article of Sullivan et al.[44], consisted of maximum ten sessions focused on goal setting, activity planning, learning specific techniques to target and reduce catastrophic thinking and exposing techniques to facilitate re-engagement in activities.

Fear-avoidance beliefs

Six RCTs were found about interventions focused on fear-avoidance beliefs and work participation.[21-26] Only one of the studied interventions had a significant effect on this factor and on work participation.[26] The "Classification-based cognitive functional therapy" studied by Vibe Fersum et al.[26] among employees with non-specific chronic low back pain significantly decreased fear-avoidance beliefs and decreased the number of sick leave days. This intervention contained components of movement exercises, tailored physical activity and was directed at outlining the vicious cycle of pain. None of the interventions in other studies showed a significant effect on fear-avoidance beliefs as compared to the control groups.[21-25]

Perceived work-relatedness

One RCT of Muschalla et al.[15] was found with an intervention focused on perceived work-relatedness of the health problem and work participation. This intervention, which focused mainly on developing and training coping strategies among employees with orthopedic, cardiologic and neurological disorders, decreased perceived work-relatedness in the intervention group. The intervention also reduced the sick leave duration after six months for patients with work-anxiety, but not for the whole group of participants.

Coping strategies

Seven studies described interventions on coping strategies and work participation, of which five RCTs and two cohort studies.[13, 15, 17, 23, 27, 33, 40] The "Stimulating health participation and relapse prevention at work" intervention of Arends et al.[27] among employees with common mental disorders and the "Cognitive behavioral group intervention on work-anxiety" of Muschalla et al.[15] among employees with orthopedic, cardiologic and neurological disorders changed coping and improved

work participation. In the study of Arends et al.[27] on the effect of an intervention focused on the problem solving process, employees in the intervention group used the coping strategy distraction more often than the control group and had a lower incidence of recurrent sickness absence. However, there were no differences between the control group and intervention group in other coping strategies. In the study of Muschalla et al.[15], employees in the intervention group showed a significant increase in the coping strategies self-calming and self-instruction and showed a decrease in sick leave duration. This intervention was also directed at problem solving and contained training on strategies to cope with work-anxiety and situation and behavior analyses. The interventions studied in the RCTs by Harris et al.[23], Hees et al.[13] and Fauser et al.[17] did not significantly change coping or work participation. The intervention in the cohort study of Asih et al.[40] among employees with chronic musculoskeletal disorders significantly changed coping profiles. The intervention contained components of strength training, cognitive behavior therapy, coping skill training and fear-avoidance beliefs training. After the intervention, there were more adaptive copers and less dysfunctional copers or interpersonally distressed persons. There was a significant association between the coping profiles at discharge and work retention, but not with RTW rate. In addition, the "Multimodel rehabilitation program" described in the cohort study of Pietilä-Holmner et al.[33] seemed to change coping strategies. Employees who participated in the program scored higher in the coping strategy engagement and the coping strategy pain willingness and had a lower rate of sick leave one year after the intervention.

Consultation with OPs, IPs and a patient representative

Two OPs, two IPs and a patient representative were consulted to give feedback on the findings of this scoping review. The OPs and IPs recognized interventions or components of the interventions and had experience with recommending them to employees. The patient representative recognized components of interventions in the interventions she had followed.

We asked the OPs and IPs specifically about their experience with interventions on changing motivation and optimism/pessimism, because on these factors no interventions had been identified in this scoping review. They were not aware of interventions on these factors either. However, they indicated that they would try to influence some cognitions and perceptions of employees, for example motivation and self-efficacy, by themselves during their consultations.

For choosing an intervention that they would recommend to employees in daily practice, they would, however, not only look at the effectiveness of the intervention. They also considered it very important to look at the type of client (e.g. level of education) and the disease or disorder he or she has, for choosing the right intervention. Some physicians mentioned the importance of deciding together with the employee which intervention is the best fit for the employee. The patient representative emphasized that her preference for one intervention above another is partially based on how much expertise the providers have with the interventions. Because in the Netherlands the employer has to pay for the intervention, the costs of the intervention, the amount of money the employer wants to invest in the employee and the reimbursement policies of insurance companies are all important for determining whether interventions are recommended or not. Some OPs and IPs mentioned that most of the time it is not one person-related factor, but multiple negative cognitions and perceptions that are present in employees, which could make it important to combine interventions or components of interventions.

Discussion

In this scoping review, we identified 29 studies, of which 23 with a moderate risk of bias, that studied interventions aimed at changing at least one of ten cognitions and perceptions in order to change work participation. The interventions included in the study mainly focused on changing recovery and RTW expectations, self-efficacy, feelings of control, perceived health, fear-avoidance beliefs, perceived work-relatedness of the health problem, coping strategies and catastrophizing. We found no interventions on changing motivation or on optimism/pessimism.

From the results of this review, we can conclude that four interventions were effective in changing cognitions and perceptions and work participation, and can be recommended to employees by OHPs: The "Stimulating health participation and relapse prevention at work" intervention described by Arends et al.[27], the "Cognitive behavioral group intervention on work-anxiety" described by Muschalla et al.[15], the "Combined cognitive behavioral pain competence and depression prevention training" described by Hampel et al.[12] and "Classification-based cognitive functional therapy" described by Vibe Fersum et al.[26] These interventions were effective in changing work participation by changing coping[15, 27], perceived work-relatedness[15], self-efficacy[12] or fear-avoidance beliefs.[26] Two of the four interventions[26, 27] involved individual sessions with employees and two interventions[12, 15] involved group sessions.

The four interventions that were effective in changing cognitions and perceptions and in increasing work participation had only one main provider, and this was an occupational physician,[27] psychological therapist[12, 15] or physiotherapist.[26] This is in contrast to a review of Hoefsmit et al.[24] in which they conclude that it is especially multidisciplinary interventions in which multiple professionals are involved, that seem effective in increasing work participation. However, as we looked at the effectiveness of the intervention on work participation and on one specific cognition or perception, it might not be surprising that it was especially mono-disciplinary interventions that seem to be effective. Besides, many multidisciplinary interventions that were found in this scoping review were studied in cohort studies instead of RCTs. From these studies we cannot conclude whether the interventions are effective or not because they do not compare the change in the cognitions and perceptions and work participation between an intervention and a control group, while many of these interventions seemed to change cognitions and perceptions and work participation over time. An example of this is the intervention of Asih et al.[40], which changed coping profiles over time, which in turn had a positive effect on the work retention rate. Therefore, it is possible that more of the described interventions in this scoping review are effective, but that the effectiveness has just not been studied in RCTs yet.

Some of the interventions found in this scoping review which were specifically aimed at one person-related factor also had effects on other person-related factors. For example, the intervention of Muschalla et al.[15] on developing and training coping strategies also had an effect on perceived work-relatedness. This could indicate that some of the cognitions and perceptions are related to other cognitions and perceptions. This is in line with a study by Petrie and Weinmann[46] and a study of Woodhouse et al.[47], which describe that illness perceptions, such as beliefs about the cause of the illness, can influence coping strategies. It might be that changing one cognition or perception could have an effect on another cognition or perception as well.

For certain cognitions and perceptions, no interventions were found at all. This was the case for the factors motivation and optimism/pessimism. The OPs and IPs we approached did not know interventions specifically aimed at these cognitions and perceptions either. However, they did mention that they sometimes try to influence the cognitions and perceptions (such as motivation) of the employees during their consultations without implementing a specific intervention. This is in line with the results of two studies of Müssener et al.[48, 49] in which patients said that encounters with physicians could affect different cognitions and perceptions,

such as motivation. So, it is possible that some cognitions and perceptions could also be affected during consultations.

Strengths and limitations

This review provides an overview of interventions aimed at changing cognitions and perceptions and work participation. OPs, IPs and other OHPs can use this overview to get an indication of which intervention they should recommend in order to increase work participation in employees with chronic health problems. We followed all the steps of the framework of Arksey and O'Malley[7] for conducting this scoping review including the essential last step as described by Levac et al.[5] in which we consulted important stakeholders (e.g. OPs, IPs and a patient representative). This provided additional information into the factors that we should keep in mind when putting these findings into practice, such as the costs and the target audience of the intervention.

A limitation of this review might be that some interventions are tested on specific groups, for example on employees with depression.[13,35] It is possible that cognitions and perceptions are different between groups. For example, fear-avoidance beliefs can be a factor that is more often present in people who experience pain than in people with other health problems. In addition, components of some interventions are not applicable to employees with other health problems. For example, in the interventions described by Harris et al.[23] participants get homework assignments with exposure to pain-provoking physical activity. This component of the intervention is not applicable for employees who do not have pain when they are physically active. Therefore, the question remains how generalizable the results of studies on interventions tested on specific groups are to a broader population or employees with other health problems. Another limitation is that although the results show effectiveness of some interventions on changing cognitions and perceptions and changing work participation, it remains unclear which part or component of the intervention does have an actual effect on the person-related factor. This is especially the case for multidisciplinary interventions that focus on many different aspects.

Implications for practice and future research

This review provides an overview of interventions that focus on changing cognitions and perceptions and work participation. OHPs may use the overview of interventions to help employees with chronic health problems to increase work participation.

Many of the identified interventions were not proven effective. Therefore, more studies, and especially more RCTs with a low risk of bias, are needed to study how hindering cognitions and perceptions can be limited and positive cognitions and perceptions fostered. In addition feasibility studies are needed to assess the practicality of the different interventions. Because many of the interventions included in the review are multidisciplinary interventions that focus on many different aspects and are also tested on different groups of employees, it is also important to study which component of the interventions actually helps for which group of employees. According to the consulted stakeholders the expertise of the intervention provider, the type of client (e.g. level of education) and the disease or disorder he or she has are very important to consider when recommending interventions. Results of research assessing which intervention components work for whom, may contribute to the development of more effective and efficient interventions to increase work participation. Finally, research is needed to determine whether these newly developed interventions actually could improve work participation and whether they are cost-effective, because costs are a very important aspect for OHPs in determining whether they should recommend an intervention according to the consulted stakeholders.

Conclusion

In conclusion, 29 studies were found which described interventions that focused on cognitions and perceptions and were aimed at increasing work participation. Four of these interventions[12, 15, 26, 27] are proven to be effective in RCTs and could be recommended by OHPs to employees in order to change cognitions and perceptions and increase work participation. However, most studies that were included had a moderate risk of bias, so caution should be used when recommending these interventions towards employees. More RCTs with a low risk of bias are needed to explore which of these and other promising interventions that were studied in other study designs are most effective (generally and in terms of costs). In addition, more studies are needed to explore which components work for whom in order to increase the generalizability of the findings.

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Appendix 1. Search strategy

Table 1. Ovid MEDLINE search strategy

Ovid MEDLINE(R) ALL <1946 to June 12, 2020> Search date: 15 June 2020		
#	**Searches**	**Results**
1	exp industry/ or exp work/ or exp employment/	448189
2	manpower.fs,sh.	7447
3	(worka* or worke* or workg* or worki* or workl* or workp* or work capacity or work disabilit* or work abilit* or at work or work exposure or work related or workers or job* or employee or staff or personnel or occupation or occupations or occupational or outdoor work* or day shift* or night shift* or shift work* or vocational rehabilitation or sick leave or absenteeism or sickness absen* or absente* or presente* or "return to work" or vocational reintegration or retirement or pension or employment or unemployed or unemployment or work status or industries or industrial sector or repetitive work).ab,kf,ti.	1962185
4	or/1-3 [work]	2291579
5	exp chronic disease/ or long-term care/ or return to work/	288792
6	(((long term or longterm or chronic*) adj3 (ill or illness or disease? or disorder? or condition? or health or sick* or disabil* or injur* or trauma* or care)) or pain or rtw or "return to work" or (month? adj3 (sick or ill))).ab,kf,ti.	1028871
7	(follow up or chronic).hw.	1157609
8	or/5-7	1989602
9	clinical trial.mp.	708643
10	clinical trial.pt.	523177
11	random:.mp. or tu.xs.	5563273
12	(therap* or treatment? or intervention? or rehabilitation).mp.	8949976
13	or/9-12 [therapy]	10868461
14	motivation/ or catastrophization/ or self concept/ or self efficacy/ or adaptation, psychological/	221232
15	(expectation? or belief? or motivation* or unmotivated or willingness or drive or coping or fear avoidance or kinesiophobia or "locus of control" or pain control or personal control or optimism or optimistic or pessimis* or positive outlook or hopelessness or catastrophizing or catastrophization or negativity or ((negative or catastrophic) adj2 (perception? or thinking or thoughts)) or self concept or self esteem or self efficacy or self confiden* or perceived health or "state of health" or perceived severity or self perce* or blam* or work relatedness or (worker? adj2 interview*)).ab,kf,ti.	529332
16	or/14-15 [factors]	656820

Table 1. Continued

Ovid MEDLINE(R) ALL <1946 to June 12, 2020> Search date: 15 June 2020		
#	**Searches**	**Results**
17	(life orientation test or "lot-r" or lot revised or illness perception? questionnaire or ipq or coping strateg* questionnaire or csq or pain coping inventory or fear avoidance beliefs questionnaire or fabq or pain management inventory or avoidance endurance questionnaire or aeq or tampa scale or "health locus of control scale" or hlc or mastery scale or pain catastrophizing scale or self efficacy scale or "rtw-se" or ((general health or health status) adj3 (measur* or report* or rate? or rating)) or (general health and (sf36 or sf 36 or shortform 36 or short form 36))).ab,kf,ti.	19328
18	13 and ((visual analog scale or vas) and general health).ab,kf,ti.	426
19	13 and (((general health or health status) adj3 (measur* or report* or rate? or rating)) or (general health and (sf36 or sf 36 or shortform 36 or short form 36))).ab,kf,ti.	6968
20	or/17-19 [relevant inventories]	19540
21	4 and 20	3257
22	and/4,8,13,16	9968
23	21 or 22	12878
24	limit 23 to yr="2013-current"	5520

Table 2. Ovid PsycINFO search strategy

Ovid PsycINFO <1806 to October Week 2 2020> Search date: 15 June 2020		
#	**Searches**	**Results**
1	exp employment/ or exp personnel/ or occupational exposure/ or industrial accidents/ or occupational health/ or occupational safety/ or work related illnesses/	532931
2	(worka* or worke* or workg* or worki* or workl* or workp* or work capacity or work disabilit* or work abilit* or at work or work exposure or work related or workers or job* or employee or staff or personnel or occupation or occupations or occupational or outdoor work* or day shift* or night shift* or shift work* or vocational rehabilitation or sick leave or absenteeism or sickness absen* or absente* or presente* or "return to work" or vocational reintegration or retirement or pension or employment or unemployed or unemployment or work status or industries or industrial sector or repetitive work).ab,id,ti.	863151
3	or/1-2 [work]	1172287
4	chronic illness/ or "chronicity (disorders)"/ or long term care/	21012
5	(((long term or longterm or chronic*) adj3 (ill or illness or disease? or disorder? or condition? or health or sick* or disabil* or injur* or trauma* or care)) or pain or rtw or "return to work" or (month? adj3 (sick or ill))).ab,id,ti.	155769
6	(follow up or chronic).hw.	32637
7	or/4-6	165693
8	clinical trial.mp.	14982
9	random:.mp.	210548
10	(therap* or treatment? or intervention? or rehabilitation).mp.	1215793
11	or/8-10 [therapy]	1317785
12	motivation/ or catastrophization/ or self concept/ or self esteem/ or self efficacy/ or attribution/ or coping behavior/ or "stress and coping measures"/ or "internal external locus of control"/	209489
13	(expectation? or belief? or motivation* or unmotivated or willingness or drive or coping or fear avoidance or kinesiophobia or "locus of control" or pain control or personal control or optimism or optimistic or pessimis* or positive outlook or hopelessness or catastrophizing or catastrophization or negativity or ((negative or catastrophic) adj2 (perception? or thinking or thoughts)) or self concept or self esteem or self efficacy or self confiden* or perceived health or "state of health" or perceived severity or self perce* or blam* or work relatedness or (worker? adj2 interview*)).ab,id,ti.	586298
14	or/12-13 [factors]	634126

Table 2. Continued

Ovid PsycINFO <1806 to October Week 2 2020> Search date: 15 June 2020		
#	**Searches**	**Results**
15	(life orientation test or "lot-r" or lot revised or illness perception? questionnaire or ipq or coping strateg* questionnaire or csq or pain coping inventory or fear avoidance beliefs questionnaire or fabq or pain management inventory or avoidance endurance questionnaire or aeq or tampa scale or "health locus of control scale" or hlc or mastery scale or pain catastrophizing scale or self efficacy scale or "rtw-se" or ((general health or health status) adj3 (measur* or report* or rate? or rating)) or (general health and (sf36 or sf 36 or shortform 36 or short form 36))).ab,id,ti,tm.	22920
16	11 and ((visual analog scale or vas) and general health).ab,id,ti,tm.	45
17	11 and (((general health or health status) adj3 (measur* or report* or rate? or rating)) or (general health and (sf36 or sf 36 or shortform 36 or short form 36)) or (mos adj3 "36")).ab,id,ti,tm.	2409
18	or/15-17 [relevant inventories]	23297
19	3 and 18	5798
20	and/3,7,11,14	4232
21	19 or 20	9653
22	limit 21 to yr="2013-current"	4429

Appendix 2. Data-extraction table

Table 1. Details of included studies

First author, year, country (continent)	Study design	Population N: Number of subjects A: Age; mean age (SD) G: Gender H: Health status	Description intervention D: Duration or number of sessions S: Individual or group sessions P: Provider(s) of intervention M: Main components
Aasdahl et al. 2018[34] Norway (Europe)	Single group pre-test post-test study	N: 168 A: 47.0 (8.8) G: 32 males, 136 females H: Musculoskeletal, psychological or general and unspecified diagnoses of the International Classification of Primary Care	**Short inpatient program:** D: 4+4 days with 2 weeks at home in-between S: Individual and group sessions P: Coordinators with diverse backgrounds (physical therapy, psychology, exercise physiology, nursing or other) M: - Group discussions based on acceptance and commitment therapy - Psychoeducation on stress - Meetings with coordinators and physicians - Mindfulness sessions - Individual and group based supervised training sessions - Creating a RTW plan - Meeting with employer **Long inpatient program:** D: 3.5 weeks S: Individual and group sessions P: Coordinators with diverse backgrounds (physical therapy, psychology, exercise physiology, nursing or other) M: - Group discussions based on acceptance and commitment therapy - Psychoeducation - Meetings with coordinators and physicians - Mindfulness sessions - Individual and group based supervised training sessions - Walking to work - Creating a RTW plan - A day with outdoor activities - Network day in which participants bring persons to gain insight in the rehabilitation process **Outpatient program:** D: Once a week for 6 weeks, each session lasted 2.5 hours S: Group sessions P: Physicians, psychologists, social worker, physiotherapist M: - Group discussions based on acceptance and commitment therapy - Group discussions on physical activity - Sessions with social worker and acceptance and commitment therapy moderator - Home practice, including mindfulness

Description control intervention D: Duration or number of sessions S: Individual or group sessions P: Provider(s) of intervention M: Main components	Cognitions and perceptions	Follow-up	Risk of bias	Results
-	- Expectations about length of sick leave (one question: "For how long do you believe you will be sick listed from today?")	9 months	Moderate	Expectations about sick leave duration significantly changed after the programs (p = .01). 56 (33%) participants improved their expectations, 32 (19%) participants reduced their expectations and 80 (48%) participants did not change their expectations. At 9 months follow-up, sustainable RTW was achieved by 69 participants (41%) and the median of work participation days was 113. No information on significance of increase of work participation is provided. A positive change in expectations was associated with sustainable RTW (p < .01) and work participation days (p < .01).

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Aasdahl et al. 2019[21] Norway (Europe)	Randomized controlled trial	**Short inpatient program:** N: 92 A: 45.0 (8.7) G: 21 males, 71 females H: Musculoskeletal, psychological or general and unspecified diagnoses of the International Classification of Primary Care **Short outpatient program:** N: 76 A: 45.1 (9.6) G: 14 males, 62 females H: Musculoskeletal, psychological or general and unspecified diagnoses of the International Classification of Primary Care **Long inpatient program:** N: 86 A: 46.3 (8.7) G: 16 males, 70 females H: Musculoskeletal, psychological or general and unspecified diagnoses of the International Classification of Primary Care **Long outpatient program:** N: 80 A: 45.2 (10.4) G: 19 males, 61 females H: Musculoskeletal, psychological or general and unspecified diagnoses of the International Classification of Primary Care	**Short inpatient program:** D: 4+4 days with 2 weeks at home in-between S: Individual and group sessions P: Coordinators with diverse backgrounds (physical therapy, psychology, exercise physiology, nursing or other) M: - Group discussions based on acceptance and commitment therapy - Psychoeducation on stress - Meetings with coordinators and physicians - Mindfulness sessions - Individual and group based supervised training sessions - Creating a RTW plan - Meeting with employer **Long inpatient program:** D: 3.5 weeks S: Individual and group sessions P: Coordinators with diverse backgrounds (physical therapy, psychology, exercise physiology, nursing or other) M: - Group discussions based on acceptance and commitment therapy - Psychoeducation - Meetings with coordinators and physicians - Mindfulness sessions - Individual and group based supervised training sessions - Walking to work - Creating a RTW plan - A day with outdoor activities - Network day in which participants bring persons to gain insight in the rehabilitation process

Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
Outpatient program (long and short program are identical): D: Once a week for 6 weeks, each session lasted 2.5 hours S: Group sessions P: Physicians, psychologists, social worker, physiotherapist M: - Group discussions based on acceptance and commitment therapy - Group discussions on physical activity - Sessions with social worker and acceptance and commitment therapy moderator - Home practice, including mindfulness	- Fear-avoidance beliefs (Fear-Avoidance Beliefs Questionnaire)	3, 9, 12 months	Moderate	Fear-avoidance beliefs for work decreased from baseline to 12 months follow-up for the participants in the short inpatient program and the short outpatient program, but there was no significant difference between the trials. Fear-avoidance beliefs for work decreased from baseline to 12 months follow-up for the participants in the long inpatient program and the long outpatient program, but there was no significant difference between the trials. 74% of the participants with a psychological diagnosis and 63% of the participants with a musculoskeletal diagnosis, reduced their fear-avoidance beliefs for work after 12 months. Participants that had reduced fear-avoidance beliefs for work at 9 moths had 30 more work days than participants with increased scores in fear-avoidance and 43 more work days than participants with consistently high scores of fear-avoidance beliefs, but 23 less work days than participants with consistently low scores of fear-avoidance beliefs for work.

