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REVIEW ARTICLE

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Effectiveness and characteristics of interventions to improve work participation in adults with chronic physical conditions: a systematic review

Joan A. C. Verhoef[a,b], Marjolijn I. Bal[a,b], Pepijn D. D. M. Roelofs[a], Jeroen A. J. Borghouts[c], Marij E. Roebroeck[b,d] and Harald S. Miedema[a]

[a]Research Centre Innovations in Care, Rotterdam University of Applied Sciences, Rotterdam, The Netherlands; [b]Department of Rehabilitation Medicine, Erasmus University Medical Center, Rotterdam, The Netherlands; [c]Research Centre Caring Society, Avans University of Applied Sciences, Breda, The Netherlands; [d]Rijndam Rehabilitation Institute, Rotterdam, The Netherlands

ABSTRACT

Purpose: Chronic physical conditions often negatively affect work participation. The objective of this systematic review is to investigate the effectiveness and characteristics of vocational rehabilitation interventions for people with a chronic physical condition.

Methods: Searches in five databases up to April 2020 identified 30 studies meeting our inclusion criteria. Two reviewers independently assessed and extracted data. The Grading of Recommendation, Assessment, Development and Evaluation (GRADE) framework was used to evaluate quality of evidence for three outcome measures related to work participation.

Results: All vocational rehabilitation interventions consisted of multiple components, but their characteristics varied widely. Analysis of 22 trials yielded a moderate positive effect with moderate certainty of interventions on work status; analysis of five trials with low risk of bias showed a large positive effect with moderate certainty (risk ratio 1.33 and 1.57, respectively). In addition, in eight studies we found a moderate to small positive effect with low certainty on work attitude (standardized mean difference = 0.59 or 0.38, respectively). We found no effect on work productivity in nine studies.

Conclusion: The systematic review of the literature showed positive effects of vocational rehabilitation interventions on work status and on work attitude; we found no effect on work productivity.

➤ IMPLICATIONS FOR REHABILITATION

- In rehabilitation, addressing work participation of persons with a chronic physical condition using targeted interventions is beneficial to improve or sustain work participation, irrespective of the intervention characteristics and diagnosis.
- Interventions that include multiple components and offer individual support, whether or not combined with group sessions, are likely to be more effective in improving work participation in persons with a chronic physical condition.
- The overview of vocational interventions in this systematic review may assist healthcare professionals in making informed decisions as to which intervention to provide.
- Vocational rehabilitation, as well as studies on work participation in chronic disease, should include a long follow-up period to explore if work participation is sustainable and contributes to health and wellbeing.

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Introduction

Chronic physical conditions often result in disability, such as pain and physical limitations, and restrictions in daily activities and participation in society. Participation restrictions frequently include temporary or permanent health-related problems in work participation, such as (involuntary) part-time employment, difficulty meeting work demands (e.g. work hours, work pace), difficulty in performing work tasks, balancing work and home life, as well as dealing with sick leave, and job loss or unemployment [1–6]. Due to the increasing number of people with a chronic physical condition and their problems with employment, their work participation is a growing concern in society [1,6].

About 30% of employees with a chronic condition experiences problems with employment related to their condition [3]. Despite disease-specific differences, there are generic characteristics that can be considered common consequences of a chronic physical condition that hamper work participation, such as pain, fatigue and functional disabilities, variability of symptoms, an unpredictable course of symptoms, and long-lasting impact of consequences [3,5–8]. As a result, people with chronic physical conditions may face many similar challenges and adaptive tasks to participate in work [9]. In addition, a systematic review found that most of the factors associated with work participation of workers with a chronic physical condition are independent of the diagnosis [10]. Therefore, the use of a generic approach to improve the work participation of persons with a chronic physical condition might be appropriate. However, an overview of interventions and evidence on the effectiveness of interventions to enhance work

CONTACT Joan A. C. Verhoef j.a.c.verhoef@hr.nl Research Centre Innovations in Care, Rotterdam University of Applied Sciences, P.O. Box 25035, Rotterdam, 3001 HA, The Netherlands

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participation of people with chronic physical conditions, irrespective of diagnosis, is lacking.

The current systematic review investigates the effectiveness and characteristics of vocational rehabilitation interventions for people with a chronic physical condition. For this study, chronic back pain was excluded because vocational interventions for patients with chronic back pain have been systematically reviewed and published [11–14].

Methods

A systematic review of the literature was performed: such reviews seek to systematically search for, appraise and synthesize research evidence [15]. This type of review allows to explore the effectiveness and intervention characteristics. The study protocol was not registered and has not previously been published.

Search strategy

A systematic extensive electronic search was conducted in the databases MEDLINE, CINAHL, Cochrane controlled trials register, Embase and PsycINFO up to April 2020. The search strategy was developed based on literature [16,17], group discussions among the authors, and preliminary searches to inform the strategy. The final search strategy employed variations and Boolean connections (AND, OR, NOT) of MeSH terms, subject headings and keywords related to chronic physical conditions, vocational rehabilitation, and work participation. In addition, we used the search strategy for randomized controlled trials and controlled clinical trials as recommended by the Cochrane collaboration [18]. The search strategy was adapted according to the particular database, using database thesauruses to identify relevant variations of these terms. The search strategy used in Medline is presented in Box 1. In addition, the reference lists of the identified original papers were checked for additional relevant studies.

Box 1. Search strategy (Medline)
(((((Clinical trial[pt] OR randomized[tiab] OR placebo[tiab] OR clinical trials[mh] OR randomly[tiab] OR trial[ti]) NOT (animals[mh]))) AND (program* OR training OR education OR rehabilitation OR multidisciplinary OR therapy)) AND ("Work"[Mesh] OR "Employment"[Mesh] OR "Employment, Supported"[Mesh] OR "Occupations"[Mesh] OR job OR employment OR vocation)) AND (("Chronic Disease"[Mesh] OR "Disabled Persons"[Mesh] OR chronic OR disability or disabilities) NOT (mental or mentally or psychiatric)

Study selection

Retrieved records ($n = 13{,}156$) were imported into Endnote and duplicates were removed ($n = 3465$). Inclusion criteria for this review were: (i) population: working-age adults (18–65 years) with a chronic physical condition, other than chronic back pain, lasting $\geq$ 3 months or that can be categorized as long-lasting based on disease characteristics (e.g. rheumatoid arthritis), (ii) Intervention: studies focusing on vocational rehabilitation interventions containing specific elements to improve work participation (excluding surgery, medication), (iii) Comparison: no vocational intervention (usual care, waiting list), (iv) outcome: work participation (v) original controlled trials in the English language and peer-reviewed.

Based upon title and abstract, three authors (JV, MB, PR) independently screened the articles for eligibility and excluded the studies that clearly did not meet one or more inclusion criteria ($n = 9429$). Full-text copies of all other articles ($n = 119$) were obtained and two authors (JV, MB) independently decided on the inclusion of these studies, based upon full text. At all stages of selection, disagreements in the independent decisions were resolved by discussion until consensus was reached. If both reviewers did not reach consensus, a third author was consulted (HM). The selection process and reasons for exclusion are shown in Figure 1.

