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### **Cognitions and perceptions of workers with a chronic disease**

*Development and evaluation of a training program for occupational health professionals*

de Wit, M.E.C.

#### **Publication date**

2021

[Link to publication](#)

#### **Citation for published version (APA):**

de Wit, M. E. C. (2021). *Cognitions and perceptions of workers with a chronic disease: Development and evaluation of a training program for occupational health professionals*. [Thesis, fully internal, Universiteit van Amsterdam].

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# CHAPTER 5

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

Mariska de Wit  
Bedra Horreh  
Joost G. Daams  
Carel T. J. Hulshof  
Haije Wind  
Angela G. E. M. de Boer

BMC Public Health. 2020;20(1):1610.

## 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.<sup>1</sup> Personal factors that can influence work participation are cognitions and perceptions of employees.<sup>2-4</sup> 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.<sup>2</sup>, 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.<sup>2</sup> 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.<sup>2</sup>

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.<sup>5</sup>

We used the Joanna Briggs Institute Reviewers' Manual for methodology for Scoping Reviews<sup>6</sup> and the scoping review framework of Arksey and O'Malley<sup>7</sup> 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.<sup>8</sup>

### **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.<sup>9</sup> 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.<sup>2</sup> 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.<sup>10</sup> 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.<sup>11</sup> 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<sup>7</sup> 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.