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Adams et al. 2017[35] Canada (North-America)	Cohort study	N: 80 A: Males: 46.7 (9.5), females: 45.7 (8.3) G: 26 males, 54 females H: Major depressive disorder	**Risk-targeted activity-reintegration intervention/ Progressive goal attainment program:** D: 1 session a week during 10 weeks S: Individual sessions P: Occupational therapist M: - Goal setting - Activity planning - Learning techniques targeting disability beliefs - Thought monitoring to target catastrophic thinking - Exposing techniques to facilitate re-engagement in avoided activities - Problem solving challenges to resume occupational activities
Arends et al. 2014[27] The Netherlands (Europe)	Randomized controlled trial	**Stimulating healthy participation and relapse prevention at work (SHARP-at work) intervention:** N: 80 A: 41.3 (9.4) G: 27 males, 53 females H: Common mental disorders **CAU:** N: 78 A: 43.3 (9.8) G: 38 males, 40 females H: Common mental disorders	**SHARP-at work intervention:** D: 2-5 consultations of 30 minutes within 3 months after RTW S: Individual sessions P: Occupational physician M: Problem solving process consisting of: - Inventory of problems at work - Brainstorming on solutions - Note solutions and support needed - Discussion about solutions and making an action plan - Evaluation of action plan

	Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
	-	- Catastrophizing (Symptom Catastrophizing Scale)	1 month	Low	Catastrophizing scores reduced form 10.6 (2.7) to 6.2 (3.3) after the intervention ($p < .001$). At 1 month follow-up, 21 participants (26%) had returned to work full-time, 3 participants (4%) had returned part-time, 36 participants (45%) were enrolled in a RTW program, and 20 participants (25%) remained absent. No information on significance of increase of work participation is provided. Reductions in catastrophizing predicted occupational re-engagement at the follow-up ($p = .01$).
	CAU: According to guideline on: "Management of mental health problems of workers by occupational physicians"	- Coping (Utrecht Coping List)	3, 6, 12 months	Moderate	No significant differences in using the three coping strategies (problem focused, emotional and distraction) at all follow-up measurements between the CAU and the SHARP group, except for the coping strategy distraction which was more used by the SHARP group at 3 months follow-up ($p < .05$). The SHARP group had a lower incidence of recurrent sickness absence than the CAU group at 3 months (11% vs 22%), 6 months (21% vs 39%) and at 12 months (34% vs 47%), ($p < .05$). No information on within-group difference is provided. Time to recurrent sickness absence was longer in the SHARP group (median of 365 days) as compared to the CAU group (median of 253 days), ($p < .05$).

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Asih et al. 2015[40] United States (North-America)	Cohort study	N: 716 A: Adaptive coper: 46.0 (10.8), interpersonally distressed: 45.2 (9.5), dysfunctional: 44.9 (10.1), anomalous: 49.0 (11.2) G: 439 males, 277 females H: Chronic disabling occupational musculoskeletal disorders	**Functional restoration program (FRP):** D: 160 hours, during 4-6 weeks S: Individual and group sessions P: Physical therapist, occupational therapist M: - Evaluations aimed to individually tailored treatment targets - Mobility, strength and fitness training - Cognitive behavior therapy - Counseling - Stress management training - Coping skills training - Fear-avoidance beliefs training - Patient education about overcoming disability and vocational reintegration - Medical supervision including medication management, interventions to improve function, and an assessment of remaining surgical options
Chu et al. 2015[28] China (Asia)	Cohort study	N: 142 A: 42.0, range 21-62 G: 57 males, 85 females H: Chronic non-cancer pain	**Comprehensive outpatient pain engagement (COPE) program:** D: 100 hours during 14 days S: Group sessions P: Psychologist, physiotherapist, occupational therapist, pain nurse, hospital chaplain, medical social worker M: - Education about pain pathophysiology - Behavioral training - Pacing, relaxation, strengthening and stretching exercises - Thought management - Communication - Activity planning - Appropriate use of medication
Fauser et al. 2019[17] Germany (Europe)	Randomized controlled trial	**Conventional rehabilitation plus additional work-related modules:** N: 229 A: 50.8 (7.1) G: 66 males, 163 females H: Cancer **Conventional medical rehabilitation:** N: 255 A: 50.3 (7.9) G: 94 males, 161 females H: Cancer	**Conventional medical rehabilitation plus additional work-related modules:** D: 100 hours S: Individual and group sessions P: Physician, psychologist, psychotherapist, occupational therapist, physiotherapist, social worker M: - Exercise therapy - Physiotherapy - Social counseling - Occupational therapy - Nutritional advice - Psychological seminars and counseling - Medical treatment and counseling - Work-related diagnostic evaluation - Intensive social counseling - Work-related psychosocial groups - Work-related functional capacity training

	Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
	-	- Coping (Coping profiles from Multidimensional Pain Inventory (MPI) questionnaire)	12 months	Moderate	Coping profiles changed after the FRP (p < .001). After FRP, there was an increase in the overall number of patients who became Adaptive coper (AC) (from 32.8% to 47.9%) or Anomalous (from 6.8% to 22.5%) and a decrease in Dysfunctional copers (DYS) (from 39.4% to 14.9%) or Interpersonally distressed (ID) (from 21% to 14.7%). There was a significant association between coping profiles at discharge and work retention. The DYS had a work retention rate of 64.4% compared to 85.1% in the Anomalous group, 82.2% in the AC group and 74.5% in the ID group (p = .009). Of the 457 participants who completed the program, 369 returned to work. Information about significance was not provided. There was no association between coping profiles at discharge and RTW rate.
	-	- Catastrophizing (Pain Catastrophizing Scale) - Self-efficacy (Patient Self Efficacy Questionnaire) - Perceived health (36-item Short-Form Health Survey)	12 months	Moderate	Catastrophizing decreased one year after the program, from a mean of 34.1 (11.1) to 25.8 (14.1) (p < .001). Self-efficacy increased one year after the program, from 23.2 (11.0) to 30.6 (13.9) (p < .001). Perceived health improved one year after the program from 21.4 (18.1) to 36.7 (23.0) (p = .03). Work status improved one year after the program, with 35% of the participants working after the program, as compared to 17% before the program (p = .0002).
	Conventional medical rehabilitation: D: 60-75 hours during 3 weeks S: - P: - M: - Exercise therapy - Physiotherapy - Social counseling - Occupational therapy - Nutritional advice - Psychological seminars and counseling - Medical treatment and counseling	- Perceived health (European Organization for Research and Treatment of Cancer Quality of Life Questionnaire; EORTC QLQ-C30) - Coping (Freiburg Questionnaire of Coping with Illness)	12 months	Moderate	For perceived health and coping there were no significant differences between the intervention and control group one year after completing the programs. No information on significance of within-group difference is provided. After one year 28.5% of the intervention group and 25.3% of the control group had still not returned to work. No information on significance of within-group difference is provided. There were no significant differences in time until RTW between the intervention and control group.

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Gagnon et al. 2013[36] United States (North-America)	Cohort study	N: 101 A: 43.5 (8.2) G: 64 males, 37 females H: Chronic pain	**Interdisciplinary pain management program:** D: 8 hours for 5 days during 4 weeks S: Individual and group sessions P: Physicians M: - Vocational counseling - Psychological treatment - Occupational therapy - Physical therapy - Biofeedback/ relaxation training - Aerobic conditioning - Physician appointments - Pool therapy - Education - Feldenkrais movement therapy
Granviken et al. 2015[22] Norway (Europe)	Randomized controlled trial	**Home exercise intervention:** N: 23 A: 48.2 (9.8) G: 12 males, 11 females H: Subacromial impingement **Supervised exercise intervention:** N: 23 A: 47.6 (10.0) G: 12 males, 11 females H: Subacromial impingement	**Supervised exercise intervention:** D: 10 supervised sessions and exercises at home for 6 weeks S: Individual sessions P: Physiotherapist M: -Theory lesson on anatomy and rehabilitation - Supervised exercise therapy focused on re-establishing normal shoulder movement patterns - Home exercises
Haiduk et al. 2017[32] Switzerland (Europe)	Cohort study	N: 59 A: 40.3 (12.3) G: 10 males, 49 females H: Chronic neck pain	**The 4 interdisciplinary pain program:** D: 24.5-27.5 hours per week during 4 weeks S: Individual and group sessions P: Clinical neuropsychologists, physicians, physiotherapists, occupational therapists, Qigong instructors, creative therapists M: - Physiotherapy - Strength and endurance training - Occupational therapy - Cognitive behavioral and coping therapy - Relaxation - Music and painting therapy - Tai Chi and Qigong

	Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
	-	- Catastrophizing (Pain Catastrophizing Scale)	At discharge from program	High	Catastrophizing decreased at discharge from the interdisciplinary pain management program from a mean score of approximately 28 to 24 (p = .033). From the program completers, 49% were working, whereas 12% were working at the start. No information on significance is provided. A greater percentage of the program completers was working as compared to the non-completers (49% vs approximately 9%), (p = .005).
	Home exercise intervention: D: 1 supervised session and exercises at home for 6 weeks S: Individual sessions P: Physiotherapist M: -Theory lesson on anatomy and rehabilitation - A session with physiotherapist to set up a tailored home-exercise program focused on re-establishing normal shoulder movement patterns	- Fear-avoidance beliefs (Fear-Avoidance Beliefs Questionnaire)	6, 26 weeks	Moderate	Fear-avoidance beliefs decreased after 6 weeks with -3.2 (5.5) in the home exercise group and -3.1 (7.8) in the supervised exercise group. No information on significance of within-group difference is provided. There were no significant differences between the groups. At 6 weeks, 7 of the 21 participants in the home exercise group were on sick leave and in the supervised exercise 10 of the 23 participants were on sick leave. At 26 weeks, 4 of the 18 participants in the home exercise group and 3 of the 21 participants in the supervised exercise group were on sick leave. No information on significance of within-group difference is provided. There were no significant differences between the groups.
	-	- Catastrophizing (Coping Strategies Questionnaire) - Perceived health (36-item Short-Form Health Survey)	6, 60 months	Moderate	Catastrophizing improved from a mean of 57.5 (18.2) at entry to 63.7 (20.0) at 6 months (p = .03) and to 76.2 (23.5) at the 60 months (p < .001) follow-up after the 4 interdisciplinary pain program. Perceived health did not change at 6 months, but improved from 52.6 (17.3) at entry to 60.5 (20.8) after 60 months (p = .01). Median working capacity increased from 0 hours a week at entry, to 9 hours a week at 6 months to 30 hours a week after 60 months. No information on significance is provided.

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Hampel et al. 2019[12] Germany (Europe)	Randomized controlled trial	**Combined cognitive behavioral pain competence and depression prevention training:** N: 295 A: 53.3 (6.0) G: 53 males, 242 females H: Chronic low back pain **Pain competence training:** N: 288 A: 53.3 (6.1) G: 53 males, 235 females H: Chronic low back pain	**Combined cognitive behavioral pain competence and depression prevention training:** D: 8 sessions of 100 minutes in 3-4 weeks S: Group sessions P: Psychotherapist M: - Standard inpatient multidisciplinary rehabilitation - Four sessions of 75 minutes of pain competence training in order to treat pain-related fear-avoidance beliefs and improve stress and pain management to promote self-management and self-efficacy expectations - Four sessions of 75 minutes of depression prevention training, including enhancement of the activity level, cognitive restructuring, social skills training, discussing cognitions and behaviors, and practicing coping strategies - Eight unguided group workshops of 25 minutes to complete homework assignments
Harris et al. 2017[23] Norway (Europe)	Randomized controlled trial	**Group physical exercise (Group PE):** N: 60 A: 44.2 (10.6) G: 32 males, 28 females H: Non-specific low back pain **Group cognitive behavioral therapy (Group CBT):** N: 55 A: 45.5 (9.1) G: 31 males, 24 females H: Non-specific low back pain **Brief intervention:** N: 99 A: 44.8 (9.7) G: 43 males, 56 females H: Non-specific low back pain	**Group PE:** D: 3 sessions of 90 minutes a week for 3 months S: Group sessions P: Physiotherapist, psychologist (optional), medical doctor (optional) M: - Brief intervention - Physical exercises adapted to the individual needs - Strength and endurance training - Relaxation - Exposure to physical activity that was perceived as harmful - Two sessions about coping, chronic pain and ergonomics (optional) **Group CBT:** D: 7 sessions of 90 minutes in 3 months S: Group sessions P: Psychiatrist M: - Brief intervention - Homework consisting of exposure to pain-provoking physical activity - Group discussions about homework and experienced problems in order to change dysfunctional thoughts

Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
Pain competence training: D: 4 sessions of 100 minutes in 3-4 weeks S: Group sessions P: Psychotherapist M: - Standard multidisciplinary rehabilitation - Four sessions of 75 minutes of pain competence training in order to treat pain-related fear-avoidance beliefs and improve stress and pain management to promote self-management and self-efficacy expectations - Four unguided group workshops of 25 minutes to complete homework assignments	- Pain self-efficacy (Pain Self-Efficacy Questionnaire)	6,12 months	Moderate	Pain self-efficacy increased over time in the intervention group in comparing with the control group (p = .016), but only for participants with high levels of depressive symptoms. Pain-related days of sick leave significantly decreased in the intervention group (p < .001), but not in the control group. After 12 months significantly more participants were employed in the intervention group in comparing to the control group (p < .017).
Brief intervention: D: 2 sessions of 2-4 hours over 5 days, 2 booster sessions (optional) S: Individual sessions P: Specialist in physical medicine and rehabilitation (first session), physiotherapist (second session) M: - Physical examination including diagnostic clarification, reassurance about normal findings, communication about harmlessness of back pain, encouragement of physical activity - Follow-up session with an educational part for strengthening the message given in the medical examination and a behavioral part for turning new insights into practical action	- Coping (Utrecht Coping List) - Fear-avoidance beliefs (Fear-Avoidance Beliefs Questionnaire)	3, 6, 12 months	Moderate	Coping improved from 3.02 (0.20) at baseline to 3.06 (0.31) at 12 months in the brief intervention group, from 3.06 (0.31) to 3.10 (0.30) for the group CBT and from 3.01 (0.30) to 3.12 (0.30) for the group PE (p = .005), but there was no significant difference between the interventions. Fear-avoidance beliefs for work decreased from 22.38 (10.7) at baseline to 17.6 (12.92) at 12 months in the brief intervention, from 24.48 (8.83) to 19.31 (11.76) for the group CBT and from 26.03 (9.07) to 18.84 (11.59) for the group PE (p < .001), but there was no significant difference between the interventions. 60% of the participants in the brief intervention group increased work participation in comparing to 54.6% in the group CBT and 51.7% in the group PE. No information on significance of within-group difference is provided. RTW at 12 months follow-up did not differ between the groups.

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Hees et al. 2013[13] The Netherlands (Europe)	Randomized controlled trial	**Treatment as usual + Occupational therapy (TAU + OT):** N: 78 A: 43.8 (9.0) G: 41 males, 37 females H: Major depressive disorder **Treatment as usual (TAU):** N: 39 A: 41.5 (9.6) G: 16 males, 23 females H: Major depressive disorder	**TAU + OT:** D: 18 sessions S: Individual sessions, group sessions, one session with employer P: Two occupational therapists M: - Problem clarification including an intake about patients current work situation and their problem areas - Group sessions where the Quality of Work model (model about factors that affect work performance) is discussed - Making a work-reintegration plan - Individual sessions where therapist relates occurring work stressors to patient's ineffective coping-pattern - A meeting with the employer about work-related difficulties - Follow-up session to discuss potential problems during the work resumption process
Hutting et al. 2015[14] The Netherlands (Europe)	Randomized controlled trial	**Self-management intervention:** N: 64 A: 45.0 (11.2) G: 11 males, 53 females H: Chronic non-specific complaints of the arm, neck or shoulder (CANS) **CAU:** N: 53 A: 47.7 (10.5) G: 17 males, 36 females H: Chronic non-specific CANS	**Self-management intervention:** D: 6 weekly sessions of 2.5 hours S: Group sessions P: Moderator M: - Making and discussing action plans - Setting targets in terms of behavior - eHealth module about training, self-management and CANS

Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
TAU: D: - S: Individual sessions P: Psychiatrist specialized in depression M: - Treatment in outpatient clinic - Psychoeducation - Supportive therapy - Cognitive behavioral interventions - Pharmacotherapy (optional) - Day or inpatient treatment (optional)	- Coping (Utrecht Coping List) - Work-related self-efficacy (Expectations regarding work resumption questionnaire)	6, 12, 18 months	Low	Active problem solving coping improved from a mean of 16.6 (3.8) to 17.9 (3.7) at 18 months follow-up ($p < .001$), passive reaction coping reduced from 15.8 (4.4) to 13.1 (3.3), ($p < .001$), avoidance coping decreased from 17.2 (3.2) to 16.9 (3.3), ($p = .05$) in the intervention group. There were no group differences. Self-efficacy improved from 3.4 (1.1) to 4.2 (1.0) at 18 months ($p < .001$) in the intervention group. There were no group differences. There was a significant decrease in hours of absenteeism, from 22.7 (10.0) to 10.4 (12.5) at 18 months ($p < .001$) in the intervention group. There were no group differences. Median number of days until partial RTW was 80 (42-172) and 361 (193-653) for full RTW for the intervention group. There were no group differences. In the intervention group, 92% of participants achieved at least partial RTW and 66% achieved full RTW during the study period of 18 months.
CAU: All CAU and information available within and outside the organization of the participant	- Pain catastrophizing (Pain Catastrophizing Scale) - Self-efficacy (Dutch Adaptation of the General Self-Efficacy Scale) - Self-efficacy at work (Self-Efficacy at Work Scale)	3, 6, 12 months	Moderate	Pain catastrophizing decreased from 10.42 at baseline to 9.25 at 12 months follow-up for the intervention group. No information on significance of within-group difference is provided. There was no difference between the groups. General self-efficacy increased from 31.16 at baseline to 32.91 at 12 months follow-up for the intervention group and self-efficacy at work from 8.62 to 13.58. No information on significance of within-group difference is provided. There was no difference between the groups. Days absent from work in the past month changed from 1.63 at baseline to 3.42 at 12 months. No information on significance of within-group difference is provided. There was no difference between the groups.

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Jensen 2013[29] Denmark (Europe)	Non-randomized experimental study	**Intervention group:** N: 118 A: 34, range 18-63 G: 15 males, 103 females H: Mental illness, musculoskeletal illness, mental and musculoskeletal illness **Reference group:** N: 86 A: Comparable to intervention group. G: Comparable to intervention group. H: Comparable to intervention group.	**RTW intervention:** D: Max. one year S: Individual and group sessions P: Social worker, experienced exercise instructor, therapist, rheumatologist M: - An individually tailored rehabilitation plan based on results from a Work Disability Diagnosis interview - Physical exercises with natural movements of the body (optional) - Ergonomic course with personal guidance at work (optional) - A discussion at the work place about a RTW plan (optional) - Consultation with a rheumatologist for diagnostics and/or treatment (optional) - Cognitive therapy (optional)
Leensen et al. 2017[30] The Netherlands (Europe)	Single group pre-test post-test study	N: 93 A: 47.9 (7.4) G: 9 males, 84 females H: Cancer	**Multidisciplinary rehabilitation program:** D: 2 times a week during 12 weeks S: Individual sessions P: Physiotherapist, oncological occupational physician M: - Supervised interval and resistance exercises - Counselling sessions with advice on gradual work resumption

	Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
	-	- Perceived health (36-item Short-Form Health Survey) - General self-efficacy (Generalized Self-Efficacy Scale)	12, 24 months	Low	Perceived health did not change after the intervention. Self-efficacy did not change after the intervention. At two-year follow-up, 64% of the intervention group returned to work in comparing to 48% in the reference group. The odds for RTW were higher in the intervention group at two-year follow-up ($p < .05$), but there was no difference at one-year follow-up. Mean duration of sick leave at one-year follow-up was significantly lower in the intervention group (28.9 weeks) as compared to the reference group (34.0 weeks) at one-year follow-up ($p < .05$), but there was no difference at two-year follow-up. Decline in self-efficacy was predictive for less chance to RTW at the one-year follow-up ($p < .05$), when adjusted for sex and age, but not at two-year follow-up. Increase in perceived health was predictive for RTW at one-year follow-up ($p < .05$) and at two-year follow-up ($p < .05$) when adjusted for sex and age.
	-	- Self-efficacy (Self-Efficacy Scale)	6, 12, 18 months	Moderate	Self-efficacy increased at 18 months from a mean of 3.7 (0.8) to 4.2 (0.6) ($p < .001$), but not at 6 months follow-up. Rate of RTW increased to 59% at 6 months follow-up, 86% at 12 months follow-up and 83% at 18 months follow-up ($p < .001$). The median number of days to RTW was 292.

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Marchand et al. 2015[24] Norway (Europe)	Randomized controlled trial	**Work-focused intervention:** N: 201 A: 40.1 (9.7) G: 111 males, 90 females H: Neck and/or back pain **Brief intervention and Multidisciplinary intervention:** N: 197 A: 41.1 (10.0) G: 101 males, 96 females H: Neck and/or back pain	**Work-focused intervention:** D: 5-6 days, during 3 weeks S: Individual and group sessions P: Physiotherapist, case-worker M: - Talking with caseworker about work histories, family lives, obstacles to RTW - Contact between caseworker and employer about possible modification at work - Creating a RTW schedule - Contact between caseworker and municipal social service (optional) - Assistance in meeting employer (optional)
Muschalla et al. 2016[15] Germany (Europe)	Randomized controlled trial	**Cognitive behavioral group intervention on work-anxiety (WAG intervention):** N: 177 A: 48.9 (8.7) G: 81 males, 96 females H: Orthopedic disorders, cardiologic disorders, neurological disorders **Recreational group (RG) intervention:** N: 168 A: 51.4 (8.0) G: 86 males, 82 females H: Orthopedic disorders, cardiologic disorders, neurological disorders	**WAG intervention:** D: Sessions of 90 minutes, 2 times a week for 3 weeks S: Group sessions P: Physician specialized in psychiatry, psychological behavior therapist M: - Developing and training individual cognitive and behavioral strategies to cope with work-anxiety - Situation and behavior analysis - Problem solving - Guided discovery questions - Homework assignments

Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
Brief intervention at Oslo University hospital: D: 3 weeks S: Individual sessions P: Physiotherapist, medical specialist M: - A diagnostic clarification - Session with a physiotherapist consisting of advice in activities, encouragement for exercise - One clarifying session with a medical specialist **Multidisciplinary intervention at St. Olav's hospital:** D: 3 weeks S: Individual and group sessions P: Physiotherapist, medical specialist, social worker M: - Cognitive behavioral therapy - Exercise	- Fear-avoidance beliefs (Fear-Avoidance Beliefs Questionnaire, the work subscale)	4, 12 months	Moderate	Fear-avoidance beliefs for work improved in 26% of the patients in the intervention group and in 20% of the patients in the control group, but no information on significance of within-group difference is provided. There were no significant differences between the groups. Improvement in fear-avoidance beliefs for work was a positive predictor for RTW (p = .023). The odds for RTW increased to 4.0 (p = .015) for the group with improved fear-avoidance beliefs for work scores. Participation in the work-focused intervention was not a significant predictor for RTW within 12 months.
RG intervention: D: Sessions of 90 minutes, 2 times a week for 3 weeks S: Group sessions P: Physician specialized in psychiatry, psychological behavior therapist M: - Unspecific recreational activities such as painting, cooking, playing games - Situation and behavior analysis - Problem solving - Guided discovery questions - Homework assignments	- Work-related coping (Job Coping and Return Intention inventory) - Work-related self-efficacy (Job Coping and Return Intention inventory) - Internal control perception concerning RTW (Job Coping and Return Intention inventory) - Relation between work and health problems (one question: "To which degree are your health problems caused or forced by your (last) work on a scale from 0-100")	6 months	Moderate	Work-related self-efficacy did not change after both interventions. Work-related active coping did not change after both interventions. Patients in the WAG showed an increase in the coping strategies self-calming and self-instruction over time as compared to the RG with covariate age (p = .025) and with covariate obtaining a workplace (p = .037). The increase in the WAG group was from a mean of 3.66 (0.93) to 3.74 (0.77). Internal and external control perception did not change for both interventions. Perceived work-relatedness decreased significantly for the WAG as compared to the RG with covariate gender (p = .007). The decrease in the WG group was from a mean of 47.69 (30.96) to 45.36 (30.07). Sick leave duration was 6 months after rehabilitation significantly lower in the WAG group (10.51 weeks) compared to the RG group (15.59 weeks) for patients with work-anxiety only (p = .05), but there were no differences between the groups for participants with work-anxiety and general mental disorders or for all the participants.