Data extraction

Two reviewers (JV, MB) extracted data on study design, study sample, characteristics and content of intervention [format (individual, group, combined), approach and professionals (mono- or multidisciplinary) duration (short, moderate and long) and intensity (low and high), and focus (vocational, cognitive-behavioural or physical)], outcome measures and study results using a predesigned data extraction form. Duration of interventions was categorized as short (<10 weeks), moderate (10–16 weeks) or long (>16 weeks), based on median (10 weeks) and mean (16 weeks) values of duration of interventions, and intensity as low ($\leq$40 h in total) or high (>40 h), based on mean number of hrs. The focus of interventions was characterized as vocational, cognitive-behavioural or physical, based on the functional domain that was primarily targeted to improve work participation.

Outcome measures were inductively derived from the data, namely:

1. *Work status*, reported as dichotomous outcome (yes/no) presenting the proportion of the study sample achieving return to work, employment or job maintenance;
2. *Work productivity*, reported as continuous outcome presenting work productivity (hours per week worked) or duration of sick leave;
3. *Work attitude*, reported as continuous outcome presenting scores on work readiness (action to find a job), employment activities, employability or self-efficacy at work.

Two reviewers (JV, MB) independently assigned the study outcomes to these three outcome measures. Other outcomes from the selected studies were not included in this review.

Methodological quality assessment

For each of the 30 included studies, two reviewers (JV and MB) independently assessed the methodological quality using the Effective Public Health Practice Project Quality Assessment Tool (EPHPP) for Quantitative Studies (https://merst.ca/wp-content/uploads/2018/02/quality-assessment-tool_2010.pdf). This tool assesses six domains or potential sources of Risk of Bias: (1) selection bias; (2) study design; (3) confounders; (4) blinding; (5) data collection method; and (6) withdrawals and dropouts. We decided to use the EPHPP tool rather than the Cochrane Collaboration Risk of Bias Tool, because the EPHPP tool was developed for use with various intervention study designs (not only randomized controlled trials), which we intended to include. The scoring of the EPHPP is based on objective guidelines [19]. Consistent with the EPHPP Quality assessment tool dictionary, each domain was rated as strong, moderate or weak and the methodological quality of the study was rated as strong when no domain was rated as weak, moderate if one domain was rated as weak, and low if two or more domains were rated as weak. Any disagreement about the methodological quality was resolved by discussion until consensus was reached.

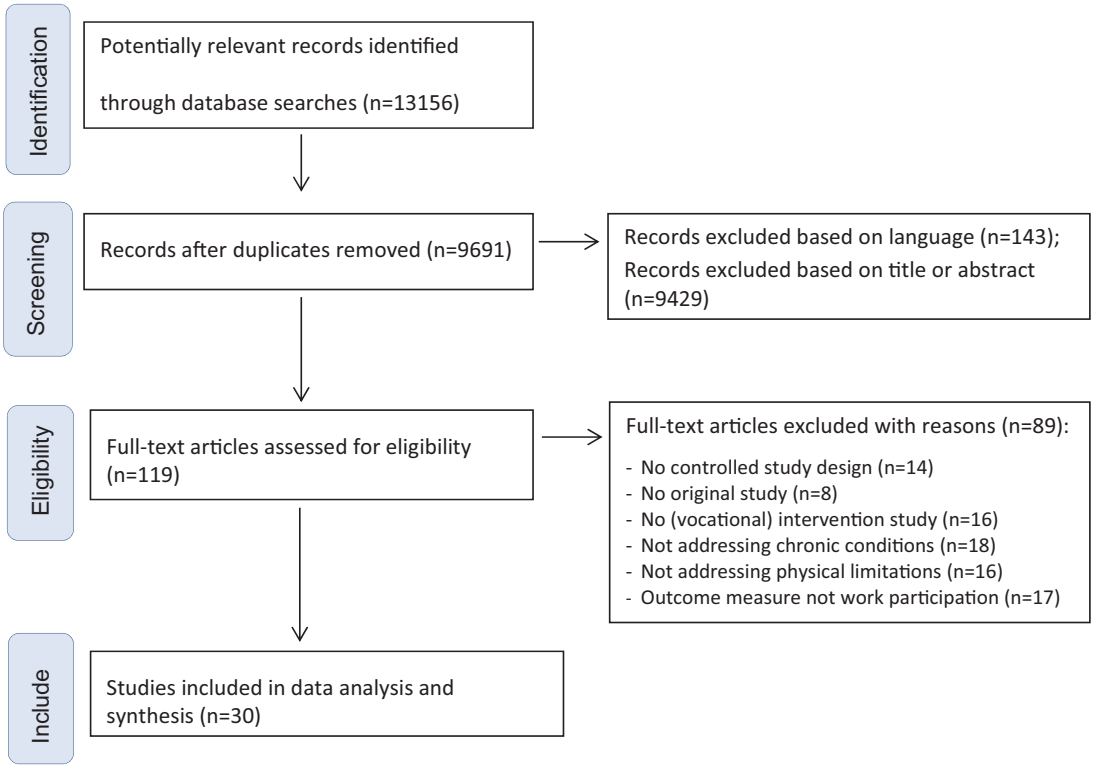

Figure 1. Flowchart of identification and selection of studies.

Table 1. Methodological quality rating of the included studies using the Effective Public Health Practice Project Quality Assessment Tool.

Study	Selection bias	Study design (Allocation bias)	Confounders	Blinding (detection bias)	Data collection methods	Withdrawals and drop-outs (attrition bias)	Rating
Hutting et al. [22]	M	S	S	M	S	M	Strong
Li et al. [40]	M	S	S	S	S	S	Strong
Li-Tsang et al. [41]	S	S	S	S	S	S	Strong
Marhold et al. [43]	S	S	S	M	S	S	Strong
Meyer et al. [54]	S	S	S	S	M	S	Strong
Ntsiea et al. [46]	S	S	S	M	S	S	Strong
Sullivan et al. [50]	M	M	S	M	M	S	Strong
Trexler et al. [51]	M	S	S	M	S	S	Strong
Allaire et al. [30]	W	S	S	M	M	M	Moderate
Cheng and Hung [33]	W	S	S	M	M	S	Moderate
De Buck et al. [34]	M	S	S	M	W	S	Moderate
Ipsen et al. [38]	M	S	S	S	S	W	Moderate
Kendall and Thompson [39]	M	S	W	S	S	M	Moderate
Keysor et al. [56]	W	S	S	S	S	S	Moderate
Macedo et al. [42]	M	S	S	W	S	S	Moderate
Salazar et al. [48]	M	S	S	W	M	S	Moderate
Skouen et al. [49]	M	S	W	M	S	S	Moderate
Anderson et al. [31]	W	S	W	M	S	W	Weak
Brattberg et al. [32]	W	S	S	M	W	S	Weak
Detaille et al. [35]	W	S	S	M	W	M	Weak
Dorstyn et al. [57]	W	S	S	M	W	M	Weak
Feuerstein et al. [36]	M	M	W	M	M	W	Weak
Haffey et al. [37]	S	M	S	W	W	W	Weak
Hammond et al. [55]	W	S	W	M	M	M	Weak
Marnetoft and Selander [44]	M	M	S	M	W	W	Weak
Martin et al. [23]	W	S	S	M	W	W	Weak
Niemeijer et al. [45]	W	S	S	W	M	S	Weak
Ottomanelli et al. [47]	W	S	W	W	W	S	Weak
Van Vilsteren et al. [53]	W	S	S	W	S	S	Weak
Varekamp et al. [52]	W	S	M	M	W	M	Weak

S: Strong; M: Moderate; W: Weak. Rating: Strong (no WEAK rating), Moderate (one WEAK rating), WEAK (two or more WEAK ratings).