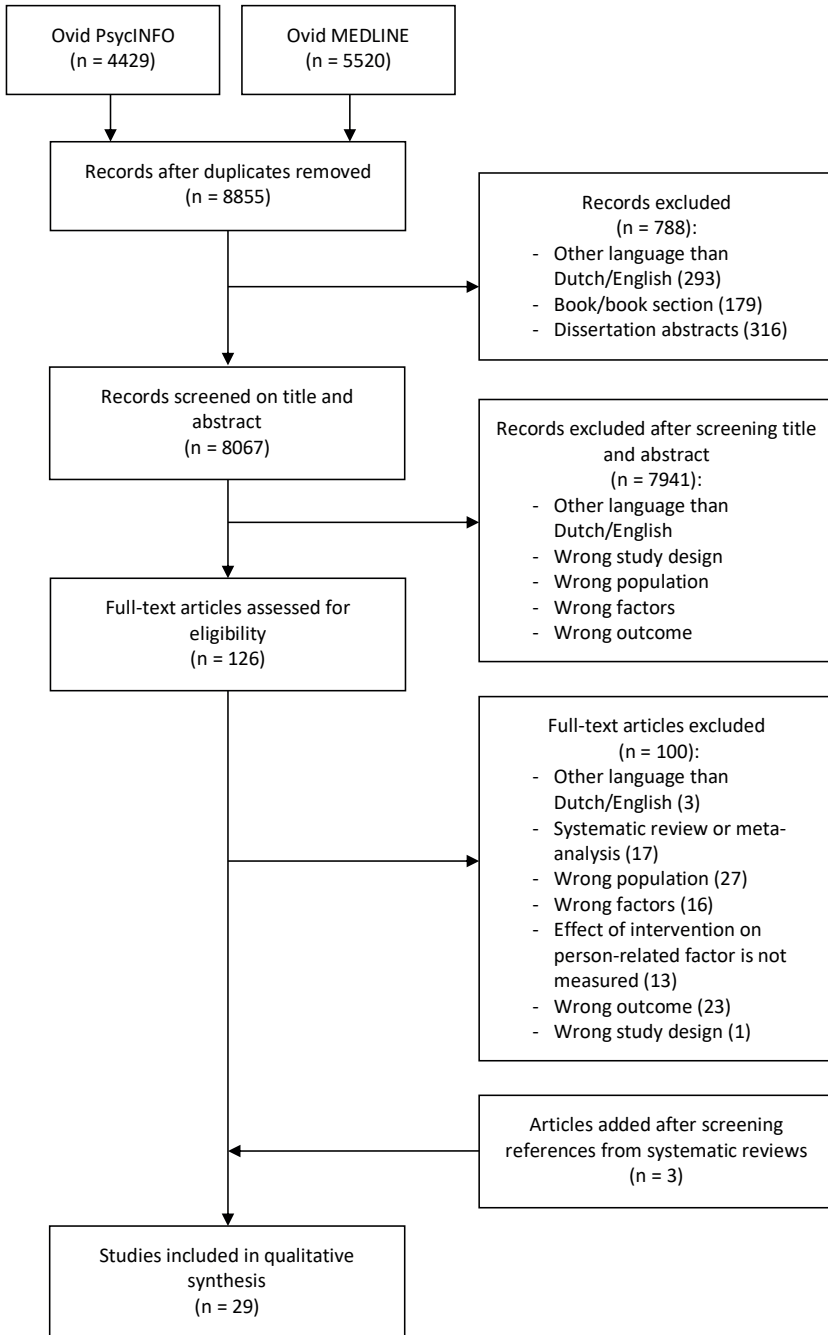


Figure 1. Flowchart of the search process

**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?
<b>Self-efficacy</b>						
Hampel et al. 2019 <sup>12</sup>	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 <sup>a</sup>	Yes	Yes
Hees et al. 2013 <sup>13</sup>	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 <sup>14</sup>	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 <sup>15</sup>	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 <sup>a</sup>	No
Wormgoor et al. 2020 <sup>16</sup>	Common mental complaints	Brief psychotherapy	Intervention focused on normalizing, accepting and coping with mental health complaints and their hindrance for work participation	No	Yes <sup>b</sup>	No
<b>Perceived health</b>						
Fauser et al. 2019 <sup>17</sup>	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 <sup>18</sup>	Anxiety, depression, other mental illness, stress and burnout, musculoskeletal disorders	P 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 <sup>19</sup>	Fibromyalgia	Multidisciplinary intervention with aftercare	Intervention consisting of psychotherapy, physiotherapy, creative therapy and an aftercare program	No	No	No
<b>Feelings of control</b>						
Muschalla et al. 2016 <sup>15</sup>	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 <sup>a</sup>	No
Pedersen et al. 2015 <sup>18</sup>	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 <sup>c</sup>	No	No
<b>Catastrophizing</b>						
Hutting et al. 2015 <sup>14</sup>	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 <sup>20</sup>	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 <sup>d</sup>	No	No
<b>Fear-avoidance beliefs</b>						
Aasdahl et al. 2019 <sup>21</sup>	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 <sup>21</sup>	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 <sup>22</sup>	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 <sup>23</sup>	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 <sup>23</sup>	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 <sup>24</sup>	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 <sup>25</sup>	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 <sup>25</sup>	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 <sup>26</sup>	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
<b>Perceived work-relatedness</b>						
Muschalla et al. 2016 <sup>15</sup>	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 <sup>a</sup>	Yes
<b>Coping strategies</b>						
Arends et al. 2014 <sup>27</sup>	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 <sup>a,d</sup>	Yes	Yes
Fauser et al. 2019 <sup>17</sup>	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 <sup>23</sup>	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 <sup>23</sup>	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 <sup>13</sup>	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 <sup>15</sup>	Orthopedic disorders, cardiac 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	<b>Yes<sup>c</sup></b>	<b>Yes<sup>a</sup></b>	<b>Yes</b>

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

<sup>a</sup> Depends on population characteristics; <sup>b</sup> Not for every moment on which the outcome is measured; <sup>c</sup> Depends on the form/subscale of the factor; <sup>d</sup> 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

<b>Study</b>	<b>Health problem population</b>	<b>Name of intervention</b>	<b>Intervention type</b>	<b>Significant positive effect on cognition or perception over time</b>	<b>Significant positive effect on work participation over time</b>	<b>Significant positive effect on work participation through change in cognition or perception</b>	<b>Should OHPs recommend this intervention?</b>
<b>Self-efficacy</b>							
Chu et al. 2015 <sup>28</sup>	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 <sup>29</sup>	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 <sup>a</sup>	Yes	No
Leensen et al. 2017 <sup>30</sup>	Cancer	Multidisciplinary rehabilitation program	Intervention with supervised interval and resistance exercises and counseling sessions with advice on work resumption	Yes <sup>b</sup>	Yes	-	Unclear
Salzwedel et al. 2020 <sup>31</sup>	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?
<b>Perceived health</b>							
Chu et al. 2015 <sup>28</sup>	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 <sup>32</sup>	Chronic neck pain	The 4 interdisciplinary pain program	Intervention with physiotherapy, strength training, occupational therapy, cognitive behavioral and coping therapy and relaxation	Yes <sup>b</sup>	NR	-	Unclear
Jensen 2013 <sup>29</sup>	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 <sup>a</sup>	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 <sup>33</sup>	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
<b>Recovery or RTW expectations</b>							
Aasdahl et al. 2018 <sup>34</sup>	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
<b>Catastrophizing</b>							
Adams et al. 2017 <sup>35</sup>	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 <sup>28</sup>	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 <sup>36</sup>	Chronic pain	Interdisciplinary pain management program	Intervention with psychological treatment, occupational therapy, physical therapy and vocational counseling	Yes	Yes	-	Unclear
Haiduk et al. 2017 <sup>32</sup>	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 <sup>33</sup>	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 <sup>37</sup>	Whiplash injury	Multidisciplinary rehabilitation program	Intervention with tailored exercises, education and instruction in self-management skills	NR	NR	Yes	Unclear
Sullivan et al. 2017 <sup>38</sup>	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 <sup>39</sup>	Chronic musculoskeletal pain	Standardized multidisciplinary team care intervention	Intervention with cognitive behavioral therapy, exercises, relaxation and education	Yes	Yes	-	Unclear
<b>Coping</b>							
Asih et al. 2015 <sup>40</sup>	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 <sup>c</sup>	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 <sup>33</sup>	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.

<sup>a</sup> Not for every moment on which the outcome is measured; <sup>b</sup> Not for every moment on which the cognition or perception is measured; <sup>c</sup> 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.<sup>12-16, 28-31</sup> The RCT of Hees et al.<sup>13</sup>, which was described in detail in Hees et al.<sup>41</sup>, the RCT of Hutting et al.<sup>14</sup>, the RCT of Muschalla et al.<sup>15</sup> and the RCT of Wormgoor et al.<sup>16</sup> 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.<sup>12</sup> 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.<sup>28</sup> among employees with non-cancer pain and the study of Leensen et al.<sup>30</sup> 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,<sup>30</sup> while the other consisted of group sessions over a shorter period of fourteen days.<sup>28</sup> 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.<sup>31</sup> 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<sup>29</sup> among employees with mental or musculoskeletal illness, which was more precisely described by Jensen<sup>42</sup>, 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.<sup>17–19,28,29,32,33</sup> The interventions of Pedersen et al.<sup>18</sup>, Fauser et al.<sup>17</sup> and Van Eijk-Hustings et al.<sup>19</sup> did not have a significant effect on perceived health. The intervention in the cohort study of Chu et al.<sup>28</sup> 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.<sup>33</sup> 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.<sup>32</sup> 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<sup>29</sup> did not have a significant effect on perceived health.