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Pedersen et al. 2015[18] Denmark (Europe)	Randomized controlled trial	**Psychoeducation:** N: 215 A: 43.5 (10.0) G: 61 males, 154 females H: Anxiety, depression, other mental illness, stress and burnout, musculoskeletal disorders **CAU:** N: 215 A: 43.9 (9.9) G: 60 males, 155 females H: Anxiety, depression, other mental illness, stress and burnout, musculoskeletal disorders	**Psychoeducation:** D: 6 weekly sessions of 2 hours S: Group sessions P: Psychiatric nurse, psychologist, social worker, physiotherapist, person previously on sick leave due to mental health problems M: - Didactic lectures and group discussions based on problem solving techniques and coping strategies - Session with relatives to hear about mental health problems and sickness absence
Pietilä-Holmner et al. 2020[33] Sweden (Europe)	Cohort study	N: 234 A: 43.6 (10.8) G: 34 males, 200 females H: Chronic musculoskeletal pain	**Multimodal rehabilitation program (MMRP):** D: Sessions of 1.5–3.5 hours a week for 6–10 weeks S: Individual and group sessions P: Physiotherapist, occupational therapist, general practitioner, social worker, psychologist M: - Goal setting together with the patient - Physical exercise - Relaxation - Training in coping strategies based on cognitive behavioural therapy (CBT) - Education in pain management

	Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
	CAU: CAU offered by job centers which typically comprises fitness workout, stress and pain management and gradual RTW. All participants were free to engage in any other treatment.	- Health locus of control (The Multidimensional Health Locus of Control) - Perceived health (one question: "In general, would you say your health is..")	3, 6, 12 months	Moderate	Internal locus of control changed from 22.0 at baseline, to 23.0 at 3 months follow-up to 24.0 at 6 months follow-up in the intervention group. No information on significance of within-group difference is provided. Internal locus of control was higher for the intervention group at 3 months follow-up (median 23.0) than for the control group (median 20.0) (p < .001) and was higher for the intervention group (median 24.0) than for the control group (median 21.0) at 6 months follow-up (p < .001). There were no differences for the other three locus of control variables (chance, doctors, other people). Perceived health did not differ between the groups at 3 months or 6 months follow-up. At 3 months more participants in the control group had full RTW than in the intervention group (28% vs 19%), but there were no significant differences at 6 or 12 months. For first RTW, there were no significant differences between the groups at either time points.
	-	- Coping (Chronic Pain Acceptance Questionnaire) - Catastrophizing (Pain Catastrophizing Scale) - Perceived health (Visual Analogue Scale)	12 months	Moderate	Catastrophizing reduced significantly from a median of 21.0 (15.8) at baseline to a median of 19.0 (16.0) at one-year follow-up (p < .001). Perceived health increased significantly from a median of 44.0 (30.0) at baseline to a median of 50.0 (34.0) at one-year follow-up (p < .001). The coping strategy activity engagement increased from a median of 29.5 (12.5) at baseline to a median of 36.0 (18.0) at follow-up (p < .001). The coping strategy pain willingness increased from 23.0 (11.0) at baseline to 27.0 (11.0) at follow-up (p < .001). At one-year follow-up, the proportion of patients on sick leave decreased significantly from 39.7% at baseline to 31.6% at the one-year follow-up (p = .027).

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Rolving et al. 2015[20] Denmark (Europe)	Randomized controlled trial	**Cognitive behavioral therapy (CBT):** N: 59 A: 51.4 (9.2) G: 23 males, 36 females H: Degenerative disc disease or spondylolisthesis undergoing lumbar spine fusion surgery **CAU:** N: 31 A: 47.7 (8.9) G: 16 males, 15 females H: Degenerative disc disease or spondylolisthesis undergoing lumbar spine fusion surgery	**CBT:** D: 6 sessions of 3 hours S: Group sessions P: Psychologist, occupational therapist, physiotherapist, social worker, spine surgeon, previously operated patient M: - Standard course of treatment - Pre- en post-operative sessions - Group discussions about the interaction of cognition and pain perception, coping strategies, pacing principles, ergonomic directions, RTW and details about the surgical procedure - Homework about thoughts and feelings in relation to stressful situations, coping strategies, and setting goals
Ronzi et al. 2017[25] France (Europe)	Randomized controlled trial	**Functional restoration program (FRP):** N: 49 A: 40.0 G: 27 males, 22 females H: Non-specific chronic low back pain **Ambulatory individual physiotherapy (AIP):** N: 54 A: 42.0 G: 33 males, 21 females H: Non-specific chronic low back pain **Mixed strategy:** N: 56 A: 40.0 G: 35 males, 21 females H: Non-specific chronic low back pain	**AIP:** D: 1 hour, 3 times a week during 5 weeks S: Individual sessions P: Physiotherapist M: - Active exercises supervised by physiotherapist - 50 minutes of home exercises, three days a week **Mixed strategy:** D: 1 hour, 3 times a week + 5 one-day sessions during 5 weeks S: Individual and group sessions P: Physiotherapist, rehabilitation physician, sports therapist, psychologist M: - Ambulatory physiotherapy - Assessment of chronic low back pain perception and discussion of representations and beliefs - Advices on appropriate activities and dietary advices - Relaxation sessions - Meeting with a psychologist

Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
CAU: D: 8 weeks S: Individual or group sessions P: Operating surgeon, nurse, physiotherapist, occupational therapist M: - Preoperative information about operation and anesthetics procedure - Medication - Information about postoperative rehabilitation and physical restrictions after surgery - Supervised exercise	- Catastrophizing (Coping Strategies Questionnaire)	3, 6, 12 months	Moderate	Catastrophizing decreased with -5.0 after 3 months, with -7.5 after 6 months and -5.0 after 1 year in comparing with baseline catastrophizing. No information on significant within-group difference is provided. Catastrophizing decreased more in the intervention group after 6 months follow-up (-7.5 points) than in the control group (-2.0), (p = .04), but there was no difference in decrease in catastrophizing between the groups at 3 months and one-year follow-up. At one-year follow-up 42% of the CBT group had resumed work. No information on significant within-group difference is provided. RTW rate and sick leave during the first year did not differ between the groups at one-year follow-up.
FRP: D: 6 hours a day, 5 days a week during 5 weeks S: Group sessions P: Physiotherapist M: - Supervised exercises focused on muscular warm-up and stretching, flexibility, cardio-respiratory, endurance, weightlifting, proprioception, coordination and strengthening	- Fear-avoidance beliefs (Fear-Avoidance Beliefs Questionnaire)	12 months	Moderate	Fear-avoidance beliefs decreased in the FRP group from 44.0 to 35.5 at 12-months follow-up and in the mixed strategy group from 44.0 to 39.0 (p < .05), but not in the AIP group. There were no differences in decreased fear-avoidance beliefs between the groups. Number of sick leave days decreased in all three treatment groups during 12 months of follow-up from 256.0 to 50.5 in the FRP group, from 209.0 to 47.0 in the mixed strategy group and from 219.0 to 45.0 in the AIP group (p < .05). There were no differences in number of sick leave days between the groups.

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Salzwedel et al. 2020[31] Germany (Europe)	Cohort study	N: 1262 A: 54.2 (7.0) G: 968 males, 294 females H: Cardiovascular diseases	**Standardized comprehensive cardiac rehabilitation (CR) program:** D: 3 to 4 weeks, with 12 sessions per week with a duration of 30-45 minutes and 8 additional sessions S: Individual and group sessions P: Cardiologist, physician and social worker M: - Counseling by a cardiologist - Risk-factor modification strategies (education on nutrition, smoking cessation, physical activity and medication adherence) - Physician-supervised exercise training and sports therapy - Psychosocial interventions - Vocational assessment - Physician and social worker counseling
Scott et al. 2014[37] Canada (North-America)	Single group pre-test post-test study	N: 148 A: 36.6 (9.2) G: - H: Whiplash injury	**Multidisciplinary rehabilitation program:** D: 7 weeks S: Individual and group sessions P: Physiotherapist, occupational therapist, psychologist M: - Tailored exercises - Education - Instruction in self-management skills
Sullivan et al. 2017[38] Canada (North-America)	Cohort study	**Men:** N: 35 A: 47.7 (10.6) H: Post-traumatic stress disorder **Women:** N: 38 A: 44.8 (8.5) H: Post-traumatic stress disorder	**Risk-targeted activity-reintegration intervention/ Progressive goal attainment program:** D: 1 session a week during 10 weeks S: Individual sessions P: Occupational therapist M: - Goal setting - Activity planning - Learning techniques targeting disability beliefs - Thought monitoring to target catastrophic thinking - Exposing techniques to facilitate re-engagement in avoided activities - Problem solving challenges to resume occupational activities

	Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
	-	- General self-efficacy expectations (Allgemeine Selbstwirksamkeit-Kurzskala: short scale for measuring general self-efficacy beliefs)	6 months	Low	The mean score for general self-efficacy expectations increased after CR from 4.1 (0.7) at admission to 4.1 (0.7) at discharge ($p < .001$). At follow-up 68.5% returned to work, 5.3% had retired, 6.3% had applied for pension, 7.1% were unemployed and 15.1% of the participants were still on sick leave. No information on significance was reported.
	-	- Pain catastrophizing (Pain Catastrophizing Scale)	12 months	Moderate	Mean catastrophizing decreased from 22.27 (SD = 10.83) to 13.66 (SD = 11.17) after the multidisciplinary rehabilitation program for participants. No information on significance is provided. At one-year follow-up, 69.6% of participants had resumed some degree of employment-related activities. No information on significance is provided. Participants who did not RTW had significantly lower percent reduction on catastrophizing than those who returned to work ($p = .001$). In 72% of the time, individuals who returned to work obtained higher percent change on pain catastrophizing than those who did not return.
	-	- Catastrophizing (Symptom Catastrophizing Scale)	1 month	Low	Catastrophizing decreased with 38% after treatment ($p < .001$). At 1 month follow-up, 34% of the participants had returned to work full-time and 15% had returned to part-time work. No information on significance is provided. Participants who returned to work at follow-up, had greater reductions in catastrophizing scores ($p < .001$), than participants who did not return. Change scores on catastrophizing contributed significant variance to the prediction of occupational re-engagement ($p < .001$).

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Van Eijk-Hustings et al. 2013[19] The Netherlands (Europe)	Randomized controlled trial	**Multidisciplinary intervention with aftercare (MD):** N: 108 A: Started: 41.6 (8.8). Not started: 41.3 (11.0) G: Started: 4 males, 63 females. Not started: 3 males, 38 females H: Fibromyalgia **Aerobic exercise (AE):** N: 47 A: Started: 43.9 (7.6). Not started: 39.1 (9.6) G: Started: 0 males, 19 females. Not started: 0 males, 28 females H: Fibromyalgia **CAU:** N: 48 A: 42.9 (11.0) G: 1 male, 47 females H: Fibromyalgia	**MD:** D: 1 year. First phase: 12 weeks, 3 days per week, with 2 sessions of 1.5 hour duration per day. Second phase: 5 meetings over a period of 9 months and 7 optional sessions S: Individual and group sessions P: A multidisciplinary team of therapists M: - Sociotherapy based on transactional analysis and aimed at increasing social behaviour strategies - Physiotherapy focused on graded activity including exercises and relaxation - Psychotherapy with general information about fibromyalgia and pain mechanisms including methods of core qualities, rational emotive therapy, transactional analysis - Creative arts therapy - Aftercare program to repeat key messages about coping - Additional individual therapy sessions (optional)
Vibe Fersum et al. 2013[26] Norway (Europe)	Randomized controlled trial	**Classification-based cognitive functional therapy (CB-CFT):** N: 51 A: 41.0 (10.3) G: 24 males, 27 females H: Non-specific chronic low back pain **Manual therapy and exercise (MT-EX):** N: 43 A: 42.9 (12.5) G: 22 males, 21 females H: Non-specific chronic low back pain	**CB-CFT:** D: Sessions from 30-60 minutes, weekly or ones every 2-3 weeks during 12 weeks S: Individual sessions P: Experienced physiotherapist M: - Outlining the vicious cycle of pain based on findings from examination - Movement exercises - Targeted functional integration of activities in daily life - Tailored physical activity program

Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
AE: D: Sessions from one hour, twice a week, during 12 weeks. S: Group sessions P: Physiotherapist M: - Warm up with aerobic exercise and stretching - Aerobic part - Resistance training - Cool down - Home exercises **CAU:** D: One or two consultations S: Individual sessions P: Rheumatologist or specialized rheumatology nurse M: - Individualized education about fibromyalgia - Lifestyle advice - Diversity of other treatments such as physiotherapy or social support from rheumatology nurse (optional)	- Perceived health (Visual Analogue Scale)	18 months	Moderate	Perceived health increased in the MD group from 48.1 (1.7) at inflow to 57.3 (2.3) at 18 months after the program (p < .05). However, there was no significant difference between perceived health in the MD group and the CAU group. There was no significant increase in perceived health in the AE group. Hours of sick leave decreased significantly from 9.2 (1.0) to 1.2 (0.8) hours of sick leave 18 months after the program in the MD group (p < .001). Between the MD group and the CAU, the difference was not statistically significant. There was no significant decrease in hours of sick leave for the AE group. Contractual hours paid work did not change for the AE group or the MD group.
MT-EX: D: Multiple sessions of 30-60 minutes S: Individual sessions P: Specialized therapist in orthopaedic manual therapy M: - Joint mobilization or manipulation technique for the spine or pelvis - Exercises or a home exercise program including general exercise or motor control exercise (optional)	- Fear-avoidance beliefs (Fear-Avoidance Beliefs Questionnaire)	3, 12 months	Moderate	Fear-avoidance beliefs for work decreased more for the CB-CFT group (from 14.1 to 8.3) than for the MT-EX group (from 19.1 to 17.4) after 3 months (p < .001). Fear-avoidance beliefs for work also decreased more for the CB-CFT group (from 14.1 to 7.7) than for the MT-EX group (from 19.1 to 16.6) after 12 months (p < .001). No information on significant within-group difference is provided. In the CB-CFT group number of people with more than 7 sick leave days changed from 23 at baseline to 10 at 12 months. No information on significant within-group difference is provided. The number of sick leave days after 12 months was lower in the CB-CFT group than in the MT-EX group after 12 months (p < .01), with 20.4% in the CB-CFT group with more than 7 sick leave days versus 42.5% in the MT-EX group with more than 7 sick leave days.

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Volker et al. 2017[39] The Netherlands (Europe)	Cohort study	N: 165 A: 44.1 (12.9) G: 22 males, 143 females H: Chronic musculoskeletal pain	**Standardized multidisciplinary team care intervention:** D: 15 weeks S: Individual and group sessions P: Rehabilitation physician, occupational therapist, social worker, psychologist, physical therapist M: - Cognitive behavioral therapy - Education - Individual and group exercises - Relaxation - Hydrotherapy
Wormgoor et al. 2020[16] Norway (Europe)	Randomized controlled trial	**Brief psychotherapy (Brief-PsT):** N: 141 A: 40.3 (10.9) G: 45 males, 96 females H: Common mental complaints **Short-term psychotherapy (Short-PsT)** N: 143 A: 42.9 (10.4) G: 52 males, 91 females H: Common mental complaints	**Brief-PsT:** D: 6 sessions. First session 90 minutes and other sessions 50 minutes S: Individual P: Psychotherapists M: - Psychotherapy sessions with focus on normalizing, accepting and coping with mental health complaints and their hindrance for work participation

RTW: Return to work, CAU: Care as usual

	Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
	-	- Catastrophizing (Pain Catastrophizing Scale)	3, 12, 24 months	Moderate	Catastrophizing decreased from a mean of 17.5 (9.6) at admission to 12.6 (9.1) at 24 months follow-up ($p < .05$). Number of patients that worked 0 or 1-24 hours decreased, whereas the number of patients working ≥ 25 hours a week increased ($p < .05$).
	Short-PsT: D: 20 sessions. First session 90 minutes and other sessions 50 minutes S: Individual P: Psychotherapists M: - Psychotherapy sessions with focus on coping with mental health complaints and hindrance for work participation. - Emphasis on an extensive anamnesis and possibility to establish a central theme based on previous or current challenging issues such as trauma or difficult childhood conditions - Reducing symptoms and problematic behaviour and improvement of home situation, with deeper focus on cognitive maladaptive coping strategies or dynamic repetitions	- Self-efficacy (General Self-Efficacy Scale)	3, 12, 24 months	Moderate	Self-efficacy improved for participants in the Brief-PsT group from 2.6 at baseline to 3.1 at two-year follow-up and for participants in the Short-PST group from 2.6 at baseline to 3.0 at two-year follow-up ($p < .001$), but there was no difference over time between the two groups. Analyses showed statistically significant improved work participation (less days sick leave) in the Brief-PsT group ($p < .001$) and the Short-PsT group ($p < .001$). At one-year follow-up, work participation was higher for the Brief-PsT group than the Short-PsT group ($p = .031$). At two-year follow-up differences were not significant.

Appendix 3. Risk of bias of included studies

Table 1. Risk of bias of randomized controlled trials

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Quality score /total	Risk of bias
Aasdahl et al. 2019[21]	1	0	1	0	0	0	1	1	0	1	1	0	1	7/13	Moderate
Arends et al. 2014[27]	1	1	0	1	0	1	1	1	1	1	1	0	1	10/13	Moderate
Fauser et al. 2019[17]	1	1	1	0	0	0	1	0	1	1	1	1	1	9/13	Moderate
Granviken et al. 2015[22]	1	1	0	0	0	1	1	1	1	1	1	1	1	10/13	Moderate
Hampel et al. 2019[12]	1	1	1	0	0	0	1	1	0	1	0	1	1	8/13	Moderate
Harris. et al. 2017[23]	1	1	0	0	0	0	1	0	1	1	1	1	1	8/13	Moderate
Hees et al. 2013[13]	1	1	1	0	0	1	1	1	1	1	1	1	1	11/13	Low
Hutting et al. 2015[14]	1	1	1	0	0	0	0	0	1	1	0	1	1	7/13	Moderate
Marchand et al. 2015[24]	1	1	1	0	0	1	0	1	1	1	1	1	1	10/13	Moderate
Muschalla et al. 2016[15]	0	0	1	0	0	0	1	1	0	1	1	1	1	7/13	Moderate
Pedersen et al. 2015[18]	1	1	0	0	0	1	0	1	1	1	1	1	1	9/13	Moderate
Rolving et al. 2015[20]	1	1	0	0	0	0	1	0	1	1	1	1	1	8/13	Moderate
Ronzi et al. 2017[25]	1	1	0	0	0	0	1	0	1	1	1	1	1	8/13	Moderate
Van Eijk-Hustings et al. 2013[19]	1	1	0	1	0	0	1	1	1	1	1	1	1	10/13	Moderate
Vibe Fersum et al. 2013[26]	1	1	0	0	0	1	1	1	1	1	1	0	1	9/13	Moderate
Wormgoor et al. 2020[16]	1	1	1	0	0	0	1	1	1	1	1	1	1	10/13	Moderate

Items Joanna Briggs Institute critical appraisal checklist for randomized controlled trials: Q1: Randomization, Q2: Allocation concealment, Q3: Similarity groups at baseline, Q4: Blinding participants, Q5: Blinding treatment providers, Q6: Blinding outcome assessors, Q7: Treatment groups treated identically, Q8: Completeness follow-up, Q9: Intention to treat analysis, Q10: Identical outcome measures, Q11: Reliability outcome measures, Q12: Appropriate statistical analysis, Q13: Appropriate trial design

1: Description in study meets criterion; 0: Description in study does not meet criterion

Table 2. Risk of bias of cohort studies

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Quality score /total	Risk of bias
Adams et al. 2017[35]	1	1	1	1	1	1	1	0	1	X	1	10/11	Low
Asih et al. 2015[40]	1	1	1	0	0	0	1	1	0	0	1	6/11	Moderate
Chu et al. 2015[28]	1	1	1	1	1	0	1	1	0	0	1	8/11	Moderate
Gagnon et al. 2013[36]	1	1	1	0	0	0	1	0	0	0	1	5/11	High
Haiduk et al. 2017[32]	1	1	1	0	0	0	1	1	0	1	1	7/11	Moderate
Pietilä-Holmner et al. 2020[33]	1	1	1	1	1	0	1	1	0	0	1	8/11	Moderate
Salzwedel et al. 2020[31]	1	1	1	1	1	0	0	1	1	1	1	9/11	Low
Sullivan et al. 2017[38]	1	1	1	1	1	1	1	0	0	1	1	9/11	Low
Volker et al. 2017[39]	1	1	1	0	0	0	1	1	0	1	1	7/11	Moderate