Data analysis and synthesis

A mixture of strategies was used for data analysis to accommodate the variety of interventions and studies.

First, the content and characteristics of interventions were described based on data-extraction.

Second, we explored effectiveness of interventions for each outcome measure separately. The estimated effects of all studies for each outcome were first visually displayed in forest plots using Review Manager (software version 5.3) [18,20]. A random effects model was applied to take into account the possible statistical heterogeneity of the studies. For the dichotomous outcome work status, the risk ratio (RR) was used to compare effect sizes [18,21]. For the continuous outcomes work productivity and work attitude the standardized mean difference (SMD) was used, since measurement scales differed across studies [21]. Data obtained at 12 months (52 weeks) follow-up were used for the analyses. Otherwise, the duration of follow-up in weeks was added to the study reference (for example: Macedo et al. 2009_26). In the case of missing data, authors were contacted to request additional information [22]. Studies lacking standard deviations (SD) of mean scores were not included in the forest plots [23].

Third, statistical pooling (meta-analysis) of the outcome measures work status, work productivity and work attitude was performed, for all studies that reported one (or more) of these specific outcome measures, as well as the subset of studies of which the methodological quality was rated as high. Statistical heterogeneity was assessed with Chi^2 and I^2 statistics. The effect size of the dichotomous outcome measure work status was interpreted as high, when the RR was $\leq$0.50 or $\geq$1.50 and as moderate with an RR $>$0.50 but $\leq$0.75 or $<$1.50 but $\geq$1.25. Interpretation of the effect size of continuous outcome measures with SMD was based on Cohen's method [24]: small when SMD $>$0.20 (but $<$0.50), moderate when SMD $\geq$0.50 (but $<$0.80) and large when SMD $\geq$0.80.

Finally, we assessed the overall quality of the evidence for each outcome measure using the Grades of Recommendation, Assessment, Development and Evaluation Working Group (GRADE) approach [18,25–28]. Evidence of randomized controlled trials was rated as high, but could be rated down by one level (into moderate) or by two or three levels (to low or very low quality), with respect to each of five factors: (1) risk of bias: outcome of EPHPP-tool moderate or weak; (2) inconsistency: variability or heterogeneity in magnitude of effect among studies; (3) indirectness of evidence: indirect comparison of interventions within studies; (4) imprecision of results: for dichotomous outcomes full confidence intervals (CI) below 0.75 or above 1.25 or a number of participants of $\geq$300; for continuous outcomes full CI below or above the level of a predefined minimal important difference or number of participants $\geq$400; (5) likeliness of publication bias: underestimation or overestimation of effect due to selective publication of studies. Publication bias was checked by constructing a funnel plot [29].

Results

Study characteristics

A total of 30 studies met our inclusion criteria for this systematic review [22,23,30–57] (see Figure 1). These studies addressed work participation in patients with various chronic physical conditions, such as musculoskeletal disorders and/or musculoskeletal pain ($n = 13$), rheumatic diseases ($n = 6$), traumatic brain injury ($n = 5$), mixed population of various chronic physical diseases ($n = 3$), spinal cord injury ($n = 2$) and human immunodeficiency virus (HIV) ($n = 1$).

Studies were published between 1991 and 2020 and conducted in various countries: the USA ($n = 10$), the Netherlands ($n = 5$), Hong Kong ($n = 3$), Sweden ($n = 3$), Norway ($n = 2$), United Kingdom ($n = 2$), Australia ($n = 1$), Canada ($n = 1$), New Zealand ($n = 1$), South Africa ($n = 1$) and Switzerland ($n = 1$).

Methodological quality of the included studies

The results of the methodological quality assessment are presented in Table 1: 8 studies were rated as high quality, 9 studies as moderate quality and 13 studies as low quality.

Characteristics and content of interventions

An overview of the characteristics of the included studies and interventions is presented in Table 2. With regard to intervention format, 11 of 30 interventions (37%) combined a group program and individual treatment, 13 interventions (43%) only offered individual treatment and 6 interventions (20%) only provided a group program (Tables 2 and 3).

Fifteen interventions (50%) applied a monodisciplinary approach and 15 interventions (50%) a multidisciplinary approach. In ten of the 15 multidisciplinary interventions (67%), the team consisted of healthcare professionals only (for example: physician, physiotherapist, occupational therapist, psychologist); four interventions (27%) included also vocational professionals, such as a vocational counsellor or job coach. One team consisted of vocational professionals only. Fourteen interventions (47%) had a short duration, lasting $<$10 weeks; five (17%) with a high intensity ($>$40 h in total) and nine (30%) with a low intensity. Eight interventions (27%) had a moderate duration of 10–16 weeks, two (7%) with a high and six (20%) with a low intensity. Another eight interventions (27%) had a long duration, lasting $\geq$16 weeks, all with a low intensity.

All 30 interventions consisted of multiple treatment components, with a focus on vocational, (cognitive-)behavioural or physical functioning. Interventions primarily targeting vocational functioning to improve work participation ($n = 16$; 53%), included job searching, job interview skills, specific work training, job placement, vocational counselling, or work place visits. Interventions primarily targeting (cognitive-) behavioural change ($n = 9$; 30%), included coping strategies, problem solving, goal setting, cognitive skills, communication skills, stress management or empowerment. Interventions targeting physical functioning to improve work participation ($n = 5$; 17%), included exercise training, skills training, graded activity or work hardening.

Effectiveness of interventions on work participation

A summary of the effectiveness and characteristics of interventions, related to the three outcome measures, is presented in Table 3. Twenty-two studies addressed one of the three outcome measures of work participation, seven studies addressed two, and one study addressed all three outcomes. In total, the 30 studies addressed 39 outcomes.

Below we describe the effectiveness for each of the three outcomes; these results are visualized in Figures 2–4.

Effects on work status ($n = 22$)

Twenty-two studies measured the dichotomous difference in work status, such as return to work; (competitive, paid) employment,

Table 2. Characteristics of the included studies and interventions.