### ***Recovery and RTW expectations***

One study of Aasdahl et al.<sup>34</sup> 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.<sup>15, 18</sup> The intervention of Muschalla et al.<sup>15</sup> did not have an effect on internal and external control perception. However, the intervention studied by Pedersen et al.<sup>18</sup>, 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.<sup>14, 20, 28, 32, 33, 35-39</sup> Among these studies there were two RCTs.<sup>14, 20</sup> 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.<sup>20</sup> 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.<sup>43</sup>, decreased catastrophizing more in the intervention group than in the control group after six months, but not after three months and one-year follow-up. All the interventions in the other studies<sup>28, 32, 33, 35-39</sup> 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.<sup>37</sup>, was not reported. The interventions described by Chu et al.<sup>28</sup> among employees with chronic non-cancer pain, Gagnon et al.<sup>36</sup> among employees with chronic pain, Pietilä-Holmner et al.<sup>33</sup> among patients with chronic musculoskeletal pain and Volker et al.<sup>39</sup>, 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.<sup>39</sup>, Pietilä-Holmner et al.<sup>33</sup> and Chu et al.<sup>28</sup> contained relaxation exercises as well. The multidisciplinary intervention of Haiduk et al.<sup>32</sup> 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.<sup>35</sup>, Scott et al.<sup>37</sup>, and Sullivan et al.<sup>38</sup>, 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.<sup>35</sup> and Sullivan et al.<sup>38</sup>, which was further described in the article of Sullivan et al.<sup>44</sup>, 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.<sup>21-26</sup> Only one of the studied interventions had a significant effect on this factor and on work participation.<sup>26</sup> The “Classification-based cognitive functional therapy” studied by Vibe Fersum et al.<sup>26</sup> 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.<sup>21-25</sup>

### ***Perceived work-relatedness***

One RCT of Muschalla et al.<sup>15</sup> 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.<sup>13, 15, 17, 23, 27, 33, 40</sup> The “Stimulating health participation and relapse prevention at work” intervention of Arends et al.<sup>27</sup> among employees with common mental disorders and the “Cognitive behavioral group intervention on work-anxiety” of Muschalla et al.<sup>15</sup> among employees with orthopedic, cardiologic and neurological disorders changed coping and improved

work participation. In the study of Arends et al.<sup>27</sup> 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.<sup>15</sup>, 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.<sup>23</sup>, Hees et al.<sup>13</sup> and Fauser et al.<sup>17</sup> did not significantly change coping or work participation. The intervention in the cohort study of Asih et al.<sup>40</sup> 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.<sup>33</sup> 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.<sup>27</sup>, the “Cognitive behavioral group intervention on work-anxiety” described by Muschalla et al.<sup>15</sup>, the “Combined cognitive behavioral pain competence and depression prevention training” described by Hampel et al.<sup>12</sup> and “Classification-based cognitive functional therapy” described by Vibe Fersum et al.<sup>26</sup> These interventions were effective in changing work participation by changing coping<sup>15, 27</sup>, perceived work-relatedness<sup>15</sup>, self-efficacy<sup>12</sup> or fear-avoidance beliefs.<sup>26</sup> Two of the four interventions<sup>26, 27</sup> involved individual sessions with employees and two interventions<sup>12, 15</sup> 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,<sup>27</sup> psychological therapist<sup>12, 15</sup> or physiotherapist.<sup>26</sup> This is in contrast to a review of Hoefsmit et al.<sup>24</sup> 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.<sup>40</sup>, 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.<sup>15</sup> 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<sup>46</sup> and a study of Woodhouse et al.<sup>47</sup>, 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.<sup>48, 49</sup> 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<sup>7</sup> for conducting this scoping review including the essential last step as described by Levac et al.<sup>5</sup> 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.<sup>13,35</sup> 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.<sup>23</sup> 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<sup>12, 15, 26, 27</sup> 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

<b>Ovid MEDLINE(R) ALL &lt;1946 to June 12, 2020&gt;</b>		
<b>Search date: 15 June 2020</b>		
<b>#</b>	<b>Searches</b>	<b>Results</b>
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 kinesiphobia 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

<b>Ovid MEDLINE(R) ALL &lt;1946 to June 12, 2020&gt;</b>		
<b>Search date: 15 June 2020</b>		
<b>#</b>	<b>Searches</b>	<b>Results</b>
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

<b>Ovid PsycINFO &lt;1806 to October Week 2 2020&gt;</b>		
<b>Search date: 15 June 2020</b>		
<b>#</b>	<b>Searches</b>	<b>Results</b>
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

<b>Ovid PsycINFO &lt;1806 to October Week 2 2020&gt;</b>		
<b>Search date: 15 June 2020</b>		
<b>#</b>	<b>Searches</b>	<b>Results</b>
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	Description intervention
		<b>N: Number of subjects</b> <b>A: Age; mean age (SD)</b> <b>G: Gender</b> <b>H: Health status</b>	<b>D: Duration or number of sessions</b> <b>S: Individual or group sessions</b> <b>P: Provider(s) of intervention</b> <b>M: Main components</b>
Aasdahl et al. 2018 <sup>34</sup> 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	<p><b>Short inpatient program:</b></p> 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
			<p><b>Long inpatient program:</b></p> 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
			<p><b>Outpatient program:</b></p> 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	Cognitions and perceptions	Follow-up	Risk of bias	Results
<p><b>D: Duration or number of sessions</b>  <b>S: Individual or group sessions</b>  <b>P: Provider(s) of intervention</b>  <b>M: Main components</b></p>	<p>- Expectations about length of sick leave (one question: "For how long do you believe you will be sick listed from today?")</p>	9 months	Moderate	<p>Expectations about sick leave duration significantly changed after the programs (<math>p = .01</math>). 56 (33%) participants improved their expectations, 32 (19%) participants reduced their expectations and 80 (48%) participants did not change their expectations.</p> <p>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.</p> <p>A positive change in expectations was associated with sustainable RTW (<math>p &lt; .01</math>) and work participation days (<math>p &lt; .01</math>).</p>