Items Joanna Briggs Institute critical appraisal checklist for cohort studies: Q1: Similarity groups, Q2: Similarity exposure measurement, Q3: Validity and reliability exposure measurement, Q4: Identification confounders, Q5: Dealing with confounders, Q6: Participants free of outcome at start, Q7: Validity and reliability outcome measures, Q8: Sufficiency follow-up time, Q9: Completeness follow-up, Q10: Strategies for incomplete follow-up, Q11: Appropriate statistical analysis

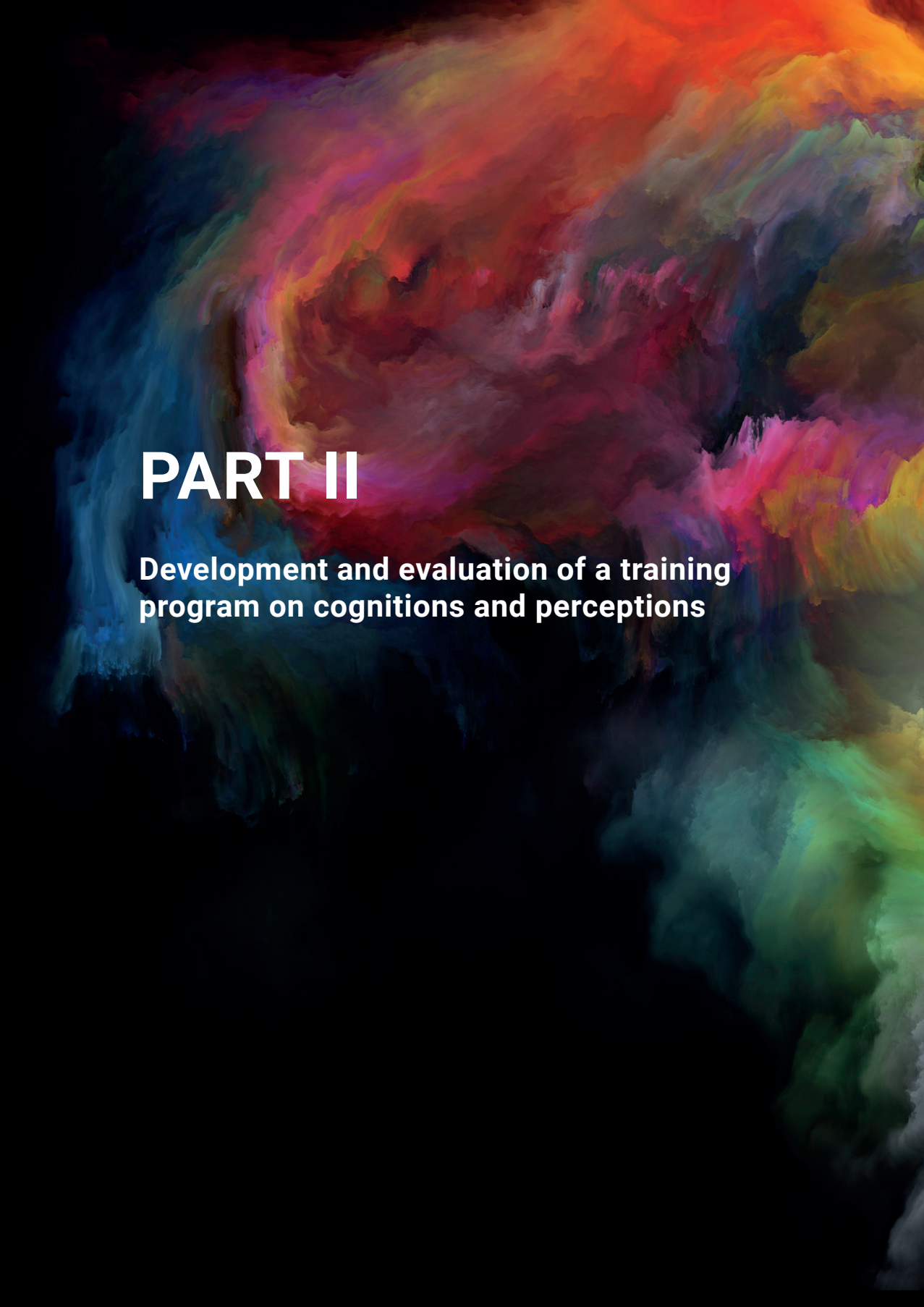
X: Item not applicable; 1: Description in study meets criterion; 0: Description in study does not meet criterion

Table 3. Risk of bias of non-randomized experimental studies and studies with a single group pre-test post-test design

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Quality score /total	Risk of bias
Aasdahl et al. 2018[34]	1	1	1	0	1	0	1	1	1	7/9	Moderate
Jensen 2013[29]	1	1	0	1	1	1	1	1	1	8/9	Low
Leensen et al. 2017[30]	1	1	1	0	1	0	1	1	1	7/9	Moderate
Scott et al. 2014[37]	1	1	1	0	0	1	1	1	1	7/9	Moderate

Items Joanna Briggs Institute critical appraisal checklist for quasi-experimental studies: Q1: Clear cause and effect, Q2: Similarity groups, Q3: Similarity treatment, Q4: Presence of control group, Q5: Multiple measurements of outcome pre and post, Q6: Completeness follow-up, Q7: Similarity outcome measurement, Q8: Reliability outcome measures, Q9: Appropriate statistical analysis

1: Description in study meets criterion; 0: Description in study does not meet criterion



PART II

Development and evaluation of a training program on cognitions and perceptions

CHAPTER 6

Training on involving cognitions and perceptions in the occupational health management and work disability assessment of workers: development and evaluation

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Abstract

Purpose: To develop a training program for occupational health professionals (OHPs) on how to involve cognitions and perceptions in the occupational health management and work disability assessment of workers with a chronic disease. In addition, to evaluate the OHPs' satisfaction with the training and the feasibility of the training and learned skills.

Methods: The training program was developed using information from previously conducted studies regarding cognitions and perceptions in relation to work participation. Satisfaction with the training by OHPs was evaluated by means of a questionnaire after the training. A smaller group of OHPs were interviewed three to six months after the training to evaluate the feasibility of the training and learned skills.

Results: The 4.5-hour training program consisted of four parts concerning: 1) cognitions and perceptions associated with work participation, 2) how to obtain information on them, 3) the course of the conversation on these factors, and 4) intervening on these factors. Eight training sessions were conducted with 57 OHPs, of whom 54 evaluated the training. Participants were very satisfied (score 8.5 on a scale from 1 to 10). The eleven interviewed participants were more aware of cognitions and perceptions during consultations and perceived the training to be feasible. However, not all participants had applied the acquired skills in their practice, partially because of a lack of time.

Conclusion: OHPs are very satisfied with the newly developed training program and perceive it to be feasible. The training increases awareness of important cognitions and perceptions and may possibly help to increase work participation of workers with a chronic disease.

Introduction

A chronic disease can limit physical and mental functioning, which can have a negative impact on work participation.[1, 2] The World Health Organization defines a chronic disease as a disease with a long duration and generally slow progression.[3] In order to improve work participation of workers with a chronic disease, it is important for occupational health professionals (OHPs), who make important decisions concerning work participation of workers with health problems, to focus on those factors that can influence work participation. Cognitions and perceptions, such as recovery expectations and self-efficacy, are examples of these factors that can influence work participation.[4, 5] Evidence was found for an association between 10 different cognitions and perceptions and work participation: recovery and return to work (RTW) expectations, self-efficacy, feelings of control, perceived health, fear-avoidance beliefs, perceived work-relatedness, coping strategies, catastrophizing, motivation and optimism/pessimism.[6]

In general, OHPs recognize the importance of such cognitions and perceptions.[7-9] In a study by Achterberg et al.[7] motivation, coping strategies, own expectations for work participation and self-perceived health were identified by insurance physicians (IPs) and labor experts as factors that are important for work participation in young disabled persons in the Netherlands. In a study by Peters et al.[9] experts on work disability agreed that motivation to RTW, self-efficacy, positive coping skills, having no catastrophizing thoughts and having no fear-avoidance beliefs were important facilitators for RTW following surgery.

However, obtaining reliable information on these cognitions and perceptions from workers themselves is a challenge. In our earlier studies, the majority of the OHPs and workers agreed that information on these factors should be obtained during consultations with workers.[10, 11] Whether information about cognitions and perceptions can be obtained during consultations depends on the course of these conversations and the disclosure by workers. Previous studies have shown that factors such as a lack of trust and lack of listening can have a negative influence on disclosure during consultation, which makes it difficult for OHPs to obtain reliable information.[12, 13]

If OHPs succeed in obtaining information on cognitions and perceptions, the second challenge is to try to influence these factors if they are hindering work participation. In this regard, OHPs need to be aware of existing effective interventions. Sullivan et al.[14] described the Progressive Goal Attainment Program

that was able to reduce catastrophizing thoughts – a predictor of RTW. Leensen et al.[15] described a multidisciplinary rehabilitation program that increased the self-efficacy of workers with cancer and had a positive influence on RTW.

Although it is important for OHPs to know how to obtain information on workers' cognitions and perceptions and how to intervene on these factors, currently no specific training exists for OHPs. Therefore, the purpose of the present study was: 1) to develop a training program for OHPs on involving workers' cognitions and perceptions in the occupational health management and work disability assessment of workers, 2) to evaluate the OHPs' satisfaction with the training, and 3) to evaluate the feasibility of the training and learned skills three to six months after the training.

Methods

The Medical Ethics Review Committee of the Academic Medical Center (AMC), University of Amsterdam, confirmed that the Medical Research Involving Human Subjects Act (WMO) does not apply to this study and that official approval by this committee was therefore not required (W 19__174 # 19.213 and W 19_494 # 20.012).

Participants

The OHPs who participated in the training were occupational physicians (OPs), OPs in training, IPs and IPs in training, working in the Netherlands. The main task for OPs in the Netherlands is prevention of work-related diseases, promoting health, and occupational health management of workers with health problems. IPs aim to increase work participation by evaluating the functional abilities of workers and by determining whether workers should receive a work disability benefit.

Procedure

Step 1. Development of the training

The main goals of the training program for OHPs are acquiring knowledge of cognitions and perceptions associated with work participation, identifying these cognitions and perceptions, and changing these cognitions and perceptions when necessary. The information provided during the training was based on four previously conducted studies.[6, 10, 11, 16] Results of a systematic review formed the basis for the content about the cognitions and perceptions important for work

participation.[6] Information concerning methods physicians can apply to obtain information in order to identify cognitions and perceptions was retrieved from results of a survey study among physicians.[10] Information about factors that may influence the course of a conversation concerning cognitions and perceptions was retrieved from a focus group study among workers with chronic health problems.[11] A scoping review about interventions that are aimed at changing cognitions and perceptions and improving work participation formed the basis for the final part of the training program, in combination with information on how to change cognitions and perceptions retrieved from different guidelines for OPs and IPs.[16]

Various exercises were developed for practicing with the learned information and acquired skills during the training. By basing the exercises on real client cases provided by OHPs and developing exercises in which participants needed to discuss their own client cases with each other, a clear connection was made between theory and practice.

In order to help OHPs to apply the learned skills in daily practice, a conversation tool was developed for them. The first version of this conversation tool was tested on face validity by a patient representative, three IPs and two OPs who were not participants in the training. The conversation tool was adapted on the basis of their feedback, collected during phone interviews.

Step 2. Evaluation of OHPs' satisfaction with the training

In October and November 2019, eight training sessions were scheduled for the OPs and IPs. OPs and IPs who were interested in participating received an email with information about the training program and signed an informed consent form.

After the training the participants received a questionnaire on paper about their satisfaction in respect of different aspects of the training, which they could complete immediately or at home. The anonymous questionnaire consisted of ten statements about reaching the most important goals of the training (e.g. knowing important cognitions and perceptions, identifying them and changing them when necessary) that had to be scored on a 5-point Likert scale (completely disagree – completely agree) and eight statements about the design of the training program (e.g. duration, level, content) that had to be scored on a 5-point Likert scale (very dissatisfied – very satisfied), with room for explanation. Besides this, they had to rate their satisfaction with the complete training on a scale from 1 to 10 (very dissatisfied – very satisfied). There were five "yes" or "no" questions concerning

the possible implementation of the conversation tool and learned skills in practice and four open questions about positive and negative elements of the training and barriers to and facilitators for implementation. Finally, there was room for additional comments.

Step 3. Interviews concerning feasibility of the training and learned skills
In January 2020, the OPs and IPs who were willing to participate in an interview study concerning the feasibility of the training and learned skills in practice were recruited by e-mail, and written consent was obtained. The structured interviews were conducted by the researchers by phone, audio-recorded and transcribed. The framework for the interview guide consisted of the following feasibility aspects proposed by Bowen et al.[17]: acceptability, demand, implementation, practicality, adaptation, integration and limited-efficacy testing. The aim of this feasibility study was to reflect on the experience of the participants with the training and with the learned skills in practice. An analysis concerning practical aspects on future implementation, which were addressed in the questions concerning the aspects practicality, integration and factors affecting implementation ease or difficulty, will be reported in a separate study.

Data analysis
Statistical data was analyzed using SPSS statistics 26.0. Descriptive statistics were used to describe the scores on the questionnaires and to describe the characteristics of the participants who participated in the interviews. The answers to the open questions from the questionnaires were summarized by one researcher (MdW) and checked by the other researchers (BH, AdB, HW, CH).

The transcripts of the interviews were coded using MAXQDA 2020 Software.[18] For the coding, a mixed concept-driven and data-driven approach was applied and the steps described by Kuckartz et al.[19] were followed. The starting point and main categories from the coding system were the feasibility aspects.[17] Subsequently, sub-codes were assigned using a data-driven approach. All interviews were coded independently by two researchers (MdW and NZ). Afterwards, the codes were discussed by the two researchers until consensus was reached. Quotations were presented to illustrate the findings.

Results

Content of the training

The training program has a duration of 4.5 hours (including breaks) and consists of four main parts, which are described in Table 1. During the training, a conversation tool is presented to the participants to help them to apply the learned skills in daily practice. The tool can be used before, during and/or after consultations with workers with a chronic disease. The tool consists of a list of the cognitions and perceptions with their definitions, instructions about how to use the tool, examples of questions OHPs could ask to obtain information concerning cognitions and perceptions, a list of indicators for limiting or promoting cognitions and perceptions, and a checklist in which OHPs can indicate whether or not a cognition or perception has a limiting effect on work participation for the worker in question.

All information concerning the training is bundled in a trainers' manual and a PowerPoint which is presented during the training. Eligible trainers are OPs and IPs with extensive experience in occupational health care.

OHPs' satisfaction with the training

In total 54 of the 57 OPs and IPs who participated in the training program completed the anonymous questionnaire concerning their satisfaction with the training (response rate: 94.7%).

Overall, the participants were very satisfied with the training. Of the total number of participants, 52 participants gave a mean score of 8.5 (SD = .8) on a scale from 1 to 10 for their overall satisfaction with the training.

More than 90 percent of the participants "agreed" or "completely agreed" that 9 of the 10 goals of the training had been met (Table 2). In contrast, only 77 percent indicated that they had reached the goal concerning knowing about interventions focused on cognitions and perceptions and improving work participation.

In Table 3 scores are presented regarding satisfaction with the training. All participants who scored the statements were "satisfied" or "very satisfied" about the assignments, the explanation in class, the cases that were presented and the appendices that were handed out. One person was dissatisfied with the group size of the training and three participants were dissatisfied with the duration of the training.

Table 1. Overview of training on cognitions and perceptions

Module	Time	Content
Introduction	15 minutes	• General introduction about the learning goals of the training
		• Introduction round
Part 1: Importance of cognitions and perceptions	45 minutes	• Information about ten cognitions and perceptions associated with work participation: recovery and return to work expectations, self-efficacy, feelings of control, perceived health, fear-avoidance beliefs, perceived work-relatedness, coping strategies, catastrophizing, motivation and optimism/ pessimism
		• Discussion about the importance of cognitions and perceptions
		• Information about importance of cognitions and perceptions according to OPs and IPs in the Netherlands
Part 2: Obtaining information	60 minutes	• Information about how to obtain information concerning cognitions and perceptions
		• Exercise in identifying cognitions and perceptions in different written cases
		• Exercise in thinking up questions that could be asked to obtain information regarding cognitions and perceptions
		• Explanation about the conversation tool
Part 3: Course of the conversation	45 minutes	• Exercise in which participants need to mention as many factors that can influence the course of the conversation as possible
		• Information about factors that can influence the course of the conversation according to workers
Part 4: Interventions	55 minutes	• Exercise in which participants discuss how they dealt with workers with limiting cognitions and perceptions in the past
		• Information about methods to change cognitions and perceptions
Debriefing	20 minutes	• Discussion about the most important things learned during the training according to the participants

OPs: Occupational physicians, IPs: Insurance physicians

Table 2. Scores on 5-point Likert scale (completely disagree – completely agree) on statements about reaching the goals of the training

Statements	*N*	Percentage of participants with score 4 (agree) or 5 (completely agree)	Minimum and maximum scores
1. I know important cognitions and perceptions	53	98	3-5
2. I know the ten cognitions and perceptions associated with work participation	52	98	3-5
3. I know how information can be obtained	53	94	3-5
4. I know which questions to ask to obtain information	53	92	3-5
5. I know the conversation tool and how it can be used	53	94	2-5
6. I know indicators for cognitions and perceptions	53	94	3-5
7. I am able to recognize cognitions and perceptions	52	96	3-5
8. I know the prerequisites for having a conversation	52	92	2-5
9. I know the positive and negative influences on the course of a conversation	53	91	2-5
10. I know which interventions can support work participation	53	77	3-5

Table 3. Scores on 5-point Likert scale (very dissatisfied – very satisfied) on statements about the design of the training

Statements	*N*	Percentage of participants with score 4 (satisfied) or 5 (very satisfied)	Minimum and maximum scores
How satisfied are you with…			
1. …the level of the training	54	98	3-5
2. …the assignments during the training	53	100	4-5
3. …the explanation in class during the training	53	100	4-5
4. …the cases that were presented during the training	53	100	4-5
5. …the group size of the training	53	96	2-5
6. …the duration of the training	53	91	2-5
7. …the appendices that were handed out during the training	52	100	4-5
8. …the conversation tool	52	98	3-5

Overall, 51 out of 52 participants agreed that the training was useful for practice. Fifty-two out of 53 participants expressed the intention to use the learned skills and the appendices, and 50 out of 52 participants had the intention to apply the conversation tool in practice. Reasons for not doing so were a lack of experience and not seeing workers during consultations more than once. Forty-eight out of 49 participants thought that the training could be implemented in practice and 51 out of 52 participants would recommend the training program to their colleagues.

In the open-ended questions participants mentioned positive and negative components of the training. Overall, participants appreciated the interaction during the training, the assignments and the debriefing after the assignments. However, some participants reported that there was not enough time to practice the learned skills during the training, in particular for the final part of the training program, concerning interventions.

Participants indicated that the implementation of the training into practice would be facilitated if the training was implemented in the standard education for physicians or if awareness was raised about the existence of the training program in professional associations or trade journals. Time was perceived to be the most important barrier for implementation.

Feasibility of the training and learned skills

Eleven participants were interviewed regarding the feasibility of the training and learned skills, among whom five OPs (of whom one in training) and six IPs (of whom two in training). These participants included five females and six males, with an mean age of 48.5 (12.9) years and 15.4 (14.2) years of work experience. The time between the training and the interview varied between 13 and 25 weeks. The codes and sub-codes that were assigned to the interviews with corresponding quotations are presented in Appendix 1.

Acceptability

In general, the participants were very satisfied with the training. It was perceived to be entertaining, clear and informative and its topic was relevant. Participants appreciated the fact that OPs and IPs were mixed in the training:

"[…] a lot of our work is similar and I think that it is useful to have both parties present during the training, because you also learn about each other's perceptions from each other's cases […]"(P6)

Most participants thought the content of the training was appropriate for their practice and that no changes were necessary. However, one participant felt that the training should be less focused on recommending interventions, but more focused on how to adapt conversation techniques to limiting cognitions and perceptions. Another participant mentioned that the training did not completely fit within his organization because, due to work pressure, the focus there was more on assessments of the functional abilities of workers than on guiding them back to work.

Overall, participants were satisfied with the tool for facilitating the use of the learned skills in practice. They thought the tool was clear and they were satisfied with its questions and arrangement. Some participants thought the tool was inappropriate to use during consultation. They said it was inconvenient or even embarrassing for physicians to look at the tool during their conversations:

"Well I also find it a bit embarrassing to be looking at a page like this during a consultation […] I should be able to do it by heart."(P3)

They also indicated that workers might disagree with the physician's thoughts about the cognitions and perceptions, which could make it inappropriate to talk about them. One participant doubted whether all her colleagues were open to this conversation tool.

Demand

Overall, the participants agreed that the training is valuable for physicians. Participants mentioned that there was room for improvement in the practice of physicians when it comes to this topic. Especially, they appreciated the fact that the training was based on scientific evidence. However, some participants mentioned that physicians implicitly already take some perceptions into account. One of the participants said the training was not useful in practice, because the training on its own would not fit into the education of the physicians.

Most of the participants mentioned that the learned skills and tool were valuable and that they used it in practice. Participants tried to identify cognitions and perceptions, used the indicators and discussed the cognitions and perceptions more during consultations than before:

"[…] to be honest I never did it (considered cognitions and perceptions during consultations), or only if it was so clear that it really stood out, but now I try to do it systematically, so for every client."(P4)

Some participants only implicitly used the learned skills. According to most participants, the learned skills can be used for consultations with all clients, although one participant used it especially when clients had psychological complaints.

However, participants did not always use the tool during consultations. Some of the participants said that they looked at the tool before consultations, in order to prepare for the consultations, or after consultations. There were also participants who did not use the tool or all learned skills, did not change the interventions they recommend or did not change anything in their reports. However, participants were still motivated to pay more attention to what they had learned and to use the skills. They planned to use the tool in scheduled consultations or planned to internalize or practice more with the cognitions and perceptions and questions they can use to obtain information, so they did not have to constantly look at the tool during consultations.

Implementation

Although the participants had the time and opportunity to participate, they said OPs and especially IPs are very busy, so time would be a main barrier to implementation of the training.

In respect of the implementation of the learned skills, time was also perceived to be a barrier. Participants mentioned they lacked time during consultations because a lot of information needs to be discussed. Some mentioned that they did not have enough time to acquaint themselves better with the tool in order to use it. However, there were participants who reported having enough time and room to use the learned skills and tool. One participant even mentioned that, because of the training, he saved time during consultations, since recognizing cognitions and perceptions was easier than before.