	Study characteristics				Intervention characteristics				
	Method				Delivery characteristics			Intervention content	
Study	Participants (*n*, diagnosis)	Outcome	Control	Results at 12 months follow-up (unless otherwise noted)	Format	Approach	Duration/frequency	Focus	Program description
Allaire et al. [30]	*N* = 242; Rheumatic disease	Work status (job loss)	Printed materials only	No significant differences in % of persons with job loss between IG and CG	I	Monodisciplinary	Two 1.5-h sessions within 5 months (total 3 h)	V	Job retention vocational rehabilitation intervention, addressing job accommodation (work barriers and solutions), vocational counselling and guidance
Anderson et al. [31]	*N* = 52; Chronic pain	Work status (RTW)	Usual care	No significant differences between groups	GI	Monodisciplinary	Multimodal training (UC) followed by 18x training group during 1.5 years (total ± 27 h)	P	Multimodal treatment for 4 weeks (UC) followed by training group based on Psychomotor Physiotherapy (NPMP), emphasizing functional movements, relaxation and incorporating cognitive behavioral therapy
Brattberg et al. [32]	*N* = 60; Chronic pain and/or burn-out	Work status; Work productivity (h/wk worked)	Waiting list	Significantly more persons in IG than in CG had improved work status. Significant group differences in work capacity.	G	Monodisciplinary	20 weeks with weekly sessions (total ± 20 h)	CB	Pain workshop internet course, addressing obstacles to change, expectations and disappointments, self-knowledge, self-destructive behavior, setting limits, stress management, strengths and weaknesses
Cheng and Hung [33]	*N* = 94; MSD	Work status (RTW)	Usual care	Significant higher RTW rate in IG than in CG after 4 weeks.	I	Monodisciplinary	4 weeks, 3 sessions/ week (total ± 12 h)	P	Workplace-based work hardening training. Job-specific activities, ergonomic education
De Buck et al. [34]	*N* = 140; Rheumatic disease	Work status (job loss)	Usual care	No difference between groups in proportion of patients with job loss	I	Multidisciplinary	At least 2 visits in 4–12 weeks (total ± 3 h)	V	Multidisciplinary job-retention vocational rehabilitation using counselling and guidance, addressing identification of resources for adapting work environment, promotion of work self-efficacy
Detaille et al. [35]	*N* = 104; Chronic somatic disease	Work attitude	Usual care	No differences in self-efficacy and self-management after 8 months	G	Monodisciplinary	6 weeks with weekly 2.5-h sessions (total 15 h)	CB	Self-management program for workers with a chronic somatic disease, addressing skill mastery and goal setting, coping, positive reframing,

(*continued*)

Table 2. Continued.

Study characteristics					Intervention characteristics				
	Method				Delivery characteristics			Intervention content	
Study	Participants (*n*, diagnosis)	Outcome	Control	Results at 12 months follow-up (unless otherwise noted)	Format	Approach	Duration/frequency	Focus	Program description
									communication, work situation
Dorstyn et al. [57]	*N* = 48; Spinal cord injury	Work attitude	Waiting list	No differences in job search self-efficacy after 4 weeks.	I	Multidisciplinary	4 weeks (online information, with weekly emails)	V	Online information package, involving six stand-alone learning modules which provided job-searching and career-planning information through text, videos, and interactive activities
Feuerstein et al. [36]	*N* = 34; MSD	Work status (RTW)	Usual care	Significantly more persons in IG than CG returned to work or were in vocational training after average of 17 months	GI	Multidisciplinary	4–6 weeks, daily 4-h sessions (total ± 120 h)	P	Multidisciplinary work re-entry rehabilitation program including warming-up, physical conditioning, work conditioning/simulation, job-related pain and stress management and ergonomic consultation
Haffey et al. [37]	*N* = 199; Traumatic brain injury	Work status (RTW)	Usual care	Differences were not tested. After 12 months 68% of IG and 34% of CG had paid employment	I	Multidisciplinary	3 months on average (total ± 60 h of staff assistance)	V	Work re-entry program, including vocational assessment, work hardening, job development, job analysis, job placement, transitional employment program, support and long-term follow-up
Hammond et al. [55]	*N* = 55; rheumatoid arthritis	Work status (job loss); Work productivity (sickness absence)	Written information	No significant differences between IG and CG after 9 months. The findings indicate VR may reduce risk of job loss and improve productivity.	I	Monodisciplinary	On average 4 h in 2–4 months	V	Vocational rehabilitation, starting with structured work interview and assessment of work barriers, followed by individualised programme including self-management at work, activity diaries, job accommodations. Also, written self-help information was provided
Hutting et al. [22]	*N* = 123; Chronic non-specific CANS	Work productivity; work attitude	Usual care	No differences between IG and CG	G	Monodisciplinary	6 weeks with weekly 2.5-h group session (total 15 h)	CB	Self-management group program, combined with an eHealth module, for employees with chronic CANS, addressing self-management themes and specific CANS-related themes

(*continued*)

Table 2. Continued.

Study characteristics					Intervention characteristics				
	Method				Delivery characteristics			Intervention content	
Study	Participants (*n*, diagnosis)	Outcome	Control	Results at 12 months follow-up (unless otherwise noted)	Format	Approach	Duration/frequency	Focus	Program description
Ipsen et al. [38]	*N* = 297; Chronic condition	Work status (Employment)	(not described)	No differences in employment rate between groups	G	Monodisciplinary	10 weeks, weekly 2-h sessions (total 20 h)	CB	Working well program, focusing on life values, goal setting, problem solving, pathway planning, healthy reactions, advocacy, stress management, physical activity, nutrition, and maintenance
Kendall and Thompson [39]	*N* = 183; Chronic pain	Work status	Waiting list	Differences were not tested. After 15 months, 28.4% of IG and 9.8% of CG returned to work	G	Multidisciplinary	6 weeks, 12 half-day sessions (total 48 h)	CB	Cognitive-behavioral pain-management program, focusing on self-management and increased participation in productive activity, addressing pain management, problem solving, stress management
Keysor et al. [56]	*N* = 287; MSD and rheumatic conditions	Work status (job loss); Work productivity	Written information	Significant fewer persons with permanent job loss in IG compared to CG after 2 years ($p = 0.03$). No significant difference in WLQ scores between IG and CG after 12 months	I	Monodisciplinary	A 1.5-h meeting with therapist, 2 phone calls at 3 and 12 weeks	V	Work disability prevention program consisting of a 1.5 h meeting, including assessment of work barriers, suggestion of solutions, action plan, written materials; and phone calls after 3 and 12 weeks addressing progress
Li et al. [40]	*N* = 64; MSD	Work attitude (work readiness)	Waiting list	Significant improvement in work readiness in IG compared with CG after 3 weeks	GI	Multidisciplinary	3 weeks with daily group sessions 2–3 h, 3 individual sessions of 1 h (total ± 40 h)	CB	Training on work readiness using cognitive behavioral approach, addressing pain and stress management, decisional balance and self-efficacy, coping strategies, re-employment training
Li-Tsang et al. [41]	*N* = 63; MSD	Work status (RTW); Work productivity; Work attitude	Usual care	Significant higher RTW rate in IG than CG and significant differences in work readiness after 3 weeks. No differences in	GI	Monodisciplinary	3 weeks with 4 1-h individual sessions + 5 group sessions (total ± 14 h)	V	Job Placement and Support Program, including role play, case-management, structured job searching and preparation

(*continued*)

Table 2. Continued.