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Aasdahl et al. 2019 <sup>21</sup> Norway (Europe)	Randomized controlled trial	<p><b>Short inpatient program:</b> 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</p> <p><b>Short outpatient program:</b> 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</p> <p><b>Long inpatient program:</b> 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</p> <p><b>Long outpatient program:</b> 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</p>	<p><b>Short inpatient program:</b> 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</p> <p><b>Long inpatient program:</b> 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</p>

Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
<p><b>Outpatient program (long and short program are identical):</b>  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</p>	<p>- Fear-avoidance beliefs (Fear-Avoidance Beliefs Questionnaire)</p>	<p>3, 9, 12 months</p>	<p>Moderate</p>	<p>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.</p> <p>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.</p> <p>Participants that had reduced fear-avoidance beliefs for work at 9 months 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.</p>

**Table 1.** Continued

<b>First author, year, country</b>	<b>Study design</b>	<b>Population</b>	<b>Description intervention</b>
Adams et al. 2017 <sup>35</sup> 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	<b>Risk-targeted activity-reintegration intervention/ Progressive goal attainment program:</b> 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 <sup>27</sup> The Netherlands (Europe)	Randomized controlled trial	<b>Stimulating healthy participation and relapse prevention at work (SHARP-at work) intervention:</b> N: 80 A: 41.3 (9.4) G: 27 males, 53 females H: Common mental disorders  <b>CAU:</b> N: 78 A: 43.3 (9.8) G: 38 males, 40 females H: Common mental disorders	<b>SHARP-at work intervention:</b> 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	<p>Catastrophizing scores reduced from 10.6 (2.7) to 6.2 (3.3) after the intervention (<math>p &lt; .001</math>).</p> <p>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.</p> <p>Reductions in catastrophizing predicted occupational re-engagement at the follow-up (<math>p = .01</math>).</p>
<p><b>CAU:</b> According to guideline on: "Management of mental health problems of workers by occupational physicians"</p>	- Coping (Utrecht Coping List)	3, 6, 12 months	Moderate	<p>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 (<math>p &lt; .05</math>).</p> <p>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%), (<math>p &lt; .05</math>). No information on within-group difference is provided.</p> <p>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), (<math>p &lt; .05</math>).</p>

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Asih et al. 2015 <sup>40</sup> 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	<b>Functional restoration program (FRP):</b> 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 <sup>28</sup> China (Asia)	Cohort study	N: 142 A: 42.0, range 21-62 G: 57 males, 85 females H: Chronic non-cancer pain	<b>Comprehensive outpatient pain engagement (COPE) program:</b> 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 <sup>17</sup> Germany (Europe)	Randomized controlled trial	<b>Conventional rehabilitation plus additional work-related modules:</b> N: 229 A: 50.8 (7.1) G: 66 males, 163 females H: Cancer  <b>Conventional medical rehabilitation:</b> N: 255 A: 50.3 (7.9) G: 94 males, 161 females H: Cancer	<b>Conventional medical rehabilitation plus additional work-related modules:</b> 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	<p>Coping profiles changed after the FRP (<math>p &lt; .001</math>). After FRP, there was an increase in the overall number of patients who became Adaptive copers (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%).</p> <p>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 (<math>p = .009</math>).</p> <p>Of the 457 participants who completed the program, 369 returned to work. Information about significance was not provided.</p> <p>There was no association between coping profiles at discharge and RTW rate.</p>
-	- Catastrophizing (Pain Catastrophizing Scale) - Self-efficacy (Patient Self Efficacy Questionnaire) - Perceived health (36-item Short-Form Health Survey)	12 months	Moderate	<p>Catastrophizing decreased one year after the program, from a mean of 34.1 (11.1) to 25.8 (14.1) (<math>p &lt; .001</math>).</p> <p>Self-efficacy increased one year after the program, from 23.2 (11.0) to 30.6 (13.9) (<math>p &lt; .001</math>).</p> <p>Perceived health improved one year after the program from 21.4 (18.1) to 36.7 (23.0) (<math>p = .03</math>).</p> <p>Work status improved one year after the program, with 35% of the participants working after the program, as compared to 17% before the program (<math>p = .0002</math>).</p>
<b>Conventional medical rehabilitation:</b> 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	<p>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.</p> <p>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.</p>



Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Gagnon et al. 2013 <sup>36</sup> United States (North-America)	Cohort study	N: 101 A: 43.5 (8.2) G: 64 males, 37 females H: Chronic pain	<b>Interdisciplinary pain management program:</b> 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 <sup>22</sup> Norway (Europe)	Randomized controlled trial	<b>Home exercise intervention:</b> N: 23 A: 48.2 (9.8) G: 12 males, 11 females H: Subacromial impingement  <b>Supervised exercise intervention:</b> N: 23 A: 47.6 (10.0) G: 12 males, 11 females H: Subacromial impingement	<b>Supervised exercise intervention:</b> 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 <sup>32</sup> Switzerland (Europe)	Cohort study	N: 59 A: 40.3 (12.3) G: 10 males, 49 females H: Chronic neck pain	<b>The 4 interdisciplinary pain program:</b> 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	<p>Catastrophizing decreased at discharge from the interdisciplinary pain management program from a mean score of approximately 28 to 24 (<math>p = .033</math>).</p> <p>From the program completers, 49% were working, whereas 12% were working at the start. No information on significance is provided.</p> <p>A greater percentage of the program completers was working as compared to the non-completers (49% vs approximately 9%), (<math>p = .005</math>).</p>
<p><b>Home exercise intervention:</b>  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</p>	- Fear-avoidance beliefs (Fear-Avoidance Beliefs Questionnaire)	6, 26 weeks	Moderate	<p>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.</p> <p>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.</p>
-	- Catastrophizing (Coping Strategies Questionnaire) - Perceived health (36-item Short-Form Health Survey)	6, 60 months	Moderate	<p>Catastrophizing improved from a mean of 57.5 (18.2) at entry to 63.7 (20.0) at 6 months (<math>p = .03</math>) and to 76.2 (23.5) at the 60 months (<math>p &lt; .001</math>) follow-up after the 4 interdisciplinary pain program.</p> <p>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 (<math>p = .01</math>).</p> <p>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.</p>

Table 1. Continued

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

Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
<p><b>Pain competence training:</b>  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</p>	<p>- Pain self-efficacy (Pain Self-Efficacy Questionnaire)</p>	<p>6,12 months</p>	<p>Moderate</p>	<p>Pain self-efficacy increased over time in the intervention group in comparing with the control group (<math>p = .016</math>), but only for participants with high levels of depressive symptoms.  Pain-related days of sick leave significantly decreased in the intervention group (<math>p &lt; .001</math>), but not in the control group.  After 12 months significantly more participants were employed in the intervention group in comparing to the control group (<math>p &lt; .017</math>).</p>
<p><b>Brief intervention:</b>  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</p>	<p>- Coping (Utrecht Coping List)  - Fear-avoidance beliefs (Fear-Avoidance Beliefs Questionnaire)</p>	<p>3, 6, 12 months</p>	<p>Moderate</p>	<p>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 (<math>p = .005</math>), 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 (<math>p &lt; .001</math>), 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.</p>

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Hees et al. 2013 <sup>13</sup> The Netherlands (Europe)	Randomized controlled trial	<p><b>Treatment as usual + Occupational therapy (TAU + OT):</b> N: 78 A: 43.8 (9.0) G: 41 males, 37 females H: Major depressive disorder</p> <p><b>Treatment as usual (TAU):</b> N: 39 A: 41.5 (9.6) G: 16 males, 23 females H: Major depressive disorder</p>	<p><b>TAU + OT:</b> 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</p>
Hutting et al. 2015 <sup>14</sup> The Netherlands (Europe)	Randomized controlled trial	<p><b>Self-management intervention:</b> N: 64 A: 45.0 (11.2) G: 11 males, 53 females H: Chronic non-specific complaints of the arm, neck or shoulder (CANS)</p> <p><b>CAU:</b> N: 53 A: 47.7 (10.5) G: 17 males, 36 females H: Chronic non-specific CANS</p>	<p><b>Self-management intervention:</b> 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</p>

Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
<p><b>TAU:</b> 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)</p>	<p>- Coping (Utrecht Coping List) - Work-related self-efficacy (Expectations regarding work resumption questionnaire)</p>	6, 12, 18 months	Low	<p>Active problem solving coping improved from a mean of 16.6 (3.8) to 17.9 (3.7) at 18 months follow-up (<math>p &lt; .001</math>), passive reaction coping reduced from 15.8 (4.4) to 13.1 (3.3), (<math>p &lt; .001</math>), avoidance coping decreased from 17.2 (3.2) to 16.9 (3.3), (<math>p = .05</math>) in the intervention group. There were no group differences.</p> <p>Self-efficacy improved from 3.4 (1.1) to 4.2 (1.0) at 18 months (<math>p &lt; .001</math>) in the intervention group. There were no group differences.</p> <p>There was a significant decrease in hours of absenteeism, from 22.7 (10.0) to 10.4 (12.5) at 18 months (<math>p &lt; .001</math>) in the intervention group. There were no group differences.</p> <p>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.</p> <p>In the intervention group, 92% of participants achieved at least partial RTW and 66% achieved full RTW during the study period of 18 months.</p>
<p><b>CAU:</b> All CAU and information available within and outside the organization of the participant</p>	<p>- Pain catastrophizing (Pain Catastrophizing Scale) - Self-efficacy (Dutch Adaptation of the General Self-Efficacy Scale) - Self-efficacy at work (Self-Efficacy at Work Scale)</p>	3, 6, 12 months	Moderate	<p>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.</p> <p>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.</p> <p>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.</p>

**Table 1.** Continued

<b>First author, year, country</b>	<b>Study design</b>	<b>Population</b>	<b>Description intervention</b>
Jensen 2013 <sup>29</sup> Denmark (Europe)	Non-randomized experimental study	<p><b>Intervention group:</b> N: 118 A: 34, range 18-63 G: 15 males, 103 females H: Mental illness, musculoskeletal illness, mental and musculoskeletal illness</p> <p><b>Reference group:</b> N: 86 A: Comparable to intervention group. G: Comparable to intervention group. H: Comparable to intervention group.</p>	<p><b>RTW intervention:</b> 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)</p>
Leensen et al. 2017 <sup>30</sup> The Netherlands (Europe)	Single group pre-test post-test study	<p>N: 93 A: 47.9 (7.4) G: 9 males, 84 females H: Cancer</p>	<p><b>Multidisciplinary rehabilitation program:</b> 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</p>

Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
-	<ul style="list-style-type: none"> <li>- Perceived health (36-item Short-Form Health Survey)</li> <li>- General self-efficacy (Generalized Self-Efficacy Scale)</li> </ul>	12, 24 months	Low	<p>Perceived health did not change after the intervention.</p> <p>Self-efficacy did not change after the intervention.</p> <p>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 (<math>p &lt; .05</math>), but there was no difference at one-year follow-up.</p> <p>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 (<math>p &lt; .05</math>), but there was no difference at two-year follow-up.</p> <p>Decline in self-efficacy was predictive for less chance to RTW at the one-year follow-up (<math>p &lt; .05</math>), when adjusted for sex and age, but not at two-year follow-up.</p> <p>Increase in perceived health was predictive for RTW at one-year follow-up (<math>p &lt; .05</math>) and at two-year follow-up (<math>p &lt; .05</math>) when adjusted for sex and age.</p>
-	<ul style="list-style-type: none"> <li>- Self-efficacy (Self-Efficacy Scale)</li> </ul>	6, 12, 18 months	Moderate	<p>Self-efficacy increased at 18 months from a mean of 3.7 (0.8) to 4.2 (0.6) (<math>p &lt; .001</math>), but not at 6 months follow-up.</p> <p>Rate of RTW increased to 59% at 6 months follow-up, 86% at 12 months follow-up and 83% at 18 months follow-up (<math>p &lt; .001</math>). The median number of days to RTW was 292.</p>



Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Marchand et al. 2015 <sup>24</sup> Norway (Europe)	Randomized controlled trial	<p><b>Work-focused intervention:</b></p> <p>N: 201 A: 40.1 (9.7) G: 111 males, 90 females H: Neck and/or back pain</p> <p><b>Brief intervention and Multidisciplinary intervention:</b></p> <p>N: 197 A: 41.1 (10.0) G: 101 males, 96 females H: Neck and/or back pain</p>	<p><b>Work-focused intervention:</b></p> <p>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)</p>
Muschalla et al. 2016 <sup>15</sup> Germany (Europe)	Randomized controlled trial	<p><b>Cognitive behavioral group intervention on work-anxiety (WAG intervention):</b></p> <p>N: 177 A: 48.9 (8.7) G: 81 males, 96 females H: Orthopedic disorders, cardiologic disorders, neurological disorders</p> <p><b>Recreational group (RG) intervention:</b></p> <p>N: 168 A: 51.4 (8.0) G: 86 males, 82 females H: Orthopedic disorders, cardiologic disorders, neurological disorders</p>	<p><b>WAG intervention:</b></p> <p>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</p>

Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
<p><b>Brief intervention at Oslo University hospital:</b>            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</p>	<p>- Fear-avoidance beliefs (Fear-Avoidance Beliefs Questionnaire, the work subscale)</p>	<p>4, 12 months</p>	<p>Moderate</p>	<p>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 (<math>p = .023</math>). The odds for RTW increased to 4.0 (<math>p = .015</math>) 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.</p>
<p><b>Multidisciplinary intervention at St. Olav's hospital:</b>            D: 3 weeks            S: Individual and group sessions            P: Physiotherapist, medical specialist, social worker            M: - Cognitive behavioral therapy            - Exercise</p>	<p>- 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")</p>	<p>6 months</p>	<p>Moderate</p>	<p>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 (<math>p = .025</math>) and with covariate obtaining a workplace (<math>p = .037</math>). 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 (<math>p = .007</math>). 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 (<math>p = .05</math>), but there were no differences between the groups for participants with work-anxiety and general mental disorders or for all the participants.</p>

**Table 1.** Continued

<b>First author, year, country</b>	<b>Study design</b>	<b>Population</b>	<b>Description intervention</b>
Pedersen et al. 2015 <sup>18</sup> Denmark (Europe)	Randomized controlled trial	<p><b>Psychoeducation:</b></p> <p>N: 215 A: 43.5 (10.0) G: 61 males, 154 females H: Anxiety, depression, other mental illness, stress and burnout, musculoskeletal disorders</p> <p><b>CAU:</b></p> <p>N: 215 A: 43.9 (9.9) G: 60 males, 155 females H: Anxiety, depression, other mental illness, stress and burnout, musculoskeletal disorders</p>	<p><b>Psychoeducation:</b></p> <p>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</p>
Pietilä-Holmner et al. 2020 <sup>33</sup> Sweden (Europe)	Cohort study	<p>N: 234 A: 43.6 (10.8) G: 34 males, 200 females H: Chronic musculoskeletal pain</p>	<p><b>Multimodal rehabilitation program (MMRP):</b></p> <p>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</p>

Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
<p><b>CAU:</b> 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.</p>	<p>- Health locus of control (The Multidimensional Health Locus of Control) - Perceived health (one question: "In general, would you say your health is..")</p>	3, 6, 12 months	Moderate	<p>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.</p> <p>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) (<math>p &lt; .001</math>) and was higher for the intervention group (median 24.0) than for the control group (median 21.0) at 6 months follow-up (<math>p &lt; .001</math>). 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.</p> <p>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.</p>
-	<p>- Coping (Chronic Pain Acceptance Questionnaire) - Catastrophizing (Pain Catastrophizing Scale) - Perceived health (Visual Analogue Scale)</p>	12 months	Moderate	<p>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 (<math>p &lt; .001</math>).</p> <p>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 (<math>p &lt; .001</math>).</p> <p>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 (<math>p &lt; .001</math>). The coping strategy pain willingness increased from 23.0 (11.0) at baseline to 27.0 (11.0) at follow-up (<math>p &lt; .001</math>).</p> <p>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 (<math>p = .027</math>).</p>