Another barrier for implementing the learned skills was that cognitions and perceptions were sometimes not easy to recognize. In the cases discussed during the training cognitions and perceptions were more obvious, while in practice they were sometimes less clear:

"What I particularly noticed was that you can't just quickly identify a certain cognition. […] it's often a lot more subtle. It takes a bit more effort to discover what it is."(P4)

Adaptation

The majority of the physicians agreed that the training was suitable for OPs and IPs, because both professionals see workers with chronic diseases who experience limiting cognitions and perceptions. However, some participants felt that the training was more suitable for OPs than for IPs, because OPs see workers multiple times, while sometimes IPs only see them once and OPs recommend interventions to workers more often than IPs.

Limited efficacy

Participants mentioned that the training was a kind of eye-opener to the importance of cognitions and perceptions. The training increased their awareness of cognitions and perceptions during consultations. Participants had the feeling that the cognitions and perceptions were better outlined than before and that they were better at recognizing and naming them:

"During the training I found it a real eye-opener that, oh, you can use these terms, and you can ask these questions."(P1)

Information about the cognitions and perceptions helped to form a complete picture and predict the future ability of the client and can be used as input for following consultations with the worker. However, some participants did not have the feeling that the training led to changes in the work disability assessment.

Discussion

Key findings

A four-part training program was developed for OHPs to acquire knowledge of cognitions and perceptions important to work participation of workers with a chronic disease, how to obtain information concerning these factors, the course of the conversation on these factors and intervening on cognitions and perceptions. OHPs who participated in the training were very satisfied overall with the design and content of the training. Directly after the training the participants felt that their knowledge had been improved. They were motivated and intended to use the learned skills with the corresponding conversation tool in practice. Three to six months after the training, the participants indicated being more aware of cognitions and perceptions during consultations and having the feeling they were better outlined than before. Although the training was perceived feasible, not all participants used all the learned skills and the corresponding tool during consultations.

The training was perceived important and suitable for both OPs and IPs, partly because participants see people with the same kind of cognitions and perceptions. This was also found in previous studies, the results of which showed that both OPs and IPs agree that multiple cognitions and perceptions are important for work participation.[6, 7, 20] The perceived importance of cognitions and perceptions for work participation is also an explanation for why almost all OPs and IPs were planning to apply the learned skills and conversation tool in practice. The developed training program contained different components that might help improve the effectiveness of training in changing the behavior of physicians as mentioned in previous studies by Mostofian et al.[21] and Berkhof et al.[22] The training was active and provided room for discussion between the physicians, and during the training a clear link was made between what the physicians learned and actual cases from their practice.

However, three to six months after they had done the training the eleven participants interviewed mentioned that they did not use everything they had learned. Participants mentioned three main problems for implementing the learned skills in practice. The first problem is that sometimes cognitions and perceptions are still hard to identify during consultations. Although during training the participants had the opportunity to practice the skill of identifying cognitions and perceptions in different cases, this practice might not reflect real-life cases enough because they were written cases. Results of a review by Berkhof et al.[22] concerning teaching communication skills to physicians indicate that role-play with actors might be more effective in helping the physicians to practice this skill in the future than exercises with written cases. The second problem with the implementation is that looking at the conversation tool during consultations was perceived to be inappropriate. Possibly, looking at the tool disrupts eye contact between the worker and the physician and can give the worker the feeling that the physician is not well prepared. Both aspects are important for the course of the conversation between physician and client.[23, 24] A solution for OPs and IPs might be to internalize the cognitions, perceptions and corresponding questions, which many of the interviewed participants were already planning to do. However, this automatically leads to third problem for implementation: a lack of time, which can form an obstruction to OPs and IPs internalizing the cognitions and perceptions. This was also perceived to be a barrier in previous studies about implementing new skills for OPs and IPs in practice.[25, 26]

The reasons mentioned for not using all learned skills raise the question whether a 4.5-hour training program is long or comprehensive enough to learn OHPs how

to involve cognitions and perceptions during practice. According to the review by Berkhof et al.[22], training programs on communication skills for physicians should have a duration of at least one day. Although the short duration of the training makes it feasible, extra time during the training or follow-up training program might possibly improve the feasibility of applying the learned skills in practice. This might give OHPs more time to practice identifying cognitions and perceptions and internalizing the cognitions and perceptions, which may remove the need for OHPs to look at the tool, and save time before and during consultations.

Besides extending the duration of the training and offering follow-up training, offering the training at an early stage in the education of OHPs might improve the feasibility of the learned skills. Implementing the acquired skills during practice may be easier for OHPs in training than for experienced physicians, because for experienced physicians this often involves altering long-established practices.[27]

Strengths and limitations

A strength of this study is that the developed training program is based on evidence from previously conducted studies. The exercises included in the training are based on real-life cases from OHPs, which may bridge the gap between theory and practice. The new training program was extensively evaluated by means of questionnaires and in-depth interviews.

A limitation of this study is the fact that, in the satisfaction questionnaires directly after the training, we did not ask whether participants were OPs, IPs, or in training and therefore, we were not able to analyze whether OPs and IPs evaluated the training differently. This might have been relevant because some of the interviewees said this training is more suitable for OPs than for IPs. Another limitation is that not all participants were available to be interviewed at follow-up. It is possible that the participants who wanted to be interviewed were, in general, more positive about their experiences with putting the learned skills into practice.

Implications for practice and future research

The developed training program can help OHPs to identify important cognitions and perceptions during consultations and to know how to intervene on these cognitions and perceptions in order to improve work participation. After the training, participants mentioned being better equipped to recognize cognitions and perceptions during consultations. However, to know whether the training truly has an effect on the ability to recognize cognitions and perceptions during consultations, a further study with a robust design, i.e. a randomized controlled

trial, should be conducted. Besides, study is required into whether this training has an effect on the work participation of the workers with a chronic disease. Studies should also be conducted to test whether the learned information and skills are also applicable in consultations with workers who have non-chronic health problems. Finally, study is also required into whether increasing the length of the training, adding follow-up training or offering the training at an early stage in education of OHPs could improve the feasibility of the learned skills in practice.

Conclusion

In this study, a training program was developed which may help OHPs to involve workers' cognitions and perceptions in the occupational health management and work disability assessment of these workers. OHPs were very satisfied with the training and perceived it to be feasible, although not all OHPs used all learned skills in practice. After the training, OHPs mentioned they were more aware of the cognitions and perceptions and they were better equipped to recognize them during consultations, which can help them in their efforts to improve work participation in workers with a chronic disease.

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Appendix 1. Code system of interviews

Table 1. Code system of interviews three to six months after the training (*N* = 11)

Feasibility aspects Bowen	Sub-themes	Data-driven sub-codes
Acceptability	*Satisfaction*	• Satisfied with topic
		• Satisfied with training
		• Satisfied with mix OPs and IPs
		• Satisfied with tool
		• Not satisfied with tool
	Perceived appropriateness	• No changes necessary
		• Less focus on interventions during training
		• Not appropriate during consultation
		• Not suitable to apply to all clients
	Fit within organizational culture	• Organizational readiness
		• Organizational support
Demand	*Perceived demand*	• Valuable
		• Confidence in own ability
		• Not useful
	Actual use	• Used
		• Not used
	Expressed interest or intention to use	• Intrinsic motivation
		• Intend to use
		• Internalizing
Implementation	*Success or failure of execution*	• No barriers to application
		• Difficult to recognize factors
	Amount, type of resources needed to implement	• Enough time during consultation
		• Enough time during preparation of consultation
		• Lack of time during consultation
		• Lack of time in general
Adaptation	*Population adaptation*	• Suitable for OPs and IPs
		• Not suitable for IPs
		• Suitable for OPs
Limited efficacy	*Intended effects of program or process on key variables*	• Eye opener/increased awareness
		• Identify more accurately
		• Effect on assessment
		• Input for consultation
		• No effect on assessment

OPs: Occupational physicians, IPs: Insurance physicians

CHAPTER 7

Effects of a training program for occupational health professionals on the cognitions and perceptions of workers: a randomized controlled trial

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Submitted

Abstract

Objectives: To evaluate the effects of a training program for occupational health professionals (OHPs) on their ability to identify the cognitions and perceptions of workers with a chronic disease that may hinder work participation, and on their ability to recommend evidence-based interventions aimed at the identified cognitions and perceptions.

Methods: A randomized controlled trial was conducted in which OHPs were randomly assigned to a training program on the cognitions and perceptions of workers with a chronic disease (n = 29) or to a control group that did not receive training (n = 30). Participants received home assignments in which they had to identify the cognitions and perceptions of workers in video vignettes and had to indicate which interventions they would recommend to foster work participation. A generalized linear model repeated measures ANOVA was conducted to study the effects of the training program.

Results: The results of the analyses showed an increase in the ability to identify the cognitions and perceptions of workers of OHPs who received the training compared to the control group (p < .001). The results also showed an increased ability to recommend evidence-based interventions aimed at these cognitions and perceptions (p < .001) as a result of participation in the training.

Conclusions: The training program helps OHPs to identify cognitions and perceptions and to recommend evidence-based interventions. This can support them in their activities to increase the work participation of workers with a chronic disease.

Introduction

It is expected that the prevalence of chronic diseases in adults of working age will increase because of the aging world population and an increase in the state pension age in different countries.[1] However, having a chronic disease has a negative effect on work participation.[1,2] Nonetheless, people with a chronic disease greatly value their work, for example, for providing them with an income, social contacts, and the feeling that they contribute to society.[3] Sickness absence due to chronic diseases can have a large financial burden.[1] Therefore, the work participation of people with a chronic disease, should be supported.

To support work participation, occupational health professionals (OHPs)—namely health professionals who make decisions about work participation or workers receiving benefits—should focus on factors that influence the work participation of workers with a chronic disease. Workers' cognitions and perceptions are factors that can influence their work participation.[4,5] For example, fear-avoidance beliefs have a negative effect on returning to work after sick leave, while positive expectations regarding return to work have a positive effect on work participation.[6,7] OHPs should take these factors into account in order to stimulate work participation in workers with a chronic disease.

However, taking cognitions and perceptions into account during consultations can be a challenge. Various factors can make it difficult to obtain information on these cognitions and perceptions from workers. Factors such as a lack of trust in the OHP or a lack of empathy by the OHP may hinder disclosure by workers, which may limit the information that OHPs obtain concerning important cognitions and perceptions.[8-10] If OHPs obtain information about the cognitions and perceptions of workers successfully, another challenge for them is to know what to do when these cognitions and perceptions limit work participation.

To overcome these difficulties, a training program was developed for OHPs on how to identify cognitions and perceptions during consultations and on recommending interventions aimed at these cognitions and perceptions. The content of the training program is evidence-based, but we do not know whether this training has an effect on the ability of OHPs to identify cognitions and perceptions that limit work participation and to recommend evidence-based interventions to change them. Therefore, in this study we evaluate the effectiveness of the training in a randomized controlled trial.

The research questions are: Does the newly developed training program for OHPs have an effect on the ability to identify the cognitions and perceptions of workers? And does the training have an effect on the ability of OHPs to recommend evidence-based interventions toward workers aimed at the cognitions and perceptions of workers?

Method

Study design

In this randomized waiting-list controlled trial, participants in the intervention group participated in the training program in October 2019. Participants in the control group participated in the training program after they had completed the post-test in November 2019. During this study period, no restrictions were imposed on participants with regard to following any other training. The Medical Ethics Review Committee of the Academic Medical Center (AMC), University of Amsterdam, confirmed that the Medical Research Involving Human Subjects Act (WMO) did not apply to this study and the official approval of this committee was therefore not required (W 19__174 # 19.213). The Consolidated Standards of Reporting Trials (CONSORT) Statement was used to ensure that we reported all relevant components of this study.[11]

Participants

OHPs were eligible if they were occupational physicians (OPs), OPs in training, insurance physicians (IPs), or IPs in training; these are the main OHPs in the Netherlands. The role of OPs in the Netherlands is to prevent occupational and work-related diseases, promote health, prevent sick leave, or promote return to work after sick leave by, for example, recommending interventions that can increase work participation. The task of IPs is to evaluate the functional abilities and disabilities of workers that can influence whether they receive a work disability benefit and to provide recommendations for interventions to promote return to work.

The participants in this convenience sample were recruited from different professional associations and educational institutions in the Netherlands, namely the Netherlands Society of Occupational Medicine (NVAB), the Dutch Association for Insurance Medicine (NVVG), the Dutch Association of Medical Advisers in Private Insurance (GAV), the School for Public and Occupational Health Professionals (SGBO), and the Netherlands School of Public and Occupational Health (NSPOH).

In July, August, or September 2019, all OHPs who were members of the NVAB or NVVG or were in training at SGBO or NSPOH received an email inviting them to participate in this study. The email had an attachment that provided information about the content, duration, and location of the training, information about the home assignments, and the researchers' contact details. The members of the GAV could access the same information on their organization's website.

If OHPs were interested in participating, they had to email one of the researchers before October 1, 2019. They subsequently received an email containing further information about the training and when it would be held. After participants had signed an informed consent form, which was sent by regular mail, they were assigned to either the control or the intervention group.

Randomization

The OHPs were randomized by one of the researchers (MdW) using a randomized block design. A random number generator (www.randomizer.org) was used to assign the participants to one of four training sessions in October 2019 (intervention group) or one of four training sessions in November 2019 (control group), with an allocation ratio of 1:1. We assigned OPs and IPs to their condition separately, in order to get an equal distribution of OPs and IPs in the control and the intervention group. Because the registration for participation was spread over several months (July–September), we decided to randomize the participants in different phases, so not all participants had to wait until October to learn the date on which they would follow the training. The participants were not informed about whether they were in the control group or intervention group until the study was completed.

Training program

The 4.5-hour evidence-based training program consists of four parts (Table 1). First, participants learn about ten cognitions and perceptions that are important for work participation: recovery and return to work expectations, self-efficacy, feelings of control, perceived health, fear-avoidance beliefs, perceived work-relatedness, coping strategies, catastrophizing, motivation and optimism/pessimism.[4] They furthermore discuss with each other which factors are according to them most important. Second, they learn how to obtain information about cognitions and perceptions. During this part the participants practice with identifying cognitions and perceptions in written cases. Furthermore, they are asked to produce questions which they can ask to workers to obtain information regarding these factors. During this part, participants also receive a conversation

tool including an overview of the cognitions and perceptions and indicators for limiting or promoting cognitions and perceptions. In the third part of the training program, participants learn about factors that can influence the course of the conversation concerning these factors. The information for the second and third parts of the training program was derived from a questionnaire study among OPs and IPs and a focus group study among workers.[10,12] In the final part of the training program, OHPs learn how they can intervene to mitigate limiting cognitions and perceptions. During this part, participants discuss with each other how they have been dealing with workers with limiting cognitions and perceptions. Besides, they learn about interventions from a previously conducted scoping review and interventions described in various guidelines for OHPs.[13] For example, they learn about interventions concerning cognitive functional therapy[14] and a cognitive behavioral group intervention on work anxiety.[15] These interventions can change cognitions such as fear-avoidance beliefs and the perceived work-relatedness of the health problem, and may stimulate work participation. In total, eight training sessions were held in the Amsterdam UMC, the Netherlands.

Table 1. Overview of training program on cognitions and perceptions

Four-part evidence-based training program for occupational health professionals		
Part 1.	Learning about ten cognitions and perceptions associated with work participation	
	1. Recovery and return to work expectations	6. Perceived work-relatedness
	2. Self-efficacy	7. Coping strategies
	3. Feelings of control	8. Catastrophizing
	4. Perceived health	9. Motivation
	5. Fear-avoidance beliefs	10. Optimism/pessimism
Part 2.	Learning how information regarding cognitions and perceptions can be obtained	
Part 3.	Learning which factors can influence the course of the conversation concerning cognitions and perceptions	
Part 4.	Learning how cognitions and perceptions can be changed in order to improve work participation	

Outcome measures

Home assignments

The effects of the training were measured by means of two home assignments. All participants received the first assignment (pre-test: T0), which was accompanied by a questionnaire on demographic variables (name, date of birth, gender, function, years of experience) at baseline. The OHPs in the intervention group received the second home assignment (post-test: T1) two weeks after they had followed

the training. The OHPs in the control group received the same assignment two weeks after the first OHPs in the intervention group had followed the training. The assignments were sent by the research assistant, and participants had two weeks to complete and return them to the research assistant.

The home assignments consisted of two questions about four video vignettes of consultations between an OP and a client in which several cognitions and perceptions were incorporated: A) What cognition(s) or perception(s) of the client do you identify in the video that can influence the client's work participation? (Mention at least one and a maximum of four); and B) What intervention(s) would you recommend when this/these cognition(s) or perception(s) limit(s) the client's work participation, in order to support the work participation? (Mention a maximum of two options per cognition or perception). The videos in the first assignment were different from those in the second assignment, but the content and difficulty were comparable. The OHPs watched the video vignettes in the home assignments for the first time and did not practice with any video vignettes of consultations during the training. Because of this, the OHPs were obligated to apply the learned knowledge and skills in a new situation which resembled a real-life consultation.

In exercises A of the four videos (1A, 2A, 3A, and 4A) of the first and second home assignments, the OHPs could score points by identifying the right cognitions and perceptions in the videos. In exercises B of the four videos (1B, 2B, 3B, and 4B), the OHPs could score points by recommending evidence-based interventions aimed at the cognitions and perceptions that could limit the work participation of the client in the videos. Points were assigned when interventions or components of interventions were mentioned that were aimed at limiting cognitions and perceptions and may increase work participation according to results from a conducted scoping review and according to various guidelines for OHPs.[13]

All home assignments were independently checked by two researchers, who received the assignments without demographic data and were blind to the participants' condition. The final scores on exercises A (0–26 points) and B (0–50 points) of the first assignment and on exercises A (0–24 points) and B (0–44 points) of the second assignment were calculated by taking the mean scores given by the two researchers. The final scores were discussed if they differed by more than three points between the researchers, until consensus on the scoring was reached. Because the total number of achievable points differed between the first and the second assignment, the points were converted into final scores

ranging from 0 to 100 by dividing the points by the maximum achievable points and multiplying that figure by 100. A high total score on exercise A indicates a high level of ability to identify cognitions and perceptions, while a high total score on exercise B indicates a high level of ability to recommend evidence-based interventions.

Video vignettes

The eight vignettes were videos of simulated consultations between OPs and clients, which were developed following various guidelines suggested by Hillen et al.[16] In the video vignettes, the clients talked about their physical and/or mental health problems. During the talks, various cognitions and perceptions emerged. The scripts of the video vignettes were based on audio recordings of consultations between an OP and nine clients, all of whom had signed informed consent forms to record their consultations. The scripts were written and discussed by all researchers, of whom one is an OP and one is an IP. Before filming, the scripts were rehearsed with some of the actors in order to make necessary changes to ensure that the scripts were as realistic as possible.

The video vignettes were recorded in a simulated consulting room by a professional audiovisual production agency. The clients were played by a female and a male actor with experience in playing the role of a client. Because the role of the OP in the videos was limited, the OP was played not by a professional actor, but by two researchers from the Amsterdam UMC, who both had experience with conducting consultations as an occupational therapist and a sociotherapist. The duration of the shortest video was 2 minutes 39 seconds, that of the longest 3 minutes 3 seconds. To pilot test the home assignments, the video vignettes and assignments were sent to an IP trainer who judged the assignments as appropriate for the assessment of the learned skills in the training.

Data analysis

Statistical analyses were performed using SPSS statistics 26.0. Descriptive statistics were used to describe the characteristics of the participants. Participants were only included in the analyses if they had completed both the pre-test and the post-test. A t-test was used to analyze group baseline differences in continuous variables and a chi-square test was used for categorical variables. A generalized linear model (GLM) repeated measures ANOVA was conducted to evaluate the effects of the treatment group (intervention vs. control) and time (pre-test vs. post-test) and time by treatment interaction. The analyses were conducted according to the intention-to-treat (ITT) principle; that is, all participants were

analyzed according to the condition in which they were assigned at the beginning of the study. After the ITT analyses, per-protocol (PP) analyses were conducted to test whether the effects of the training on the ability of OHPS to identify cognitions and perceptions and on the ability to recommend evidence-based interventions were different if we only analyzed the participants who had followed the training program and completed the home assignments in accordance with their condition. The tests were considered significant when $p < .05$.

Results

Participant characteristics

In total, 62 OHPs agreed to participate in this study and were randomly assigned to the control or the intervention group. Fifty-nine physicians completed the pre-test and the post-test; of these physicians, 29 were allocated to the intervention group. Of the 59 participants, three did not adhere to the study protocol. One participant in the intervention group did not participate in the training. Another participant, who was assigned to the control group and should have followed the training in November, followed the training in October, just like the intervention group. Therefore, these two participants were excluded from the PP analyses. One participant in the control group did not participate in the training, but because this had no effect on the scores on both of his home assignments, he was not excluded from the PP analyses. A flowchart of the study is presented in Appendix 1.

Table 2. Demographic variables at baseline

	Total (*n* = 59)		**Intervention group (*n* = 29)**		**Control group (*n* = 30)**		***p*-value**
	***n*(%)**	***M(SD)***	***n*(%)**	***M(SD)***	***n*(%)**	***M(SD)***	
Age		50.8 (11.8)		49.5 (11.5)		52.2 (12.3)	0.385
Gender							
Male	32 (54.2)		13 (44.8)		19 (63.3)		0.154
Female	27 (45.8)		16 (55.2)		11 (36.7)		
Function							
OP	25 (42.4)		12 (41.4)		13 (43.3)		0.840
OP in training	6 (10.2)		4 (13.8)		2 (6.7)		
IP	17 (28.8)		8 (27.6)		9 (30.0)		
IP in training	11 (18.6)		5 (17.2)		6 (20.0)		
Years of work experience		16.9 (12.0)		15.8 (11.4)		18.1 (12.6)	0.474

M: Mean, SD: Standard deviation

The demographic variables of all participants who completed the pre-test and the post-test are presented in Table 2 by their original assigned groups. There were no significant differences on these variables between the intervention and the control group at baseline.

Effects of the training program

Effect on the ability to identify cognitions and perceptions (Exercise A)

The mean score of the intervention group on exercise A increased from 31.7 (9.2) at pre-test to 55.5 (17.1) at post-test (Table 3). The mean score of the control group on exercise A increased from 29.7 (8.2) to 35.0 (9.6). Results of the GLM repeated measures ANOVA showed a significant effect for Time ($F(1,57) = 69.2$, $p = .000$) in ITT analyses on the scores on exercise A. There was also a significant effect for Group ($F(1,57) = 20.9$, $p = .000$). There was a significant interaction effect of Time x Group ($F(1,57) = 28.1$, $p = .000$). This indicates a positive effect of the training on scores on exercise A. PP analyses also indicated two significant main effects for time and condition and a significant interaction effect.