Study characteristics					Intervention characteristics				
	Method				Delivery characteristics			Intervention content	
Study	Participants (*n*, diagnosis)	Outcome	Control	Results at 12 months follow-up (unless otherwise noted)	Format	Approach	Duration/frequency	Focus	Program description
				hours worked (WP) between groups					
Macedo et al. [42]	*N* = 32; Rheumatoid Arthritis	Work productivity	Usual care	No differences for work days missed. RA WIS significantly improved in IG compared to CG at 6 months	I	Monodisciplinary	6 months, with 6–8 sessions of 0.5–2 h (total 3–16 h)	V	Comprehensive occupational therapy, including assessments (work, functional and psychosocial), ergonomic review; stress management; assertiveness, self-advocacy, activities of daily living, work visits
Marhold et al. [43]	*N* = 72; Chronic pain	Work productivity (No of days on sick leave)	Usual care	No differences between groups, after 6 months	GI	Monodisciplinary	12 weeks, with weekly 2.5-h sessions and 2 booster sessions (total 35 h)	CB	Cognitive behavioral return-to-work program addressing pain coping, goal setting, graded activity, pacing of activities, relaxation, cognitive techniques, stress management, problem solving
Marnetoft and Selander [44]	*N* = 47; MSD	Work status (level of benefit)	Usual care	Significantly more persons in IG than CG had lower level of benefits	GI	Multidisciplinary	8-17 weeks; 4 weeks daily 6-h sessions, followed by 4-13 weeks individual work training (total >120 h)	V	Extended multidisciplinary vocational rehabilitation program, including work training with case management addressing identifying problems, strengthen resources and self-confidence
Martin et al. [23]	*N* = 174; HIV/AIDS	Work attitude	Single session	No differences between IG and CG	GI	Multidisciplinary	7 weeks; 13 2-h sessions + 3 1-h individual sessions (total 29 h)	V	Mixed (group–individual) modality intervention that incorporated elements of motivational Interviewing, skills building, job-related skills
Meyer et al. [54]	*N* = 33; Chronic pain	Work status	Treatment by a physician	No differences between IG and CG after 32 weeks	GI	Multidisciplinary	8 weeks, daily sessions 3.5 h (5/ weeks) (total 140 h)	V	Work rehabilitation program using an operant behavioral therapy approach, including education in ergonomics, learning strategies to cope with pain and to increase self-efficacy, workplace visit
Niemeijer et al. [45]	*N* = 71; Acquired brain injury	Work status; Work attitude	Waiting list	No differences in employment rate between IG and	G	Monodisciplinary	10 weeks, 20 sessions (total ± 20 h)	CB	Vocational Transitions Program, addressing overcoming obstacles, goal-setting, strategies

(*continued*)

Table 2. Continued.

Study characteristics					Intervention characteristics				
	Method				Delivery characteristics			Intervention content	
Study	Participants (*n*, diagnosis)	Outcome	Control	Results at 12 months follow-up (unless otherwise noted)	Format	Approach	Duration/frequency	Focus	Program description
				CG after 6 months or in employability					for improving memory for work and daily living, self-awareness, stress management, problem-solving
Ntsiea et al. [46]	$N = 80$; Stroke	Work status (RTW)	Usual care	Significant higher RTW rate in IG than in CG after 6 months	I	Multidisciplinary	6 weeks, weekly 1–h session and 1 4-h work skill assessment (total: 9 h)	V	Workplace intervention program tailored to functional ability and workplace challenges, performed at the patients' place of work and including interview with patient and employer separately to establish perceived barriers and enablers of RTW
Ottomanelli et al. [47]	$N = 201$; Spinal Cord Injury (SCI)	Work status; Work productivity	Usual care	Significantly higher employment rate in IG than in CG; persons in IG worked significantly more h/week	I	Monodisciplinary	SE services were provided during 1 year (mean 36 h)	V	SCI Vocational Integration, based on Supported Employment, including integrated vocational rehabilitation, job finding, competitive employment, ongoing job support, focus on participant preferences
Salazar et al. [48]	$N = 120$; Traumatic brain injury (TBI)	Work status (RTW)	Home rehab.	No differences between IG and CG in return to employment	GI	Multidisciplinary	8 weeks, daily program (group and individual therapies) (total ± 160 h)	V	Intensive, standardized, 8-week in-hospital cognitive rehabilitation program. Group therapies addressed planning and organization, cognitive skills, pragmatic speech, psychotherapy and community reentry. Placement in various (military) work settings
Skouen et al. [49]	$N = 215$; Chronic pain	Work status (RTW)	Usual care	Differences between IG and CG for total group were not tested; significantly fewer sick days for women in extensive program	GI	Multidisciplinary	4 weeks, 6-h daily program (5 days/ week) (total 120 h)	P	Extensive multidisciplinary treatment, addressing cognitive coping strategies, body awareness training, occasional workplace intervention, lifestyle
Sullivan et al. [50]	$N = 130$; Chronic pain	Work status (RTW)	Physical therapy	Significantly more participants in IG than CG had	I	Multidisciplinary	Max. 10 weeks, weekly 1-h sessions (total 10 h)	P	Progressive Goal Attainment Program (PGAP) using cognitive techniques and physical therapy,

(*continued*)

Table 2. Continued.

Study characteristics					Intervention characteristics				
	Method				Delivery characteristics			Intervention content	
Study	Participants (*n*, diagnosis)	Outcome	Control	Results at 12 months follow-up (unless otherwise noted)	Format	Approach	Duration/frequency	Focus	Program description
				returned to work after 4 weeks					maximizing activity involvement through activity monitoring, activity prescription, and graded activity participation
Trexler et al. [51]	$N = 44$; Acquired brain injury	Work status (RTW)	Usual care	Significant more persons in IG than CG returned to competitive work, school or volunteering after 15 months	I	Multidisciplinary	15 months (individual needs, with mean 10.6 h, median 8.0 h)	V	Resource facilitation services, addressing patient and family education on brain injury, facilitation of community resources, vocational case coordination; also including outpatient rehabilitation therapies and neuropsychological services
Varekamp et al. [52]	$N = 122$; Chronic physical disease	Work status; Work attitude (self-efficacy)	Usual care	No differences in job maintenance or self-efficacy at work between IG than in CG	GI	Monodisciplinary	20 weeks, 7 3-h group sessions + 3 individual sessions (total 24 h)	CB	Job maintenance training program focusing on work related problems from an empowerment perspective, aiming to enhance knowledge, self-awareness and skills in order to help participants solve problems at work
Van Vilsteren et al. [53]	$N = 150$; Rheumatoid arthritis	Work productivity	Usual care	No effect on work instability or at-work productivity loss was found between IG and CG after 6 months	I	Multidisciplinary	12 weeks (individual needs; estimated 4–6 h in total)	V	Care for Work program: integrated care and participatory workplace intervention, based on participatory ergonomics

CANS: complaints of arm, neck and/or shoulder; CB: cognitive-behavioral focus; CG: control group; GI: combined group and individual therapy; G: group therapy; HIV: human immunodeficiency virus; IG: intervention group; I: individual therapy; MSD: musculoskeletal disorders; P: physical focus; RTW: return to work; Rehab: rehabilitation; V: vocational focus. (Author's name in capitals: study rated as high quality).