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Rolving et al. 2015 <sup>20</sup> Denmark (Europe)	Randomized controlled trial	<p><b>Cognitive behavioral therapy (CBT):</b> N: 59 A: 51.4 (9.2) G: 23 males, 36 females H: Degenerative disc disease or spondylolisthesis undergoing lumbar spine fusion surgery</p> <p><b>CAU:</b> N: 31 A: 47.7 (8.9) G: 16 males, 15 females H: Degenerative disc disease or spondylolisthesis undergoing lumbar spine fusion surgery</p>	<p><b>CBT:</b> 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</p>
Ronzi et al. 2017 <sup>25</sup> France (Europe)	Randomized controlled trial	<p><b>Functional restoration program (FRP):</b> N: 49 A: 40.0 G: 27 males, 22 females H: Non-specific chronic low back pain</p> <p><b>Ambulatory individual physiotherapy (AIP):</b> N: 54 A: 42.0 G: 33 males, 21 females H: Non-specific chronic low back pain</p> <p><b>Mixed strategy:</b> N: 56 A: 40.0 G: 35 males, 21 females H: Non-specific chronic low back pain</p>	<p><b>AIP:</b> 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</p> <p><b>Mixed strategy:</b> 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</p>

Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
<p><b>CAU:</b>  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</p>	<p>- Catastrophizing (Coping Strategies Questionnaire)</p>	<p>3, 6, 12 months</p>	<p>Moderate</p>	<p>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.</p> <p>Catastrophizing decreased more in the intervention group after 6 months follow-up (-7.5 points) than in the control group (-2.0), (<math>p = .04</math>), but there was no difference in decrease in catastrophizing between the groups at 3 months and one-year follow-up.</p> <p>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.</p>
<p><b>FRP:</b>  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</p>	<p>- Fear-avoidance beliefs (Fear-Avoidance Beliefs Questionnaire)</p>	<p>12 months</p>	<p>Moderate</p>	<p>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 (<math>p &lt; .05</math>), but not in the AIP group. There were no differences in decreased fear-avoidance beliefs between the groups.</p> <p>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 (<math>p &lt; .05</math>). There were no differences in number of sick leave days between the groups.</p>

Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Salzwedel et al. 2020 <sup>31</sup> Germany (Europe)	Cohort study	N: 1262 A: 54.2 (7.0) G: 968 males, 294 females H: Cardiovascular diseases	<b>Standardized comprehensive cardiac rehabilitation (CR) program:</b> 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 <sup>37</sup> Canada (North-America)	Single group pre-test post-test study	N: 148 A: 36.6 (9.2) G: - H: Whiplash injury	<b>Multidisciplinary rehabilitation program:</b> 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 <sup>38</sup> Canada (North-America)	Cohort study	<b>Men:</b> N: 35 A: 47.7 (10.6) H: Post-traumatic stress disorder  <b>Women:</b> N: 38 A: 44.8 (8.5) H: Post-traumatic stress disorder	<b>Risk-targeted activity-reintegration intervention/ Progressive goal attainment program:</b> 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	<p>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 (<math>p &lt; .001</math>).</p> <p>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.</p>
-	- Pain catastrophizing (Pain Catastrophizing Scale)	12 months	Moderate	<p>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.</p> <p>At one-year follow-up, 69.6% of participants had resumed some degree of employment-related activities. No information on significance is provided.</p> <p>Participants who did not RTW had significantly lower percent reduction on catastrophizing than those who returned to work (<math>p = .001</math>). In 72% of the time, individuals who returned to work obtained higher percent change on pain catastrophizing than those who did not return.</p>
-	- Catastrophizing (Symptom Catastrophizing Scale)	1 month	Low	<p>Catastrophizing decreased with 38% after treatment (<math>p &lt; .001</math>).</p> <p>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.</p> <p>Participants who returned to work at follow-up, had greater reductions in catastrophizing scores (<math>p &lt; .001</math>), than participants who did not return. Change scores on catastrophizing contributed significant variance to the prediction of occupational re-engagement (<math>p &lt; .001</math>).</p>



Table 1. Continued

First author, year, country	Study design	Population	Description intervention
Van Eijk-Hustings et al. 2013 <sup>19</sup> The Netherlands (Europe)	Randomized controlled trial	<p><b>Multidisciplinary intervention with aftercare (MD):</b> 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</p> <p><b>Aerobic exercise (AE):</b> 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</p> <p><b>CAU:</b> N: 48 A: 42.9 (11.0) G: 1 male, 47 females H: Fibromyalgia</p>	<p><b>MD:</b> 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: - Socioterapy 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)</p>
Vibe Fersum et al. 2013 <sup>26</sup> Norway (Europe)	Randomized controlled trial	<p><b>Classification-based cognitive functional therapy (CB-CFT):</b> N: 51 A: 41.0 (10.3) G: 24 males, 27 females H: Non-specific chronic low back pain</p> <p><b>Manual therapy and exercise (MT-EX):</b> N: 43 A: 42.9 (12.5) G: 22 males, 21 females H: Non-specific chronic low back pain</p>	<p><b>CB-CFT:</b> 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</p>