Effect on the ability to recommend evidence-based interventions (Exercise B)

The mean score of the intervention group on exercise B increased from 13.9 (4.7) at pre-test to 27.2 (20.2) at post-test (Table 3). The mean score of the control group on exercise B was 13.8 (6.9) at pre-test and 10.0 (8.5) at post-test. Results of the GLM repeated measures ANOVA showed a significant effect for Time ($F(1,57) = 5.9$, $p = .018$) and for Group ($F(1,57) = 13.8$, $p = .000$) in ITT analyses. There was also a significant interaction effect of Time x Group ($F(1,57) = 19.0$, $p = .000$), which indicated a positive effect of the training on scores on exercise B. PP analyses showed similar results.

Table 3. GLM repeated measures ANOVA on final scores exercise A and exercise B (ITT analyses)

		T0 ***M(SD)***	**T1** ***M(SD)***	***F***	***p*-value**
Exercise A	Intervention group	31.7 (9.2)	55.5 (17.1)	T: $F(1,57) = 69.2$	.000
	Control group	29.7 (8.2)	35.0 (9.6)	G: $F(1,57) = 20.9$	.000
				T x G: $F(1,57) = 28.1$	.000
Exercise B	Intervention group	13.9 (4.7)	27.2 (20.2)	T: $F(1,57) = 5.9$	.018
	Control group	13.8 (6.9)	10.0 (8.5)	G: $F(1,57) = 13.8$	.000
				T x G: $F(1,57) = 19.0$	.000

M: Mean, SD: Standard deviation, T: Time effect, G: Group effect, T x G: Time by Group interaction effect

Discussion

Key findings

The results of this study show that participation in the training program on the cognitions and perceptions of workers with a chronic disease improves the ability of OHPs to identify cognitions and perceptions. Participation also improves their ability to recommend evidence-based interventions toward workers to increase work participation.

The training had positive effects on the abilities of OHPs to involve cognitions and perceptions during their practice. According to Berkhof et al.[17] and Smith et al.[18], various components of the training were perceived as effective training strategies for teaching physicians and adult learners. Examples of these effective components are that during the training program, the relevance of cognitions and perceptions and of the training itself was emphasized, OHPs practiced identifying cognitions and perceptions in different written cases, OHPs obtained feedback from the trainers on the different exercises, and OHPs participated in group discussions with the other participants. However, there were also characteristics of the training that might limit its effectiveness. For example, according to a review by Berkhof et al.[17], most effective training programs last at least a whole day, while the present training lasts only 4.5 hours. Berkhof et al.[17] also identified role-play as an important strategy for teaching physicians communication skills, which was not included in this training. Extending the training and including role-play exercises might increase the effects of the training.

To study the effects of the training, participants watched video vignettes of consultations between OPs and clients with a chronic disease. Video vignettes of consultations with clients are commonly used for assessing the skills of physicians or physicians in training, or training them in relevant skills.[19, 20] When developing our video vignettes, we followed the guidelines suggested by Hillen et al.[16] in order to make realistic vignettes that would increase the external validity. Although the video vignettes resembled real-life consultations, the increased ability to identify cognitions and perceptions shown in the vignettes does not necessarily mean that identifying these person-related factors during real-life consultations will be easy. The clients in the video vignettes talked extensively about their problems and various cognitions and perceptions emerged, but previous research showed that clients' disclosure is dependent on certain factors.[10, 21, 22] Greene's Disclosure Decision-Making Model shows that the decision to disclose information depends on, for example, the perceived risks of disclosing information, the relationship

with the information receiver, and thoughts about how the receiver would respond to the shared information.[22] In addition, studies among workers with a chronic disease and primary care physicians showed that factors such as trust, listening, and asking open-ended questions are perceived as essential for disclosing information.[10, 21] Thus, in order to identify cognitions and perceptions, knowledge about the various factors that can affect disclosure are essential for OHPs during practice. In the third part of the training, the OHPs learn about the factors that can influence workers' disclosure of cognitions and perceptions. However, the obtained knowledge concerning these factors was not studied in this trial. Therefore, it is possible that the effects of the training will be even more visible during real-life consultations, because OHPs who follow the training are better equipped to retrieve information from workers that is necessary to identify cognitions and perceptions.

Strengths and limitations

A strength of this study is that the effect of the training was measured by means of a randomized trial in which the effects were tested using video vignettes that were based on real-life cases and therefore reflect true situations between a physician and a client. Another strength is that all home assignments were checked and scored by two researchers independently in order to increase the reliability of the scores.

However, there were also some limitations. First, because participants in the control condition had to do two home assignments before the training—rather than one before and one after the training—it is possible that they were aware of the condition that they were in. However, we think that this did not influence their scores on their assignments. Another limitation is that overall, the scores on exercise B on recommending interventions were low; this especially concerns the pre-test and post-test scores of the control group. This indicates that it was hard for the physicians to think up interventions aimed at the cognitions and perceptions. Although these scores emphasize the need for the training program on interventions, more elaborate pilot testing of the home assignments could have prevented this floor effect.

Implications for practice and future research

The training program for OHPs can help to identify the cognitions and perceptions of workers, which in turn can help OHPs to perceive when cognitions and perceptions are limiting work participation and to judge whether intervening on these factors is necessary. The training also increases OHPs' ability to

recommend evidence-based interventions. We are convinced that this can help them in their efforts to increase work participation. Because we only studied the effects of the training during simulated consultations between physicians and clients, additional studies should be conducted to test whether participation in the training program also affects the identification of cognitions and perceptions and recommendations in real-life consultations. In addition, it would be interesting to test whether the effects of the training are still apparent a couple of months after the training. It would be difficult to study the direct effect of the training program on work participation because there are many factors that can influence the work participation of workers with a chronic disease, such as the type of disease or disorder, the duration of the complaints, the type of work and the support from employers and colleagues. Nevertheless, further studies are needed to examine the effect of the training program on the work participation of workers with a chronic disease.

Concluding remarks

The developed training program for OHPS increases their ability to identify the cognitions and perceptions of workers and to recommend evidence-based interventions. Participation in this training might help OHPs in their efforts to increase the work participation of workers with a chronic disease.

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Appendix 1. Study flowchart

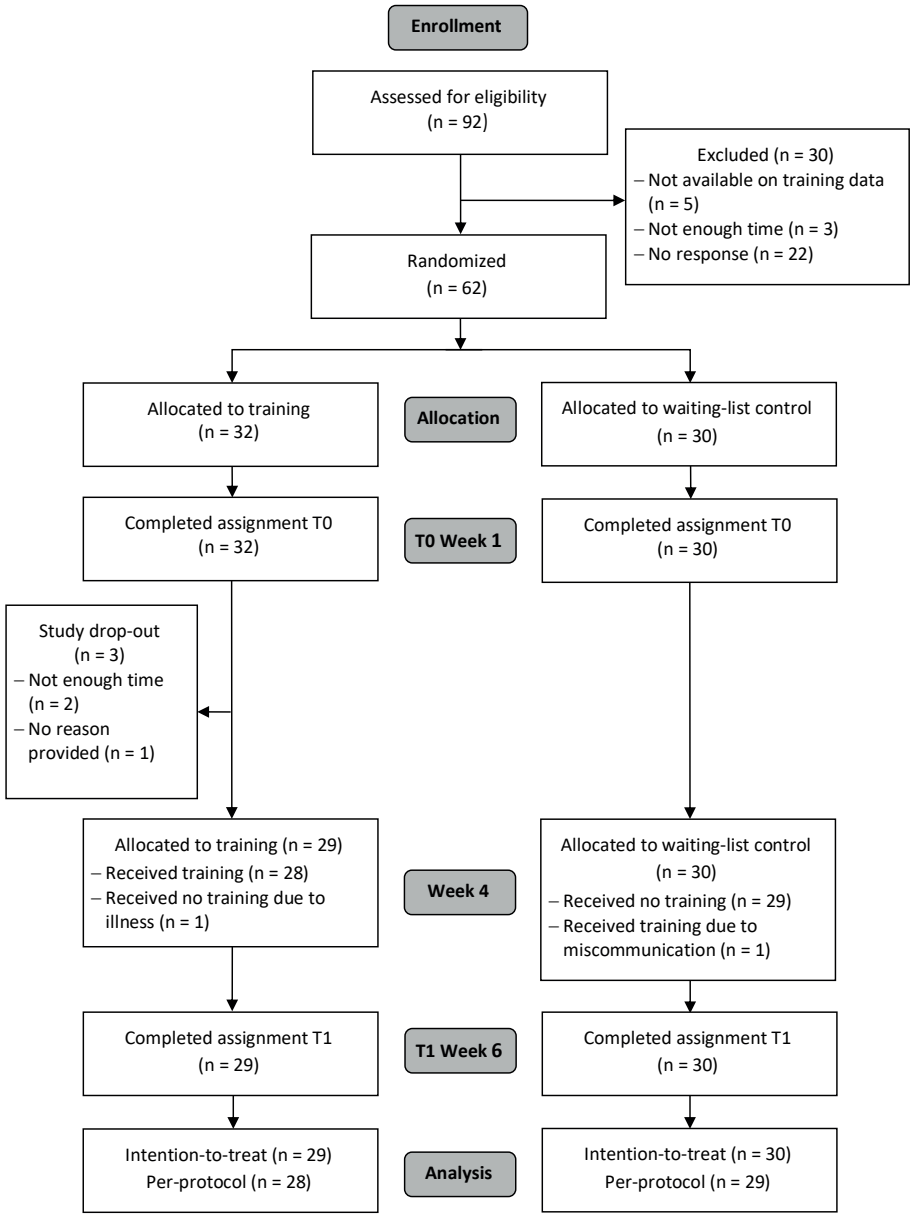

Figure 1. Study flowchart

CHAPTER 8

General discussion

General discussion

The main objective of this thesis was to gain more knowledge on how occupational health professionals (OHPs) can involve cognitions and perceptions in the occupational health management and work disability assessment of workers with a chronic disease. Part I of this thesis focused on acquiring knowledge from the literature, from OHPs and from workers with a chronic disease regarding cognitions and perceptions associated with work participation. Part II of this thesis described the development and evaluation of a training program for OHPs to involve cognitions and perceptions in daily practice.

Main findings

Part I: Acquiring knowledge about cognitions and perceptions

1. *Which cognitions and perceptions of workers are associated with work participation?*

   In the systematic review described in **Chapter 2,** evidence was found for an association between work participation and ten different cognitions and perceptions: expectations regarding recovery or return to work (RTW), optimism/pessimism, self-efficacy, motivation, feelings of control, perceived health, coping strategies, fear-avoidance beliefs, perceived work-relatedness and catastrophizing.

2. *How can information about cognitions and perceptions best be obtained from workers?*

   According to OHPs who participated in a survey study (**Chapter 3**) and workers with a chronic disease who participated in a focus group study (**Chapter 4**), there are different methods to obtain information concerning cognitions and perceptions. Examples include the following: discussing the factors during consultations; using questionnaires to obtain information; or asking significant others, employers, or treating physicians for information about the factors. According to OHPs and workers, the best method is to obtain information by discussing cognitions and perceptions during consultations.

3. *Which existing interventions are focused on cognitions and perceptions and aimed at increasing work participation?*

   In a scoping review, 29 published studies were identified in which interventions were studied, focusing on changing at least one of ten cognitions and perceptions and aimed at increasing work participation. Four interventions were judged as effective in changing coping, self-efficacy, fear-avoidance

beliefs, or perceived work-relatedness and work participation, according to the results of randomized controlled trials (**Chapter 5**).

Part II: Development and evaluation of a training program on cognitions and perceptions

4. *Is a training program on involving cognitions and perceptions in the occupational health management and work disability assessment feasible from the perspective of OHPs?*
   Participants in the training program agreed that the training program was useful and expressed the intention to use the learned skills in their practice. Although the training program was perceived as being feasible, not all participants used all learned skills and the corresponding tool during consultations three to six months after the training (**Chapter 6**).

5. *What is the effect of a training program for OHPs on the ability to involve cognitions and perceptions in the occupational health management and work disability assessment of workers with a chronic disease?*
   A randomized controlled trial using video vignettes showed that training participation increased the ability of OHPs to identify cognitions and perceptions of workers and to recommend evidence-based interventions aimed at these cognitions and perceptions (**Chapter 7**).

Interpretation of the findings

Part I: Acquiring knowledge about cognitions and perceptions

In the conducted systematic review, evidence was found for the association between ten cognitions and perceptions and work participation.[1] Although the quality of evidence for the association between some cognitions and perceptions and work participation was rather low, both occupational physicians (OPs) and insurance physicians (IPs) confirmed that cognitions and perceptions are important for work participation.[2] This underscores the need for OHPs to take these factors into account during their practices.

Many studies included in the review consider the ten cognitions and perceptions as clearly distinct factors and use different questionnaires to measure them.[1] During the training program, OHPs furthermore learn to distinguish the different cognitions and perceptions, which helped them to recognize and name them better during their practices.[3] However, some of the factors are interrelated to each other. For instance, if a worker perceives the health problem as work-related, he or she is more likely to have fear-avoidance beliefs for work. If the worker has

catastrophizing thoughts, he or she is also likely to have negative expectations regarding RTW. Indeed, in a study of Carriere et al.[4], expectations regarding RTW partially mediated the relation between catastrophizing and RTW and fully mediated the relationship between fear-avoidance and RTW. It is therefore not surprising that in our scoping review interventions were identified which were effective in changing more than one cognition or perception.[5] It might therefore not be necessary for OHPs to recommend separate interventions for every limiting cognitions or perception they identify, if some of the cognitions and perceptions are interrelated to each other. Therefore, OHPs should consider whether the limiting cognitions and perceptions they have identified are interrelated to each other when recommending interventions.

Some workers are more likely to have limiting cognitions and perceptions than others, dependent on for example their health complaints, their occupation or other personal characteristics. For example, workers with a chronic disease and who experience pain might be more likely to have fear-avoidance beliefs for physical work than workers with a chronic disease who do not experience pain. In addition, some cognitions and perceptions seem to be associated with specific personality traits. People who score high on neuroticism are more likely to have fear-avoidance beliefs and catastrophizing thoughts, while people who score high on extraversion are less likely to have fear-avoidance beliefs.[6, 7] Although some workers are more likely to have limiting cognitions and perceptions than others, OHPs should be aware that every worker they see during consultations can have cognitions and perceptions that may limit work participation.

In the survey study among OHPs and the focus group study among workers with a chronic disease, different methods were identified to obtain information concerning cognitions and perceptions.[2, 8] When looking into the literature, self-report questionnaires are mostly used to obtain information regarding cognitions and perceptions, e.g., the Fear-Avoidance Beliefs Questionnaire and the Pain Catastrophizing Scale.[9, 10] OHPs who participated in our survey study reported using the Dutch Four-Dimensional Symptom Questionnaire to assess fear-avoidance beliefs and optimism/pessimism.[2, 11] Using questionnaires for obtaining information regarding cognitions and perceptions has advantages as it is a more objective, standardized, and inexpensive method to obtain information concerning cognitions and perceptions.[12] Moreover, it may also save time for OHPs during consultations, when the questionnaires on cognitions and perceptions are already completed by the worker before the consultations. However, using questionnaires also has disadvantages. Workers in the focus group study voiced

concern that using a questionnaire may limit the comprehensiveness of the answers that a worker would provide concerning cognitions and perceptions, which is a common reported disadvantage of questionnaires.[8, 13] Workers also believed that using questionnaires may elicit dishonest responses because of the fear that other people than the OHP may read their answers. Another disadvantage of using self-report questionnaires is that some people tend to respond in a way on questionnaires that negatively influences the validity of the results.[12, 13] For example, they tend to agree with statements ('acquiescent responding') or have a tendency to use extreme scores on rating scales ('extreme responding'). In addition, questions might be not clear enough which can lead to different interpretations of questions.[13] So, using questionnaires might not be the best way to obtain information about cognitions and perceptions.

It is therefore not surprising that OHPs in our survey study and workers in our focus group study did not prefer the use of questionnaires, but preferred to obtain information about cognitions and perceptions by discussing these factors during consultations.[2, 8] However, this method comes with challenges for OHPs. First, the possibility for the OHP to identify cognitions and perceptions is highly dependent on which questions the OHP asks and how much information the worker discloses. The Disclosure Decision-Making Model states that the consideration of the risks and benefits of disclosure is an important step for deciding to disclose information or not.[14] If the risk of disclosing information outweighs the benefits, one will decide to not disclose or to wait with disclosing the information. Disclosing information regarding cognitions and perceptions to OHPs can be perceived as beneficial for workers because disclosure may help OHPs to provide emotional support and to provide tailored care for the worker, and it can give the worker a comfortable feeling that one does not conceal information. However, risks that workers might perceive are the risk of judgment, receiving negative news, being embarrassed, or being prescribed difficult lifestyle changes or other interventions.[15, 16] Workers might therefore hesitate to disclose information, especially toward OHPs, because they are afraid that information may be shared with the employer, or because disclosure may have a negative influence on receiving disability benefits. For instance, based on what the worker says the OHP could decide that the worker is able to (partially) RTW or that the worker did not do enough to promote his or her recovery, which can influence whether the workers receives disability benefits.

A second barrier for OHPs for obtaining information during consultations is that, simply put, disclosure requires a trustful relationship.[17-19] The importance of trust for discussing cognitions and perceptions was also emphasized by the workers

in our focus group study.[8] A recent study of Steel et al.[19] showed that lower trust in the physician in turn lowers the intention of workers to disclose problems or concerns during consultations with OPs. A trustful relationship is relatively hard to establish between OHPs and patients. A patient's trust in a physician is influenced by the amount of contact between patient and physician and the extent to which a patient can choose the physician.[20, 21] Workers do not have the possibility to choose their own OP or IP which in turn can increase the feelings of distrust of the employee. This was also emphasized by the workers in our focus group study who mentioned that they had the feeling that OHPs did not have an independent position, but were merely there to limit the costs of the employer instead of help the worker.[8] In addition, workers from the focus group study mentioned that the frequency of contact between the workers and OHPs is low and that they often do not see the same OP more than once. The contact moment between IPs and workers is often only once. In comparison with general practitioners, this is an extra barrier for OPs and IPs in building a trustful relationship with their client. So, although information about cognitions and perceptions can best be obtained during consultations, doing so requires extra effort from OHPs. Therefore, education and support in which questions to ask, but also about the importance of trust and other factors that can influence disclosure, is crucial for OHPs to be able to obtain information during consultations. In the developed training program, this topic is therefore given extra attention.

When OHPs succeed in obtaining information concerning cognitions and perceptions of workers, it is important that they know which interventions they can recommend that are aimed at limiting cognitions and perceptions. In a scoping review different interventions were identified that may change limiting cognitions and perceptions and increase work participation.[5] However, only four interventions were judged as effective in changing cognitions and perceptions and increasing work participation in randomized controlled trials. This might question the changeability of cognitions and perceptions by interventions. However, in the scoping review, multiple promising interventions were identified which seem to change cognitions and perceptions over time, according to different cohort studies. Besides, there are activities OPs and IPs may do themselves during consultations to change cognitions and perceptions of workers, as also mentioned by the OPs and IPs who were consulted to give feedback on the findings of the scoping review. For example, guidelines for OPs and IPs state that providing clear and unambiguous information about the disability and possibilities for work during consultations can help workers establish realistic expectations for RTW.[22] More randomized controlled trials should be conducted to test the effectiveness

of efforts of OHPs to change cognitions and perceptions during consultations and to test the effectiveness of other promising interventions.

Part II: Development and evaluation of a training program on cognitions and perceptions

Previously conducted studies have made clear that physicians struggle to translate evidence-based knowledge into practice and behavior change of physicians is often necessary.[23, 24] Therefore, we used the Behavior Change Wheel framework in the development of our intervention.[24] Following this framework, a training program would be a suitable intervention to increase the capability of OHPs to involve cognitions and perceptions into the occupational health management and work disability assessment, which could facilitate OHPs to involve these factors in daily practice. The training program contained various exercises because previous studies showed that activating physicians and practicing with knowledge and skills is more effective in changing physician behavior than passive education methods.[25-29] It is important to link education to clinical cases of physicians.[27] Therefore, during the training, the participants discussed their own cases and how they have been dealing with limiting cognitions and perceptions in these cases. In order to help OHPs apply learned skills in daily practice, a conversation tool was also developed.

The training program seemed to be effective in supporting OHP behavior change.[3] Out of 53 participants, 52 expressed the intention to use their obtained skills in practice. Most participants who were interviewed three to six months after participating in the training mentioned they were more aware of cognitions and perceptions during consultations, were better in recognizing them, and that the identification of these factors helped them to predict the future ability of the client. However, some participants did not use the tool or all learned skills, did not recommend other, more effective interventions, or did not change anything in their reports. This raises the question of whether participating in the training program is enough for OHPs to change their behavior and what can be done to increase the use of the skills into practice.

The question can be posed as to whether participation in one training session of 4.5 hours is enough to change the behavior of OHPs. In a meta-analysis about effective continuing medical education, the duration and frequency of sessions were positively associated with the effectiveness of continuing medical education.[29] However, a lack of time is often perceived as a barrier to continuing medical education.[30-32] Also, the participants in our study mentioned that a lack of time would be a barrier

for participation in the training. So, while increasing the duration of the training or increasing the number of training sessions could help to change physician behavior, doing so could also be a barrier for OHPs to participate in the first place. Thus, extending the duration and number of sessions of the training may not be the best way to increase the impact of the training on the behavior of OHPs.

In the training program, we focus especially on increasing the capability of OHPs to involve cognitions and perceptions during their practices. The Behavior Change Wheel identifies capability as one important target for intervention to change behavior.[24] However, other essential conditions for changing behavior described in this model are motivation and opportunity. Opportunity is defined as the factors outside the individual that make the behavior change possible. Although the current training program was effective in increasing the capability of OHPs,[33] a barrier for implementing the learned skills was related to opportunity, namely time. Participants experienced a lack of time to acquaint themselves with the tool and a lack of time during consultations to discuss cognitions and perceptions which limited their behavior change. In the Netherlands, consultations with OPs are often of a shorter duration than the consultations with IPs. Although the duration of consultations with IPs is longer, IPs often only see workers once, while OPs often have more than one consultation with a worker. Extending the duration or frequency of consultations might give OHPs more opportunity in order to change their behavior. The extensions increase the time to obtain information, which can help in identifying limiting cognitions and perceptions and also gives more opportunity to build a trustful relationship with the client.