Table 3. Characteristics and effectiveness of the interventions.

	Number of studies ($n = 30$)	Outcome[a]			Number of studies with significant effect (HQ)[b] ($n = 12$ (5))	Number of studies with lack of effect (HQ)[b] ($n = 18$ (3))
		Work status ($n = 22$)	Work productivity ($n = 9$)	Work attitude ($n = 8$)		
Form						
Group + individual	11	8	3	4	5 (2)	6 (2)
Individual	13	10	4	1	6 (3)	7 (–)
Group	6	4	2	3	1 (–)	5 (1)
Approach						
Multidisciplinary	15	11	2	3	6 (4)	9 (1)
Monodisciplinary	15	11	7	5	6 (1)	9 (2)
Duration and intensity						
Short						
High	5	5	–	–	1 (–)	4 (1)
Low	9	4	2	6	4 (3)	5 (1)
Moderate						
High	2	2	1	-	1 (1)	1 (–)
Low	6	5	2	1	2 (1)	4 (–)
Long						
Low	8	6	4	1	4 (1)	4 (1)
Focus of program						
Vocational	16	12	6	3	6 (3)	10 (1)
Cognitive-behavioral	9	5	3	5	3 (1)	6 (2)
Physical	5	5	–	–	3 (1)	2 (–)

[a]Total number of studies based on effectiveness on one of three outcomes: $n = 39$ (work status: $n = 22$, work productivity: $n = 9$, work attitude: $n = 8$), [b]Total number of studies and number of High Quality (HQ) studies.

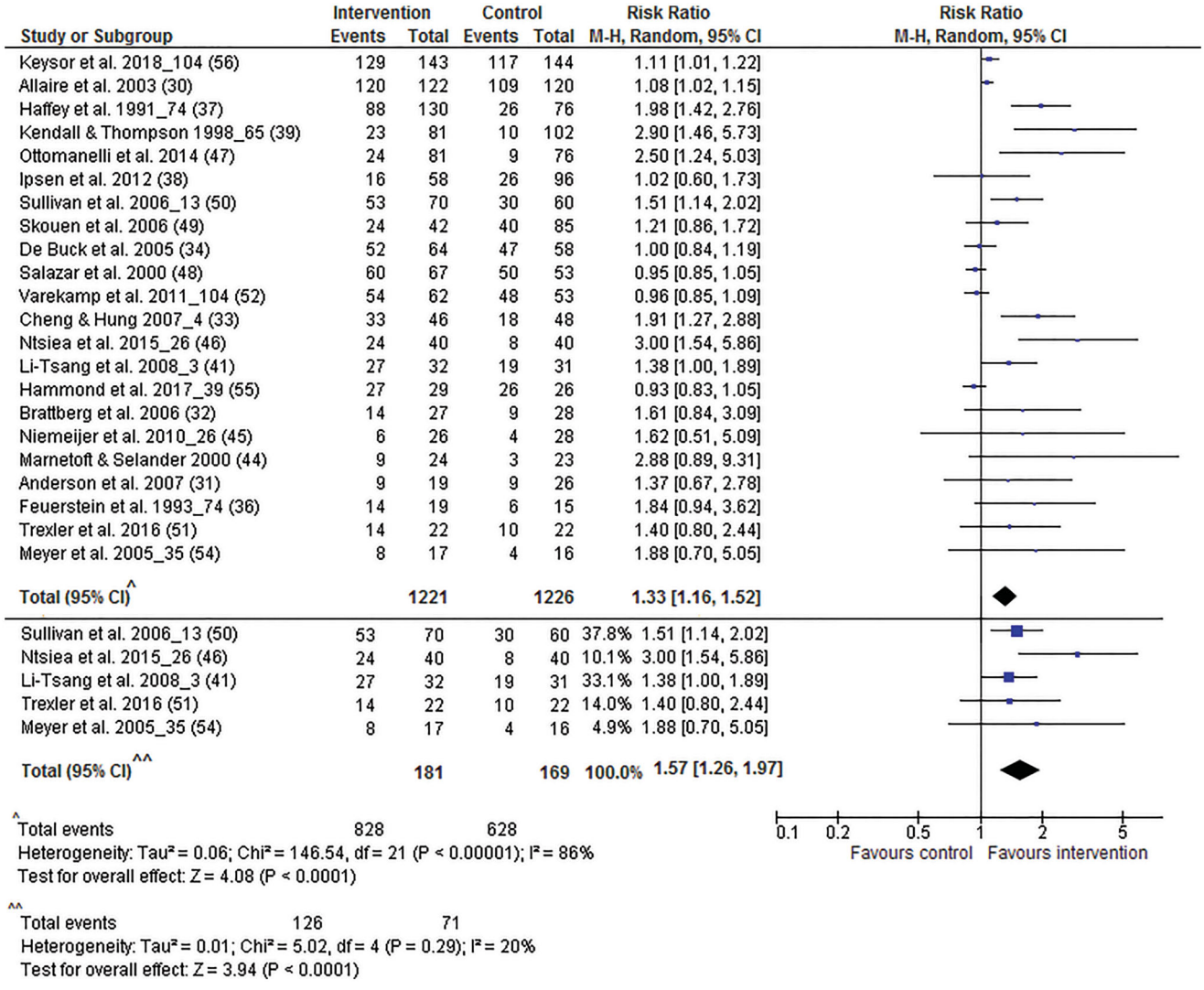

Figure 2. Effectiveness of interventions on outcome: work status in all studies and high-quality studies (ordered by sample size).