Description control intervention	Cognitions and perceptions	Follow-up	Risk of bias	Results
<p><b>AE:</b>  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</p> <p><b>CAU:</b>  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)</p>	<p>- Perceived health (Visual Analogue Scale)</p>	<p>18 months</p>	<p>Moderate</p>	<p>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 (<math>p &lt; .05</math>). 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.</p> <p>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 (<math>p &lt; .001</math>). 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.</p> <p>Contractual hours paid work did not change for the AE group or the MD group.</p>
<p><b>MT-EX:</b>  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)</p>	<p>- Fear-avoidance beliefs (Fear-Avoidance Beliefs Questionnaire)</p>	<p>3, 12 months</p>	<p>Moderate</p>	<p>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 (<math>p &lt; .001</math>). 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 (<math>p &lt; .001</math>). No information on significant within-group difference is provided.</p> <p>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.</p> <p>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 (<math>p &lt; .01</math>), 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.</p>

**Table 1.** Continued

<b>First author, year, country</b>	<b>Study design</b>	<b>Population</b>	<b>Description intervention</b>
Volker et al. 2017 <sup>39</sup> The Netherlands (Europe)	Cohort study	N: 165 A: 44.1 (12.9) G: 22 males, 143 females H: Chronic musculoskeletal pain	<b>Standardized multidisciplinary team care intervention:</b> 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 <sup>16</sup> Norway (Europe)	Randomized controlled trial	<b>Brief psychotherapy (Brief-PsT):</b> N: 141 A: 40.3 (10.9) G: 45 males, 96 females H: Common mental complaints  <b>Short-term psychotherapy (Short-PsT)</b> N: 143 A: 42.9 (10.4) G: 52 males, 91 females H: Common mental complaints	<b>Brief-PsT:</b> 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

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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 $\geq 25$ hours a week increased ( $p < .05$ ).
<p><b>Short-PsT:</b> 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.</p> <p>- 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</p> <p>- Reducing symptoms and problematic behaviour and improvement of home situation, with deeper focus on cognitive maladaptive coping strategies or dynamic repetitions</p>	- 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 <sup>21</sup>	1	0	1	0	0	0	1	1	0	1	1	0	1	7/13	Moderate
Arends et al. 2014 <sup>27</sup>	1	1	0	1	0	1	1	1	1	1	1	0	1	10/13	Moderate
Fauser et al. 2019 <sup>17</sup>	1	1	1	0	0	0	1	0	1	1	1	1	1	9/13	Moderate
Granviken et al. 2015 <sup>22</sup>	1	1	0	0	0	1	1	1	1	1	1	1	1	10/13	Moderate
Hampel et al. 2019 <sup>12</sup>	1	1	1	0	0	0	1	1	0	1	0	1	1	8/13	Moderate
Harris. et al. 2017 <sup>23</sup>	1	1	0	0	0	0	1	0	1	1	1	1	1	8/13	Moderate
Hees et al. 2013 <sup>13</sup>	1	1	1	0	0	1	1	1	1	1	1	1	1	11/13	Low
Hutting et al. 2015 <sup>14</sup>	1	1	1	0	0	0	0	0	1	1	0	1	1	7/13	Moderate
Marchand et al. 2015 <sup>24</sup>	1	1	1	0	0	1	0	1	1	1	1	1	1	10/13	Moderate
Muschalla et al. 2016 <sup>15</sup>	0	0	1	0	0	0	1	1	0	1	1	1	1	7/13	Moderate
Pedersen et al. 2015 <sup>18</sup>	1	1	0	0	0	1	0	1	1	1	1	1	1	9/13	Moderate
Rolving et al. 2015 <sup>20</sup>	1	1	0	0	0	0	1	0	1	1	1	1	1	8/13	Moderate
Ronzi et al. 2017 <sup>25</sup>	1	1	0	0	0	0	1	0	1	1	1	1	1	8/13	Moderate
Van Eijk-Hustings et al. 2013 <sup>19</sup>	1	1	0	1	0	0	1	1	1	1	1	1	1	10/13	Moderate
Vibe Fersum et al. 2013 <sup>26</sup>	1	1	0	0	0	1	1	1	1	1	1	0	1	9/13	Moderate
Wormgoor et al. 2020 <sup>16</sup>	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 <sup>35</sup>	1	1	1	1	1	1	1	0	1	X	1	10/11	Low
Asih et al. 2015 <sup>40</sup>	1	1	1	0	0	0	1	1	0	0	1	6/11	Moderate
Chu et al. 2015 <sup>28</sup>	1	1	1	1	1	0	1	1	0	0	1	8/11	Moderate
Gagnon et al. 2013 <sup>36</sup>	1	1	1	0	0	0	1	0	0	0	1	5/11	High
Haiduk et al. 2017 <sup>32</sup>	1	1	1	0	0	0	1	1	0	1	1	7/11	Moderate
Pietilä-Holmner et al. 2020 <sup>33</sup>	1	1	1	1	1	0	1	1	0	0	1	8/11	Moderate
Salzwedel et al. 2020 <sup>31</sup>	1	1	1	1	1	0	0	1	1	1	1	9/11	Low
Sullivan et al. 2017 <sup>38</sup>	1	1	1	1	1	1	1	0	0	1	1	9/11	Low
Volker et al. 2017 <sup>39</sup>	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 <sup>34</sup>	1	1	1	0	1	0	1	1	1	7/9	Moderate
Jensen 2013 <sup>29</sup>	1	1	0	1	1	1	1	1	1	8/9	Low
Leensen et al. 2017 <sup>30</sup>	1	1	1	0	1	0	1	1	1	7/9	Moderate
Scott et al. 2014 <sup>37</sup>	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