Besides increasing the opportunity for OHPs to change behavior, there are different actions that can be conducted by responsible authorities to support the behavior change.[24] Examples of these actions or policies as described in the Behavior Change Wheel are the creation of guidelines or establishing principles of behavior or practice. Making the involvement of cognitions and perceptions more standard in practice, for example by including more information about these factors in guidelines for OHPs, might be an extra stimulation for OHPs to focus on cognitions and perceptions during consultations. The OPs and IPs who were interviewed about their experiences with implementing the knowledge and skills into practice, had an average of more than 15 years of work experience. Therefore, implementing the skills would for the majority of them require changing long-established practices, which is difficult.[34] This means that it might be helpful to embed the training program into the education of OHPs in training, in addition to offering the training program as continuing medical education. Embedding the training program into the education

of OHPs in training could help to make involving cognitions and perceptions a standard of practice, which will support OHPs to do so.

Methodological considerations

Several research methods and sources were used to acquire knowledge about cognitions and perceptions needed for the development of the training program.[3] We combined evidence derived from the literature, with information from OHPs and workers with chronic diseases, because previous studies have emphasized the importance of personal experiences from physicians and patients for translating scientific evidence into practice.[35, 36] Two reviews were conducted to obtain information about 1) the association between cognitions and perceptions and work participation and 2) interventions aimed at these cognitions and perceptions.[1, 5] Systematic reviews and scoping reviews can provide a structured overview of evidence from the latest published studies from all over the world regarding these topics.[37, 38] However, in these reviews only studies were included which were published in scientific journals, and no grey literature was included. Especially for the review with recent published studies about existing interventions focused on cognitions and perceptions, relevant information might have been missed. OHPs who were consulted to provide feedback on the findings of the review mentioned that they sometimes try to change cognitions and perceptions during consultations. Efforts of the OHP to mitigate limiting cognitions and perceptions during consultations likely are effective for changing cognitions and perceptions, although no studies were found on this in the scoping review. Besides, some of the interventions from studies included in the scoping review were not yet available to recommend toward workers in the Netherlands. Therefore, the information regarding changing cognitions and perceptions provided in the last part of the training was completed with information from developed guidelines for OPs and IPs in the Netherlands. These guidelines for physicians consist of recommendations and instructions for practice to support decision-making and are developed by experts with the use of scientific evidence.[39] In the guidelines, some recommendations are stated for OHPs to intervene on different limiting cognitions and perceptions, although the evidence was limited.

To study the effects of the training on the ability to identify cognitions and perceptions and to recommend evidence-based interventions, we used a randomized controlled trial design which can provide the best evidence when measuring the effect of an intervention.[33, 40] Many studies use knowledge tests in comparable trials to study the effect of training programs. However, the problem with knowledge tests is that they only require participants to memorize knowledge

that they have heard. Instead of using a knowledge test, we used video vignettes to study the effect of the training program. OHPs were asked to identify cognitions and perceptions in video vignettes of consultations between a physician and a client and to recommend interventions aimed at these cognitions and perceptions. Using video vignettes gave the opportunity to test the ability to use skills in new situations that simulated a real-life situation, instead of just memorizing knowledge. Video vignettes of consultations with clients are commonly used for assessing or training the skills of physicians.[41, 42] Using video vignettes gives the opportunity to present exactly the same clients who say the same things and show the same nonverbal behavior toward participants in the control and intervention group. Therefore, changes in which cognitions and perceptions were identified can be assigned to differences in knowledge concerning cognitions and perceptions and skills to identify them.

However, the use of video vignettes instead of real-life consultations has also disadvantages. First of all, the question remains whether video vignettes are realistic enough to reflect consultations in daily practice. Therefore, the effect which is measured using video vignettes is questionable as to whether it is generalizable to real-life situations. Different researchers suggest testing the ecological validity of video vignettes, for example by assessing the engagement of the viewer of the vignettes,[43] by asking the viewer questions regarding the realism or believability of the video vignettes,[44] or by asking the viewer to compare the patient in the video vignette to patients the viewer encounters in daily practice.[45] We did not extensively study the realism of the video vignettes afterwards. However, results of a review of literature by Hillen et al.[44] indicate that video vignettes of communication between patients and providers are often perceived as realistic. We followed different suggestions by Hillen et al.[44] to establish realism in the video vignettes. We based the scripts of the video vignettes on audio records of real consultations between an OP and clients and used professional actors for playing the roles of clients, which was also proven to be successful for developing realistic video vignettes in similar studies.[45, 46] Besides, different OHPs with experience in consultations were involved in the development of the scripts and video vignettes to ensure that the vignettes reflect real cases, as recommended in previous studies.[44, 47] Therefore, we believe that we put enough effort to succeed in making realistic video vignettes.

Another disadvantage of using video vignettes in this study was that, while we were able to test the ability to identify cognitions and perceptions with these vignettes, we were not able to test the skills of the OHPs to elicit information

from workers in order to identify these cognitions and perceptions. During the training, OHPs learned for example about factors that can influence the course of the conversation and about which questions to ask to elicit information. Previous studies show that it is possible to test some communication strategies, such as asking questions, with video vignettes. Physicians watched video vignettes of patients who ask a question or make a statement and were subsequently asked to speak into a microphone, as if they were talking back to the patient.[41, 48] However, also in this study, the interaction between the simulated patient and physician is limited to one exchange.

It is possible that we have underestimated the effect of the training on the ability to identify cognitions and perceptions, because we did not consider the increase in ability to elicit information needed to identify cognitions and perceptions. The difference in ability to identify cognitions and perceptions between OHPs who participate in the training and who do not participate in the training might be bigger in daily practice. However, it is also possible that we have overestimated the ability of OHPs to identify cognitions and perceptions, because in consultations in daily practice, the ability to identify cognitions and perceptions is dependent on how much information the OHP can elicit. Besides, there were OHPs who participated in the training and mentioned that it was sometimes still hard to identify cognitions and perceptions during consultations in daily practice. This could be caused by a lack of ability to elicit enough information from workers during the consultation. It is therefore recommended to test the effect of the training on the ability to elicit information on cognitions and perceptions and on the ability to identify cognitions and perceptions in consultations in daily practice.

Another consideration with regard to studying the effect of the training program is that we did not study the effect of the training on the actual work participation of workers with a chronic disease. Therefore, we do not know whether the benefits of increased work participation as a result of OHPs participation in the training outweigh the costs of training the physicians. We know that participation in the training increased the ability of OHPs to recommend evidence-based interventions toward limiting cognitions and perceptions of workers and that are aimed at increasing work participation. Therefore, we think that participation in the training program can help OHPs to increase work participation of workers with a chronic disease. However, we did not study this direct effect in the current project. An important reason for not directly studying this effect is that we did not know whether the training program changed the ability of OHPs to involve cognitions and perception during their practice. Therefore, we decided to test whether the

intervention really has an effect on the skills of OHPs first. Now we know that training can increase the ability of OHPs to identify cognitions and perceptions and to recommend interventions aimed at these cognitions and perceptions, the next step would be to study the effect on work participation.

Recommendations for practice

The following is recommended for OHPs:

- *Participate in the training program on cognitions and perceptions.*
  Participation in the training program can help OHPs to identify cognitions and perceptions and to recommend evidence-based interventions to change limiting cognitions and perceptions. We believe that participation in the training can help OHPs to involve cognitions and perceptions during their practices and can help to encourage work participation of workers with a chronic disease.

- *Invest in building a trustful relationship with the worker.*
  Trust is a prerequisite for workers to disclose information about their cognitions and perceptions toward OHPs. Disclosure is needed for OHPs to be able to identify limiting cognitions and perceptions and to be able to mitigate these cognitions and perceptions in order to support work participation. Investing in a trustful relationship and creating an atmosphere in which workers feel comfortable to disclose information is essential for OHPs to be able to help workers with limiting cognitions and perceptions.

The following is recommended for workers with a chronic disease:

- *Prepare consultations with OHPs.*
  It is important for workers to prepare the consultation with OHPs by considering their answers to questions such as: What are my expectations regarding RTW? Why do I want to RTW? How do I cope with my health problems? The information about these cognitions and perceptions can help OHPs in their efforts to help workers.

The following is recommended for employers:

- *Assure that workers can go to the same OP, instead of different OPs for every consultation.*
  A trustful relationship between workers and OPs is important for workers to disclose information. Seeing different OPs instead of the same OP during different consultations can limit the possibility for workers to build a trustful relationship.

The following is recommended for the patient federation:

- *Help workers to prepare the consultations with OHPs.*
  Workers need to be aware of the tasks of OHPs and what to expect from consultations with them. Besides, workers need to be aware of the importance of disclosing information during consultations. The patient federation can help workers with providing information about consultations and preparing consultations.

The following is recommended for policymakers and professional associations of OHPs:

- *Offer the training program in continuing medical education and the education of OHPs in training.*
  Because the training program can help OHPs to identify limiting cognitions and perceptions and recommend evidence-based interventions, the training should be offered to OHPs. Offering the training in the education of OHPs in training can help to make involving cognitions and perceptions in the occupational health management and disability assessment a standard of practice.

- *Provide information about cognitions and perceptions and involving them in the occupational health management and work disability assessment in guidelines for OHPs.*
  Offering information regarding cognitions and perceptions in guidelines can be an extra stimulation for OHPs to focus on these factors during consultations. It can help to make involving cognitions and perceptions a standard of practice.

- *Assure that OHPs have enough time with workers to discuss cognitions and perceptions.*
  OHPs need to be able to discuss cognitions and perceptions during consultations, and therefore they need sufficient time with the worker. Besides, time between the OHP and the worker can help to establish a trustful relationship which can have a positive effect on disclosing information. Extending the duration of consultations or the number of consultations can therefore facilitate OHPs to involve cognitions and perceptions during their practices.

Recommendations for research

The following is recommended for future research:

- *Study how a patient's trust in the OHPs can be increased in order for patients to disclose information concerning cognitions and perceptions.*
  Trust was identified as a prerequisite for workers to disclose information regarding cognitions and perceptions. Although we know that trust is for example influenced by the amount of contact between patient and physician and the possibility to choose the physician, more information about how to establish a trustful relationship between OHPs and workers is needed.

- *Conduct more randomized controlled trials to test the effect of interventions focused on cognitions and perceptions and aimed at increasing work participation.*
  In our scoping review we found multiple promising interventions focused on cognitions and perceptions and aimed at increasing work participation in longitudinal studies. Randomized controlled trials are needed to test whether these interventions and other efforts by OHPs are really effective in changing cognitions and perceptions and increasing work participation.

- *Study how to increase the feasibility of the learned knowledge and skills into practice.*
  Although the training was overall perceived as feasible, not every participant used all learned knowledge and skills in practice. Therefore, studies are needed to test whether for example extending the duration of the training program or number of sessions, or offering the training in the education OHPs in training can support behavior change.

- *Study the effect of the training on identifying cognitions and perceptions and recommending interventions toward cognitions and perceptions in consultations in daily practice.*
  The training program increased the ability to identify cognitions and perceptions and to recommend evidence-based interventions in a video vignette study. However, for identifying cognitions and perceptions of workers in consultations in daily practice OHPs need to be able to elicit information regarding cognitions and perceptions, which is not examined in this study. Therefore, additional studies are needed to test the effect of the training in consultations in daily practice.

- *Study the effect of the training on the work participation of workers with a chronic disease and conduct an additional cost-effectiveness analysis.*
  Although we know that participation in the training increases the ability of OHPs to recommend evidence-based interventions toward limiting cognitions and perceptions of workers and that are aimed at increasing work participation, we did not directly study the effect of the training on the work participation of workers with a chronic disease. Additional studies are needed to test whether the benefits of increased work participation as a result of OHPs participation in the training outweigh the costs of training physicians.

Conclusion

Cognitions and perceptions are important factors that can influence the work participation of workers with a chronic disease. In this thesis, knowledge was acquired from the literature, from OHPs, and from workers with a chronic disease regarding cognitions and perceptions associated with work participation. With this information, a training program was developed for OHPs to involve cognitions and perceptions in the occupational health management and work disability assessment of workers with a chronic disease. Participation in the training program resulted in an increased ability of OHPs to identify cognitions and perceptions and to recommend evidence-based interventions aimed at these cognitions and perceptions. The training was perceived as feasible, but not all participants used all the learned skills and the corresponding tool during practice. The knowledge acquired in this thesis and the developed training program can help OHPs in their efforts to increase work participation of workers with a chronic disease.

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SUMMARY

Summary

As a result of rising life expectancy and increased state pension age, the number of people of working age with a chronic disease increases as well. A chronic disease is here defined as a disease with a long duration and generally slow progression. However, people with a chronic disease often experience poor health, fatigue, pain and/or functional limitations which can negatively influence work participation. For people with a chronic disease, work is very important because it provides income, social contacts, and can help to maintain mental and physical health.

Occupational health professionals (OHPs) have the important task of supporting the participation of workers with a chronic disease. In the context of this thesis, we refer to OHPs as those OHPs in the Netherlands who make important decisions regarding work participation or receiving benefits for workers with health problems: occupational physicians (OPs) and insurance physicians (IPs). To be able to support work participation, OHPs need to consider different factors that can influence work participation during their practices. Since person-centered care becomes more important in the occupational health field, cognitions and perceptions of workers receive increasing attention. Cognitions and perceptions refer to the thoughts an individual has concerning his or her disease and concerning work participation. However, knowledge concerning cognitions and perceptions and how to involve these factors in the occupational health management and work disability is scarce.

The main objective of this thesis is to gain more knowledge on how OHPs can involve cognitions and perceptions in the occupational health management and work disability assessment of workers with a chronic disease. Part I of this thesis focuses on acquiring knowledge regarding cognitions and perceptions associated with work participation. Part II of this thesis describes the development and evaluation of a training program for OHPs to involve cognitions and perceptions in daily practice. In **Chapter 1** the main research questions of this thesis are listed as follows:

Part I: Acquiring knowledge about cognitions and perceptions

1. Which cognitions and perceptions of workers are associated with work participation?
2. How can information about cognitions and perceptions best be obtained from workers?
3. Which existing interventions are focused on cognitions and perceptions and aimed at increasing work participation?

Part II: Development and evaluation of a training program on cognitions and perceptions

4. Is a training program on involving cognitions and perceptions in the occupational health management and work disability assessment feasible from the perspective of OHPs?
5. What is the effect of a training program for OHPs on the ability to involve cognitions and perceptions in the occupational health management and work disability assessment of workers with a chronic disease?

Part I: Acquiring knowledge about cognitions and perceptions

To gain insight into which cognitions and perceptions are associated with work participation, a systematic review was conducted, which is described in **Chapter 2**. A total of 113 studies were included which address the association between ten cognitions and perceptions, along with work participation. The factors positively associated with work participation were positive expectations regarding recovery or return to work, optimism, self-efficacy, motivation, feelings of control, and perceived health. The factors negatively associated with work participation were fear-avoidance beliefs, perceived work-relatedness of the health problem, and catastrophizing. Coping can have a negative or a positive association with work participation, depending on the coping strategy. The evidence for the associations between the different factors and work participation ranged from very low to moderate, in terms of quality.

The importance of the ten cognitions and perceptions was confirmed by OHPs in a survey study, which is described in **Chapter 3**. In total, 155 OPs and 56 IPs participated in this survey study. They were asked to rate the importance of the factors on a 5-point scale (1 = not important at all; 5 = extremely important). The OPs especially considered expectations regarding recovery or return to work and coping strategies as important. The factor that was considered least important by OPs was perceived health. However, half of the OPs still thought that this factor was very important or extremely important to take into account during consultations. IPs thought coping strategies was the most important factor to take into account during consultations. They thought optimism/pessimism was the least important factor, although 55% of the IPs still considered this factor as very important or extremely important.

To gain insight into methods to obtain information about cognitions and perceptions, OHPs were asked about the methods they use for obtaining information in the same survey study. The OHPs described various methods

to obtain information about cognitions and perceptions, such as using questionnaires or asking significant others, employers, or treating physicians for more information, or OHPs discuss the cognitions and perceptions during consultations. There were no notable differences between the methods used to obtain information between OPs and IPs. The OHPs agreed that the best method for obtaining information regarding cognitions and perceptions would be to discuss the factors during the consultation with the use of a topic list.

In the focus group study described in **Chapter 4**, 23 workers with a chronic disease were asked in three focus group discussions about their opinion concerning the most effective way for OHPs to obtain information concerning cognitions and perceptions from them. These workers confirmed that it would be best to obtain information about cognitions and perceptions by discussing these factors during consultations. However, whether the worker discloses information about these thoughts depends according to them on different factors. Prerequisites for having fruitful conversations included mutual trust, a sense of genuine physician interest, and understanding of the physician. In addition, various factors were identified which would influence the course of these conversations, such as the time frame of the consultation, the knowledge of the physician, and the atmosphere of the consultation.

When OHPs succeed in obtaining information about cognitions and perceptions and are able to identify which cognitions and perceptions limit work participation, it is important that they can recommend interventions that can change these factors in order to increase work participation. In **Chapter 5** a scoping review is presented, which identified 29 studies that investigated interventions focused on one of the ten cognitions and perceptions and aimed at increasing work participation. The interventions of the included studies mainly focused on changing recovery and return to work expectations, self-efficacy, feelings of control, perceived health, fear-avoidance beliefs, perceived work-relatedness of the health problem, coping strategies and catastrophizing. No interventions were found that focused on changing motivation or on optimism/pessimism. Four interventions were effective in changing coping, self-efficacy, fear-avoidance beliefs, or perceived work-relatedness and increasing work participation according to results of randomized controlled trials. Different OHPs and a patient representative were consulted in order to provide feedback on the findings of this review. They mentioned that, when recommending interventions, it is also important to consider the expertise of the intervention provider, the disease or disorder of the client and the costs of the intervention.

Part II: Development and evaluation of a training program on cognitions and perceptions

With the acquired information in the previously described studies, a training program was developed and evaluated (**Chapter 6**). The main goals of the training program for OHPs are to acquire knowledge of cognitions and perceptions associated with work participation, to be able to identify these cognitions and perceptions, and to be able to change these cognitions and perceptions when necessary. The developed training program has a duration of 4.5 hours and consists of four parts: (1) cognitions and perceptions associated with work participation; (2) how to obtain information on them; (3) the course of the conversation on these factors; and (4) intervening on these factors. During the training OHPs practice with the obtained knowledge and skills in different exercises. They also discuss the importance of cognitions and perceptions with each other and how they have been dealing with clients with limiting cognitions and perceptions. During the training, a conversation tool is presented to the OHPs to help them apply the learned skills in daily practice.

In total, 57 OHPS participated in the training, of which 54 evaluated the training via questionnaire. The 52 participants who rated their satisfaction with the training gave an overall score of 8.5 on a scale from 1 to 10. Out of 52 participants, 51 thought the training was useful for practice, and 52 out of 53 participants expressed the intention to use the learned skills in practice. Eleven OHPs were interviewed regarding the feasibility of the training program and the learned skills three to six months after participating in the training. The training program was perceived as valuable for OHPs, and participants indicated being more aware of cognitions and perceptions during consultations than before. However, not everyone used the skills and tool in practice. Reported problems for implementing the skills included difficulty in identifying cognitions and perceptions, a lack of time during consultations or for preparing them, and the conversation tool being perceived as not appropriate.

Chapter 7 describes a randomized controlled trial which studied the effect of the training program on the ability of OHPs to identify cognitions and perceptions of workers and on the ability to recommend evidence-based interventions aimed at these cognitions and perceptions. The OHPs were randomly assigned to participate in the training program (n = 29) or to a control group that did not receive training (n = 30). The 59 participants were asked to watch video vignettes of a simulated consultation between a worker and an OHP and to report which cognitions and perceptions they identified and which interventions they would

recommend aimed at these cognitions and perceptions. OHPs could score points by identifying the right cognitions and perceptions in the videos and by recommending evidence-based interventions aimed at these cognitions and perceptions. With use of a generalized linear model repeated measures ANOVA the effects of the training program were studied. The results of the analyses showed an increase in the ability of OHPs who received the training compared to the control group to identify the cognitions and perceptions of workers ($p < .001$) and to recommend evidence-based interventions aimed at these cognitions and perceptions ($p < .001$).

Conclusions and recommendations for research and practice

In **Chapter 8,** the main findings of this thesis are discussed and recommendations are made for practice and research. The studies in this thesis confirm the importance of cognitions and perceptions for the work participation of workers with a chronic disease. We recommend OHPs to discuss these factors during consultations, to identify limiting cognitions and perceptions and to recommend interventions to change them. Participation in the new developed training program can increase the ability to identify cognitions and perceptions and to recommend evidence-based interventions toward these factors. Therefore, the training should be offered to OHPs in the education of OHPs in training and in continuing education. Assurance should be made that the time of consultations between OHPs and workers is long enough to discuss cognitions and perceptions and to be able to build a trustful relationship between OHPs and workers. Workers must be aware that disclosing information about cognitions and perceptions is important for OHPs to be able to recommend interventions toward cognitions and perceptions. The patient federation should inform workers on this and should help them prepare their consultations with OHPs.

Regarding future research, we recommend conducting randomized controlled trials to test the effect of interventions aimed at cognitions and perceptions and increasing work participation. We also recommend studying the effect of the developed training program on identifying cognitions and perceptions and recommending interventions in consultations in daily practice. In addition, we recommend studying how to increase the feasibility of the learned knowledge and skills. Finally, we recommend studying the effect of the training program on work participation of workers with a chronic disease.

We conclude with the fact that cognitions and perceptions are important factors that can influence the work participation of workers with a chronic disease.

Therefore, OHPs should to take these factors into account during the occupational health management and work disability assessment. The knowledge acquired in this thesis and the developed training program can help OHPs in this, which could help them in their efforts to increase work participation of workers with a chronic disease.

SAMENVATTING

Samenvatting

Als gevolg van de hogere levensverwachting en een verhoging van de pensioenleeftijd, stijgt het aantal mensen met een chronische ziekte in de werkende leeftijd. Een chronische ziekte is hier gedefinieerd als een ziekte met een lange duur met in het algemeen een langzame progressie. Mensen met een chronische ziekte ervaren echter vaak een slechte(re) gezondheid, vermoeidheid, pijn en/of beperkingen in hun functioneren, wat een negatieve invloed kan hebben op hun participatie in werk. Mensen met een chronische ziekte vinden werk belangrijk omdat het zorgt voor een inkomen en sociale contacten en omdat het kan helpen bij het in stand houden van hun mentale en fysieke gezondheid.