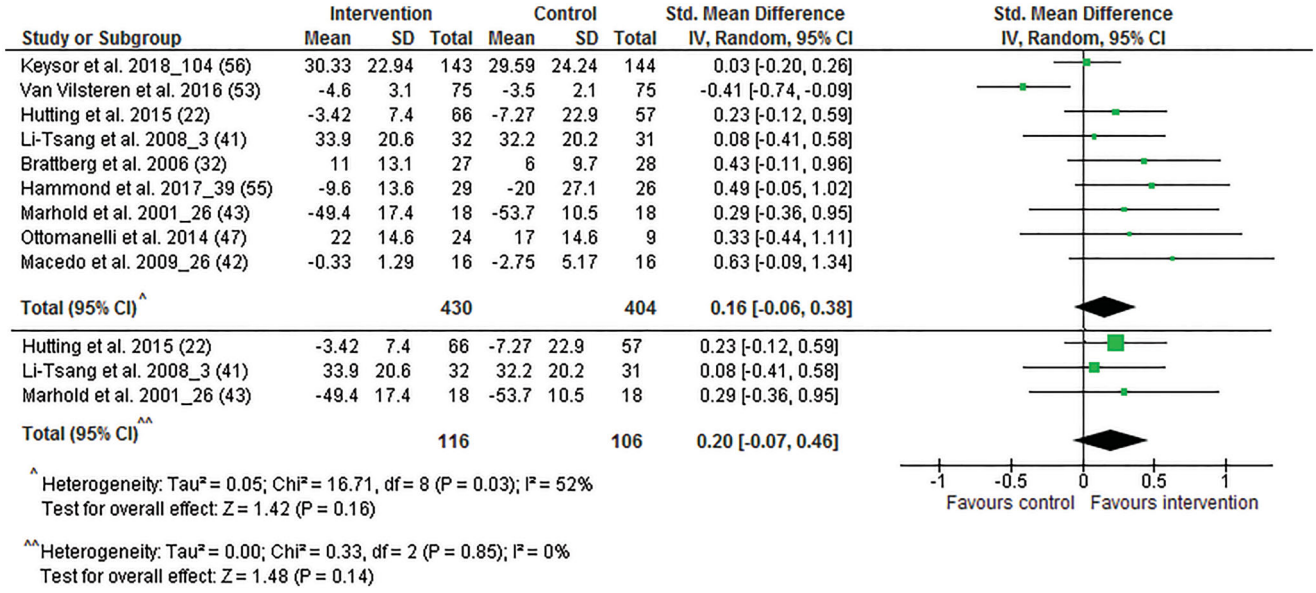

Figure 3. Effectiveness of interventions on outcome: work productivity in all studies and high-quality-studies (ordered by sample size).

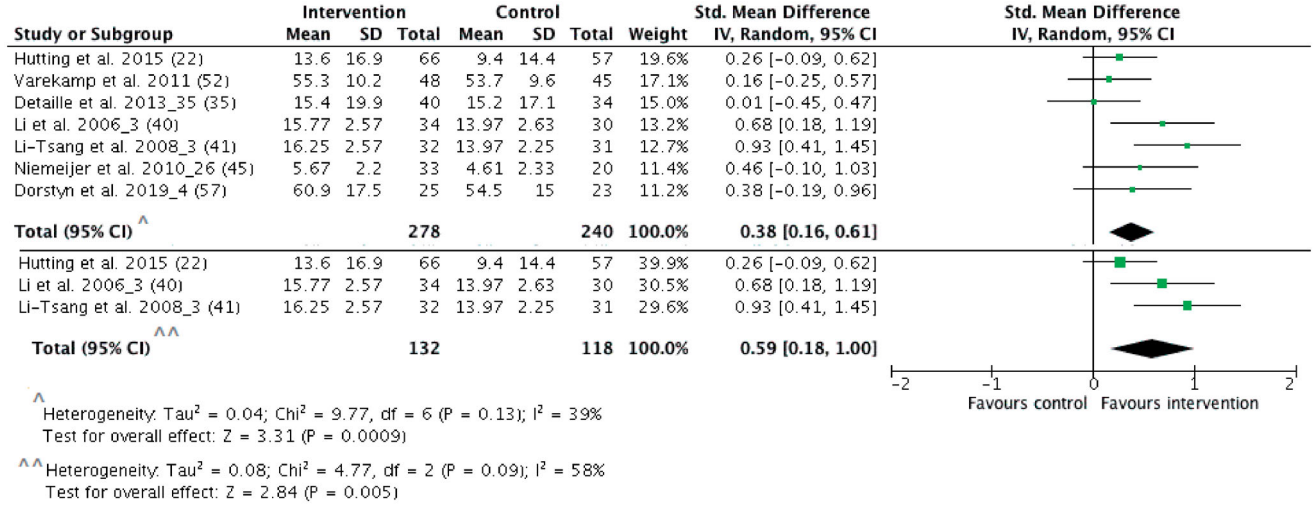

Figure 4. Effectiveness of interventions on outcome: work attitude in all studies and high-quality studies (ordered by sample size).

Table 4. Evidence profile for the outcomes work status, work productivity, work attitude.

	Quality assessment					Number of patients		
Outcome (no. of studies)	Limitation in design	Inconsistency	Indirectness	Imprecision	Publication bias	I[a]	C[b]	Quality of the evidence
Work status [22]	No serious limitation	No serious inconsistency	Indirectness	No serious imprecision	Unlikely	1221	1226	Moderate
Work productivity [9]	Limitation in design	Inconsistency	Indirectness	No serious imprecision	Unlikely	430	404	Very low
Work attitude [8]	Limitation in design	No serious inconsistency	Indirectness	No serious imprecision	Unlikely	278	240	Low

[a]Number of patients who received the intervention studied.
[b]Number of patients allocated to the control condition.

job maintenance, as outcome of the vocational rehabilitation intervention compared to the control condition (Table 3). Ten studies (45%) showed a significant difference in favour of the intervention and another 7 (32%) a positive trend. The methodological quality of five studies (23%) was high, the quality of the other seventeen studies was judged as moderate or low.

The result of the meta-analysis of all studies including evaluation of the quality of the evidence are summarized in Table 4 and presented in Figure 2. When considering all twenty-two studies in the meta-analysis, we found evidence for a moderate effect of vocational rehabilitation interventions on work participation (RR 1.33; 95% CI 1.16–1.53). Rating down for indirectness was necessary, because there was considerable variation with regard to the content of the vocational intervention and the targeted patient populations. Although the lower border of the confidence interval was lower than 1.25 we did not rate down for

imprecision, because the number of participants was very high. This means that we are moderately confident about this effect.

The result of the meta-analysis of five studies with high quality and low risk of bias is presented in Figure 2. It shows a large positive effect of vocational rehabilitation interventions on work participation (350 participants; RR 1.57; 95% CI 1.26–1.97). Only rating down of one level for indirectness was necessary.

Effects on work productivity (n = 9)

Nine studies (three of high quality), measured changes in work productivity (Figure 3; Table 3). Of these nine studies, 6 (67%) showed a positive trend in favor of the intervention, but the differences were small and not significant. The meta-analyses of all nine studies as well as the three high-quality studies yielded no significant differences (SMD 0.16 (95% CI −0.06 to 0.38), respectively, 0.20 (95% CI −0.07 to 0.47). Rating down with three levels was necessary (risk of bias/inconsistency/indirectness, see Table 4), so the certainty of these results is very low.

Effects on work attitude (n = 8)

Eight studies (three high quality) measured changes in work attitude (Figure 4; Table 3), of which two (25%) showed a significant effect in favour of the intervention and another three (38%) a positive trend. One study was not included in the meta-analysis because SDs were lacking [23]. When considering seven studies in the meta-analysis, we have evidence of an effect of small size (SMD 0.38; 95% CI 0.16-0.61) in favour of the intervention ($n = 518$). The result of the meta-analysis including evaluation of the quality of the evidence is summarized in Table 4. Rating down of two levels for risk of bias and indirectness was necessary, so we also have low certainty about this result. The result of the meta-analysis of three studies with high quality and low risk of bias is included in Figure 4 and shows an effect of moderate size (SMD 0.59; 95% CI 0.18–1.00) in favour of the intervention ($n = 250$).

Discussion

This systematic review summarizes data from 30 original studies in order to evaluate the characteristics and effectiveness of vocational rehabilitation interventions, that aim to improve work participation of persons with a chronic physical condition, other than back disorders. In contrast to the existing literature, we focused on interventions that apply a generic approach to enhance work participation of persons with a chronic physical condition, irrespective of the specific diagnosis. All interventions consisted of multiple treatment components, but varied widely regarding delivery characteristics and content.