Bedrijfs- en verzekeringsartsen die betrokken zijn bij de sociaal-medische begeleiding van werkenden en de beoordeling van de functionele mogelijkheden, spelen een belangrijke rol bij het bevorderen van de werkparticipatie van chronisch zieken. Om werkparticipatie te stimuleren moeten deze sociaalgeneeskundigen rekening houden met verschillende factoren die werkparticipatie kunnen beïnvloeden. Hierbij krijgen cognities en percepties van werkenden zelf tegenwoordig meer aandacht. Onder cognities en percepties verstaan we de gedachten van een persoon over zijn of haar ziekte en werkparticipatie. Er is echter nog weinig kennis over het betrekken van cognities en percepties bij de sociaal-medische begeleiding van de werkenden en de beoordeling van de functionele mogelijkheden.

Het belangrijkste doel van dit proefschrift is om meer inzicht te krijgen in hoe bedrijfs- en verzekeringsartsen cognities en percepties kunnen betrekken bij de begeleiding en beoordeling van chronisch zieke werkenden. Deel I van dit proefschrift is gericht op het verkrijgen van kennis over cognities en percepties die geassocieerd zijn met werkparticipatie. Deel II beschrijft de ontwikkeling en evaluatie van een training voor bedrijfs- en verzekeringsartsen gericht op het beter betrekken van cognities en percepties bij de dagelijkse praktijk. In **Hoofdstuk 1** worden de belangrijkste onderzoeksvragen van het proefschrift geformuleerd:

Deel I: Het verkrijgen van kennis over cognities en percepties

1. Welke cognities en percepties van werkenden zijn geassocieerd met werkparticipatie?
2. Hoe kan informatie over deze cognities en percepties het beste worden verkregen van werkenden?

3. Welke bestaande interventies voor deze cognities en percepties zijn gericht op het verhogen van werkparticipatie?

Deel II: De ontwikkeling en evaluatie van een training gericht op cognities en percepties

4. Is een training die gericht is op het betrekken van cognities en percepties bij de begeleiding en beoordeling haalbaar en te gebruiken volgens bedrijfs- en verzekeringsartsen?
5. Wat is het effect van een training voor bedrijfs- en verzekeringsartsen op hun vermogen om cognities en percepties te betrekken bij de begeleiding en beoordeling van chronisch zieken?

Deel I: Het verkrijgen van kennis over cognities en percepties

Om inzicht te krijgen in cognities en percepties die geassocieerd zijn met werkparticipatie, is een systematische review uitgevoerd die is beschreven in **Hoofdstuk 2**. In totaal zijn er in de review 113 onderzoeken opgenomen, die zich richtten op de relatie tussen tien cognities en percepties van werkenden enerzijds en werkparticipatie anderzijds. De factoren die positief geassocieerd waren met werkparticipatie, waren positieve verwachtingen ten aanzien van herstel of terugkeer naar werk, optimisme, zelfvertrouwen, motivatie, gevoel van controle en perceptie van de gezondheid. De factoren die negatief geassocieerd waren met werkparticipatie, waren angst-ontwijkende overtuigingen, perceptie van werkgebondenheid van problematiek, en catastroferende gedachten. Coping kan zowel een negatieve als een positieve associatie met werkparticipatie hebben; dit hangt af van de coping-strategie. De kwaliteit van het bewijs voor de associatie tussen de verschillende factoren en werkparticipatie varieerde van zeer laag tot matig.

In een vragenlijstonderzoek gaven bedrijfs- en verzekeringsartsen aan de gevonden factoren ook (erg) belangrijk te vinden (**Hoofdstuk 3**). In totaal namen 55 bedrijfsartsen en 56 verzekeringsartsen hieraan deel. In de vragenlijst werden ze gevraagd om het belang van deze factoren aan te geven op een 5-puntsschaal (1 = helemaal niet belangrijk; 5 = uitermate belangrijk). De bedrijfsartsen vonden vooral de verwachtingen ten aanzien van herstel en terugkeer naar werk en copingstrategieën belangrijk. De factor die zij het minst belangrijk vonden, was de perceptie van de gezondheid. Toch vond nog steeds de helft van de bedrijfsartsen deze factor zeer of uitermate belangrijk om mee te nemen in het spreekuur. Verzekeringsartsen vonden de factor copingstrategieën het belangrijkst. Zij vonden optimisme/pessimisme de minst belangrijke factor, hoewel nog steeds 55% van de verzekeringsartsen deze factor zeer of uitermate belangrijk vond.

Om inzicht te krijgen in de beste methoden om informatie te verkrijgen over cognities en percepties, is aan de bedrijfs- en verzekeringsartsen in hetzelfde vragenlijstonderzoek gevraagd welke methoden zij hiervoor gebruiken. De deelnemers noemen hierbij verschillende methoden. Zo gebruiken ze vragenlijsten, vragen ze informatie aan naasten, aan werkgevers of aan behandelend artsen of bespreken ze de cognities en percepties tijdens het spreekuur. Er waren geen opmerkelijke verschillen tussen de methoden gebruikt door bedrijfsartsen en verzekeringsartsen. De deelnemers uit beide beroepsgroepen waren het erover eens dat informatie over cognities en percepties het beste verkregen kan worden door de factoren tijdens het spreekuur te bespreken aan de hand van een lijst met te bespreken onderwerpen.

In de focusgroepstudie (**Hoofdstuk 4**) zijn 23 werkenden met een chronische ziekte, verdeeld over drie focusgroepbijeenkomsten, gevraagd naar hun mening over de beste manier voor bedrijfs- en verzekeringsartsen om informatie te verkrijgen over cognities en percepties van werkenden. Deze deelnemers bevestigden dat informatie hierover het beste verkregen kan worden tijdens het spreekuur. In welke mate de werkende informatie vrijgeeft over de cognities en percepties, hangt volgens hen echter af van verschillende factoren. Wederzijds vertrouwen, oprechte interesse en begrip vanuit de arts werden genoemd als belangrijke voorwaarden voor het hebben van een waardevol gesprek. Daarnaast kwamen diverse factoren naar voren die het verloop van zo'n gesprek in belangrijke mate kunnen beïnvloeden, zoals de tijdsduur van het gesprek, de kennis van de arts en de sfeer tijdens het spreekuur.

Als het bedrijfs- en verzekeringsartsen lukt om informatie te verkrijgen over cognities en percepties die de werkparticipatie kunnen belemmeren, is het belangrijk dat ze interventies gericht op deze cognities en percepties kunnen aanbevelen om daarmee de werkparticipatie te bevorderen. In **Hoofdstuk 5** is een scoping review beschreven waarin 29 onderzoeken opgenomen zijn over interventies die gericht zijn op één van de tien cognities en percepties, en op het verhogen van werkparticipatie. De interventies in de opgenomen onderzoeken richtten zich vooral op het veranderen van verwachtingen ten aanzien van herstel en terugkeer naar werk, zelfvertrouwen, gevoel van controle, perceptie van de gezondheid, angst-ontwijkende overtuigingen, perceptie van werkgebondenheid van de problematiek, coping strategieën en catastroferende gedachten. Er werden geen interventies gevonden die gericht waren op het veranderen van motivatie of optimisme/pessimisme. Uit de resultaten van gerandomiseerde gecontroleerde onderzoeken kwamen vier interventies naar voren die effectief waren in het

veranderen van coping, zelfvertrouwen, angst-ontwijkende overtuigingen en perceptie van werkgebondenheid van de problematiek en het verhogen van de werkparticipatie. Aan verschillende bedrijfs- en verzekeringsartsen en een patiëntvertegenwoordiger werd gevraagd om feedback te geven op de bevindingen van deze review. Zij gaven aan dat het ook belangrijk is om de expertise van de uitvoerder van de interventie, de ziekte of aandoening van de cliënt en de kosten van de interventie te overwegen bij het aanbevelen van een interventie.

Deel II: De ontwikkeling en evaluatie van een training gericht op cognities en percepties

Met de verkregen informatie in de hierboven beschreven onderzoeken is een training ontwikkeld en geëvalueerd (**Hoofdstuk 6**). De belangrijkste doelen van de training voor bedrijfs- en verzekeringsartsen waren om kennis over cognities en percepties geassocieerd met werkparticipatie te verkrijgen of vergroten, deze cognities en percepties bij werkenden te kunnen identificeren, en ze, indien nodig, te kunnen veranderen. De ontwikkelde training duurt 4,5 uur en bestaat uit vier delen met de volgende onderwerpen: (1) cognities en percepties geassocieerd met werkparticipatie; (2) hoe kan informatie over deze factoren worden verkregen; (3) hoe kan een goed gesprek over deze factoren worden gevoerd; en (4) welke interventies, gericht op deze factoren, kunnen in de praktijk worden ingezet. Tijdens de training oefenen de bedrijfs- en verzekeringsartsen in verschillende opdrachten met de verkregen kennis en vaardigheden. Daarnaast bespreken ze het belang van de cognities en percepties met elkaar en bespreken ze hoe ze voorheen zijn omgegaan met cliënten met belemmerende cognities en percepties. Tijdens de training ontvangen de deelnemers een gesprekstool die hen kan helpen bij het toepassen van de geleerde vaardigheden in de praktijk.

In totaal hebben 57 bedrijfs- verzekeringsartsen deelgenomen aan de training, waarvan 54 de training in een vragenlijst hebben geëvalueerd. De 52 participanten die hun tevredenheid met de training als geheel aangaven, beoordeelden deze met een gemiddelde score van een 8,5 op een schaal van 1 tot 10. Van de 52 participanten vonden 51 dat de training nuttig was voor de praktijk en 52 van de 53 participanten waren van plan om de geleerde vaardigheden in de praktijk toe te passen. Drie tot zes maanden na deelname aan de training werden 11 bedrijfs- en verzekeringsartsen geïnterviewd over de haalbaarheid en bruikbaarheid van de training en de geleerde vaardigheden in de praktijk. Bedrijfs- en verzekeringsartsen beschouwden de training als waardevol en gaven aan dat ze zich tijdens spreekuren meer bewust waren van cognities en percepties dan voor de training. Niet iedereen gebruikte echter alle geleerde vaardigheden en de gesprekstool in

de praktijk. De belangrijkste barrières voor het toepassen van de vaardigheden in de praktijk waren dat het nog steeds moeilijk was om belemmerende cognities en percepties te identificeren, dat spreekuren te kort waren en dat er te weinig tijd was om ze voor te bereiden, en dat volgens sommigen de gesprekstool niet toepassingsgericht genoeg was.

Hoofdstuk 7 beschrijft een gerandomiseerd gecontroleerd onderzoek naar het effect van de training op het vermogen van bedrijfs- en verzekeringsartsen om cognities en percepties van werkenden te identificeren en om hierop gerichte evidence-based interventies aan te bevelen. Deelnemende bedrijfs- en verzekeringsartsen werden willekeurig toegewezen om deel te nemen aan de training (n = 29) of aan een controlegroep die geen training ontving (n = 30). Alle 59 deelnemers werden gevraagd om videovignetten te bekijken van gesimuleerde spreekuren van artsen met werkenden en om vervolgens aan te geven welke cognities en percepties hier aan de orde waren en welke gerichte interventies ze hiervoor zouden aanbevelen. De bedrijfs- en verzekeringsartsen kregen punten voor het identificeren van de juiste cognities en percepties en voor het aanbevelen van hierop gerichte evidence-based interventies. Met behulp van een *generalized linear model repeated measures* ANOVA werd het effect van de training geëvalueerd. De resultaten toonden aan dat er bij bedrijfs- en verzekeringsartsen die deelnamen aan de training in vergelijking met de controlegroep een statistisch significante verbetering was in het vermogen om cognities en percepties van werkenden te identificeren (p < 0,001) en het vermogen om hiervoor evidence-based interventies aan te bevelen (p < 0,001).

Conclusies en aanbevelingen voor onderzoek en praktijk

In **Hoofdstuk 8** worden de belangrijkste bevindingen van dit proefschrift besproken en worden aanbevelingen gedaan voor onderzoek en praktijk. De verschillende onderzoeken in het proefschrift bevestigen het belang van cognities en percepties voor de werkparticipatie van werkenden met een chronische ziekte. We bevelen aan dat bedrijfs- en verzekeringsartsen deze factoren in hun spreekuren met werkenden met een chronische ziekte bespreken, belemmerende cognities en percepties identificeren en interventies aanbevelen om deze te veranderen. Deelname aan de ontwikkelde training kan deze vaardigheden vergroten. Daarom is het belangrijk dat de training in de opleiding en de nascholing aangeboden wordt aan bedrijfs- en verzekeringsartsen. De duur van spreekuren moet lang genoeg zijn om cognities en percepties te kunnen bespreken en om een vertrouwensband tussen arts en werkende te kunnen opbouwen. Werkenden moeten zich ervan bewust zijn dat het geven van informatie over hun cognities

en percepties belangrijk is voor bedrijfs- en verzekeringsartsen om gerichte interventies te kunnen aanbevelen. De Patiëntenfederatie kan werkenden hierover informeren en kan werkenden helpen om de spreekuren met bedrijfs- en verzekeringsartsen voor te bereiden.

Met betrekking tot toekomstig onderzoek bevelen we aan om meer gerandomiseerde gecontroleerde onderzoeken te doen naar het effect van interventies gericht op cognities en percepties en het verhogen van werkparticipatie. We bevelen ook aan om het effect van de ontwikkelde training op het identificeren van cognities en percepties en op het aanbevelen van interventies uit te testen in de praktijk en om te onderzoeken hoe de bruikbaarheid van de geleerde kennis en vaardigheden kan worden verhoogd. Daarnaast bevelen we aan om het effect van de training op de werkparticipatie van werkenden te onderzoeken.

Concluderend hebben we gevonden dat cognities en percepties belangrijke factoren zijn die de werkparticipatie van werkenden met een chronische ziekte kunnen beïnvloeden. Bedrijfs- en verzekeringsartsen moeten deze factoren daarom meenemen bij de begeleiding en beoordeling. De in dit proefschrift verkregen kennis en de ontwikkelde training kan bedrijfs- en verzekeringsartsen hierbij ondersteunen en kan ze helpen bij hun inspanningen om de werkparticipatie van werkenden met een chronische ziekte te verhogen.

ABOUT THE AUTHOR

Curriculum Vitae

List of publications

Portfolio

Curriculum Vitae

Mariska de Wit was born on 12th January 1993 in Grootebroek, the Netherlands. She graduated from secondary school at the Martinus College in Grootebroek in 2011. Thereafter she studied Psychology at the Vrije Universiteit Amsterdam, the Netherlands. She completed her Bachelor Psychology cum laude in 2014. In 2015 she completed her Master Psychology, route Work and Organizational Psychology cum laude at the Vrije Universiteit Amsterdam. In 2016 she completed a second Master in Pedagogical Sciences at the University of Amsterdam, the Netherlands.

During her second Master study Mariska worked as a research assistant for the Amsterdam University of Applied Sciences and the University of Amsterdam. In January 2017, she started as a PhD student at the Coronel Institute of Occupational Health, Academic Medical Center. She performed a systematic review and a scoping review, conducted a survey study among occupational health professionals and conducted a focus group study among workers with a chronic disease. In addition, she developed, evaluated and studied the effects of a training program for occupational health professionals on involving cognitions and perceptions in the occupational health management and work disability assessment. This research project resulted in several national and international publications and forms the basis of this thesis. During her PhD period, Mariska presented her studies at different conferences in the Netherlands, Ireland, Denmark and India.

Besides this doctoral research, Mariska was involved in the education of medical students. She taught different subjects in the field of occupational health and academic skills, and supervised students with their Bachelor thesis at the University of Amsterdam. She also developed education programs for the students on involving cognitions and perceptions during their practice. In 2020 she obtained her University Teaching Qualification (In Dutch: Basiskwalificatie Onderwijs).

Currently, Mariska works as a Postdoc researcher at the Department of Public and Occupational Health, Coronel Institute of Occupational Health of the Amsterdam UMC (location Academic Medical Center). Her research focuses on increasing work participation of workers with a chronic disease. During her current research project she studies the effects of the Progressive Goal Attainment Program on cognitions and perceptions and on the work participation of workers with a chronic disease in the Netherlands.

List of publications

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de Wit M, Zipfel N, Horreh B, Hulshof CTJ, Wind H, de Boer AGEM. Training on involving cognitions and perceptions in the occupational health management and work disability assessment of workers: development and evaluation. Submitted.

de Wit M, Horreh B, Hulshof CTJ, Wind H, de Boer AGEM. Effects of a training program for occupational health professionals on the cognitions and perceptions of workers: a randomized controlled trial. Submitted.

Other international publications

Oostrom JK, de Vries RE, **de Wit M**. Development and validation of a HEXACO situational judgment test. Hum Perform. 2019;32(1):1-29.

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Portfolio

Name PhD student: Mariska de Wit

PhD period: January 2017 – May 2021

Name PhD supervisors: prof. dr. H. Wind, prof. dr. C.T.J. Hulshof and dr. A.G.E.M. de Boer

	Year	Workload (ECTS)
1. PhD training		
Graduate school courses		
The AMC World of Science	2017	0.7
Clinical Epidemiology: Systematic Reviews	2017	0.7
Project Management	2017	0.6
Scientific Writing in English for Publication	2017	1.5
Medical literature: Citation Analysis, Embase/Medline via Ovid, EndNote, PsycInfo via Ovid, PubMed, Searching for CAT, Searching for Evidence, Searching for a Systematic Review	2017-2018	0.8
Basic Course Legislation and Organization for Clinical Investigators (BROK)	2018	1.0
Didactical Skills	2018	0.4
Oral Presentation in English	2018	0.8
Qualitative Health Research	2018	0.9
Practical Biostatistics	2019	1.4
Advanced Topics in Biostatistics	2020	2.1
Clinical Epidemiology: Randomized Clinical Trials	2021	0.6
Other courses		
University Teaching Qualification (In Dutch: Basiskwalificatie Onderwijs, BKO): Course Activating Education	2019	1.0
NIVA Education: Prolonging Working Life	2021	1.0
Seminars, workshops and master classes		
AMC *P*rofessional *P*erformance		
- Masterclass: Vitality	2017	0.1
AMC *S*PINOZA		
- Seminar: Academic Careers for Women	2018	0.1
- Spinoza Lecture: When Research Findings hit the Glass Wall	2018	0.1
UvA Teaching & Learning Centre		
- Workshop: Activating Teaching Methods	2019	0.3
- Knowledge Session: Practical Tips for an Online Classroom	2020	0.1
- Knowledge Session: How to use Zoom during Education	2020	0.1
- Masterclass: Attention to Student Well-Being	2021	0.1

	Year	Workload (ECTS)
APROVE		
- Workshop: Pimp my Thesis	2020	0.1
- Workshop: Print your Thesis	2020	0.1
Center for Evidence Based Education		
- Workshop: Developing Self-Study Assignments	2020	0.1
Amsterdam Public Health		
- Webinar: Valorization and Entrepreneurship	2020	0.3
AMC Postdoc Network		
- Workshop: Grant Writing	2021	0.1
- Knowledge Session: Career Options for Postdocs	2021	0.1
(Inter)national conferences		
Oral presentations		
National Network for Chronically Ill and Work, Amsterdam	2017	0.2
Research meeting Coronel Institute, Amsterdam (3)	2017-2019	0.6
European Union of Medicine in Assurance and Social Security Congress, Maastricht	2018	1.0
Circle for Occupational Healthcare, Amsterdam	2019	0.2
Researchday Instituut Gak, Hilversum and online (2)	2019-2020	0.6
International Conclave on Occupational Health, Mumbai (India) (2)	2020	1.4
Annual Congress of the Netherlands Society of Occupational Medicine, online (2)	2020-2021	0.6
Research meeting Public and Occupational Health, online	2021	0.2
Poster presentations		
Dutch International Congress on Insurance Medicine (including poster pitch), Almere	2017	0.3
Annual Congress of the Netherlands Society of Occupational Medicine (including poster pitch), Papendal (3)	2017-2019	1.0
Amsterdam Public Health (APH) meeting (2)	2017-2019	0.7
International Congress on Occupational Health, Dublin (Ireland)	2018	1.4
Researchday Instituut Gak, Hilversum	2019	0.3
Work Disability Prevention and Integration Conference, Odense (Denmark)	2019	1.4
Organizing committee		
Conference Workers with a Chronic Disease in the Center	2021	1.0
Attended conferences without presentation		
Symposium: Get your PhD without Stress	2017	0.1
Researchday Instituut Gak (2)	2017-2018	0.6
Heijermans lecture (4)	2017-2019	0.6

	Year	Workload (ECTS)
Meeting The Young Occupational Physician	2018	0.1
Care Research Days	2018	1.0
Muntendam symposium (3)	2018-2020	0.4
Cochrane symposium	2019	0.2
Science Festival: Differences between Men and Women	2019	0.1
Science Festival: Corona, now and later	2020	0.1
Other meetings		
Progress visits Instituut Gak (4)	2017-2018	0.3
Consortium meeting Workers with a Chronic Disease in the Center (7)	2017-2019	0.4
Research meeting Coronel Institute (49)	2017-2020	2.6
Societal Participation and Health meeting (3)	2017-2020	0.4
PhD ceremony (11)	2017-2021	0.8
National Network for Chronically Ill and Work (5)	2017-2021	0.5
Meeting supervisory committee Workers with a Chronic Disease in the Center (3)	2018-2020	0.2
Amsterdam Public Health meeting (6)	2018-2021	0.7
Meeting department Public and Occupational Health (7)	2020-2021	0.3
Research meeting Section 5 Amsterdam UMC (9)	2020-2021	0.3
Commission annual report Coronel Institute	2018-2020	1.6
2. Teaching		
Lecturing		
Symposium Presentation – 1st year medical students	2018	0.2
Writing an Abstract – 1st year medical students	2018-2019	1.1
Optional education Chronically Ill and Work – 2nd year medical students	2018-2019	0.3
Journal Club – 2nd year medical students	2018-2020	0.7
PICO – 1st year medical students	2018-2020	0.8
Writing a Scientific Paper – 1st year medical students	2019-2020	0.4
Optional education Physician and Top Sport – 2nd year medical students	2020	0.4
Involving Cognitions and Perceptions during Practice – 2nd master year medical students	2020-2021	1.4
Involving Cognitions and Perceptions during Practice – occupational and insurance physicians (in training)	2020-2021	0.4
Supervising		
Three students during their bachelor thesis – 3rd year medical students	2019	1.0

	Year	Workload (ECTS)
3. Parameters of esteem		
Grants		
Grant for research project on the effect of the Progressive Goal Attainment Program on cognitions and perceptions and work participation (co-applicant)	2020	
Total (28 hours = 1 ECTS)		44.1

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List of co-authors

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All authors contributed to the conception or design of the studies, the data acquisition, data analysis or interpretation of the data in the respective manuscripts. The first draft of the manuscripts were written by Mariska de Wit, but all co-authors contributed by reading and revising the respective manuscripts.

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Dankwoord

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