Overall, 63–77% of the studies showed a positive trend on work participation, but only 25–45% of the studies showed a significant effect on work participation. Effectiveness of interventions was explored for three outcome measures of work participation: work status, work productivity and work attitude. After analyzing five trials with low risk of bias, we conclude with moderate certainty that there is a large positive effect of vocational rehabilitation interventions on work status. Analysis of both low and high quality trials ($n = 22$) yielded a moderate positive effect with low certainty (RR 1.33). We conclude with low to very low certainty that vocational rehabilitation interventions also have a moderate positive effect on work attitude (SMD = 0.59 or 0.39, respectively). We found no positive effects of vocational rehabilitation interventions on work productivity, although the certainty of this conclusion is very low.

All interventions in this review used a multicomponent approach; this makes it difficult to determine which component is (most) effective in enhancing work participation. Interventions that include multiple components are likely to be more effective in improving work participation than interventions consisting of a single component [10]. A multicomponent approach might be preferred because work participation is a complex process, requiring a balance between personal abilities, limitations and work demands. In persons with a chronic physical condition, the complexity of the process is increased by the unpredictable course and day-to-day variability of symptoms and, as a result, fluctuating personal physical abilities, that may interfere with the current work demands [8,10,58]. In addition, persons with a chronic condition have to balance work with other daily activities and life at home to be able to maintain work participation [8].

The results of this study, indicating a positive effect of the use of targeted interventions on enhancing work participation of persons with a chronic condition, are in line with systematic reviews addressing work outcomes for people with chronic back pain and mental health problems [11–13,59,60]. For people with chronic back pain, systematic reviews found evidence for a relevant effect of multidisciplinary interventions on return to work [11,13] and a small effect of intense physical conditioning on reducing sick leave [12]. For persons with depression, adding a work-directed intervention to a clinical intervention reduced the number of days on sick leave; for individuals with severe mental illness, (augmented) supported employment was effective in obtaining and maintaining employment [59,60].

Methodological considerations

This study provides a comprehensive and broad overview of vocational rehabilitation interventions across a wide range of chronic physical conditions, in contrast to most previous reviews that focused on a specific diagnosis. This broad overview is a potential strength, because it increases insight in the generic components of vocational rehabilitation interventions and their effects on work-related outcomes.

We performed a systematic and comprehensive search in five databases containing the most important literature from biomedical and behavioural sciences, allied health and public health. However, due to the selection of certain databases, the exclusion of uncontrolled studies, and a restriction to the English language, we may not have identified all relevant trials. In line with our study objective, we used search terms addressing chronic physical conditions, as well as physical disability. Due to this generic approach, the literature search may not have included all studies addressing vocational rehabilitation in a specific diagnosis.

The analysis and synthesis of available evidence from the 30 studies was challenging due to the diversity of interventions, the different follow-up periods, and the lack of standardized outcome measures. In addition, the small sample sizes in a number of the included studies might have caused lack of power to detect intervention effects. Comparison of outcomes at different moments in time (ranging from 3 to 104 weeks) could also have influenced our results, because the achievement of positive effects on work-related outcomes requires a relatively long follow-up period. To improve transparency, we compared outcomes at 12 months wherever possible, and explicitly reported other follow-up periods in our results. Although included studies were heterogeneous, with respect to interventions, populations, and number of participants, we found it legitimate to rate down the level of evidence

for the outcome work status with one level because the analysis of high-quality studies showed a heterogeneity of only 20%.

Finally, we included studies from 11 different countries. Since differing systems of disability benefits have an impact on rates of absence and return to work, these systems might have affected outcomes from the various countries in different ways [61].

Although only studies with a controlled study design were included, quality assessment of the included studies showed that about 30% of the studies had a low risk of bias, whereas the other studies had a higher risk of bias. The higher risk of bias of the majority of the studies was mainly due to selection bias (participants were less likely to be representative (referred from a source or self-referred), or low percentage of agreement to participate), blinding (assessors not being blinded or study participants were aware of the research question) and data collection tools not being valid and/or reliable. Evidence of low to very low certainty is a consistent finding in studies in the domain of vocational rehabilitation. Therefore, we performed meta-analyses of only high quality studies as well as meta-analyses of both high and lower quality studies. When including only high quality trials in a meta-analysis, the effects were more pronounced.

Implications for practice

The overview of interventions in this review enables rehabilitation professionals to address work participation within rehabilitation using targeted interventions and making informed decisions about interventions. However, as a consequence of the perspective on a generic approach to improve work participation of persons with a chronic condition, and the broad variety of interventions and patient samples in the literature, the findings of this systematic review do not provide evidence which specific intervention will most effectively and efficiently benefit particular patients.

The main implications for clinical practice are twofold. First, addressing work-related problems within the rehabilitation care of persons with a chronic physical condition by means of a systematic and targeted intervention is beneficial to improve or sustain their work participation, with positive effects on finding or maintaining a job (work status) or return to work. Second, these beneficial effects seem to be generic, irrespective of the specific intervention characteristics or medical diagnosis. Notably, these generic effects were found for broad, multicomponent interventions that include individual support as one of the intervention components, whether or not combined with group sessions, and not for interventions with a single component only. Possibly, the individual support of patients may accommodate the fit between specific patient characteristics and work environment. Thus, selection of interventions should not be based on diagnoses, but professionals and persons with a chronic physical condition should select interventions that target the experienced barriers for work participation, such as physical limitations, coping with a chronic condition, or problems in the social work environment.

Implications for research

This systematic review reveals a need for further research on interventions targeting work participation in persons with a chronic physical condition to strengthen the evidence for effective interventions.

Future research should apply controlled study designs with high-quality methodology in order to improve the quality of evidence. Studies should apply a follow-up period of at least 12 months and preferably two years to examine outcomes on work participation. Primary outcome measures should be standardised, assessed and reported on all follow-up measurements. Furthermore, interventions should be adequately described to enable comparability of intervention components across studies and applicability in practice. For this, the 12-item template for intervention description and replication (TIDieR) checklist can be used [62].

Finally, future research might provide evidence or increase insight in which specific intervention will most effectively and efficiently benefit particular patients to improve work participation.

Conclusion

Vocational rehabilitation interventions consist of multiple components, and vary widely regarding content and delivery characteristics. With information from 30 controlled studies, we conclude with moderate certainty that there is a large to moderate positive effect of vocational rehabilitation interventions on work status, and with low certainty that there is a moderate to small positive effect on work attitude. We found no effect on work productivity. Most studies showed positive effects or positive trends regarding work participation, irrespective of the specific intervention characteristics and diagnosis. The risk of bias in the majority of studies was high, implying that future studies with a lower risk of bias can add to the evidence for effectiveness.

Ethical approval

This study complied with The Netherlands Code of Conduct for Scientific Practice from the Association of Universities in the Netherlands (VSNU). The requirements for authorship have been met and each author believes that the manuscript represents honest work.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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