

A systematic review of interventions to retain chronically ill occupationally active employees in work: can findings be transferred to cancer survivors?

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ABSTRACT

Background: Interventions supporting occupationally active cancer survivors to retain work and prevent adverse work outcomes, beyond return to work, are scarce. As lessons may be learned from interventions that have been evaluated in working employees with other chronic diseases than cancer, the objective of this review was to summarize the characteristics of these interventions.

Material and methods: Studies were identified through computerized PubMed, EMBASE and PsycINFO searches, without any language or year of publication restrictions. Randomized controlled trials were included if they evaluated the effectiveness of interventions to retain chronically ill occupationally active employees in work. Two authors independently extracted data from each study and assessed the risk of bias.

Results: The search identified 536 unique studies, of which 18 met the inclusion criteria. All included studies had a low risk of bias. (Psycho-)educational interventions for chronically ill employees to retain work were evaluated in two studies, physical interventions in three studies, vocational/work-related interventions in five studies, and multidisciplinary interventions in eight studies. Vocational/work-related and multidisciplinary interventions, and the involvement of professional trainers, showed the most promising effects in retaining employees. However, small sample sizes may have caused imprecise effect estimates.

Conclusion: Based on studies focusing on occupationally active employees with other chronic diseases than cancer, it is advised that working cancer survivors should be offered tailored interventions, by skilled trainers, to sustain their employability. Shared goal setting, with relevant stakeholders, and vocational components should be included, potentially as part of a multidisciplinary intervention.

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Background

The number of people diagnosed with cancer and living with its long-term consequences is rising. In Europe, there are about 3.5 million new cancer cases each year and up to 50% of the cases are of working age at the time of diagnosis [1,2]. In the Netherlands and in Denmark, about 110,000 and 41,000 persons respectively, are diagnosed with cancer annually and in both countries, 40% receives this diagnosis at working age [3,4]. As mortality rates from cancer have declined steadily over the past two decades, because of major developments in cancer screening and treatment options, return to work (RTW) rates among cancer survivors in Western countries have successively increased [5]. Until now, numerous studies have been performed exploring factors related to RTW in cancer

survivors, and evaluating the effectiveness of interventions to support survivors in their RTW process [5–7]. However, scientific studies barely focused on patients who were able to continue to work during or after the treatment.

Cancer has become a chronic disease for many, and nowadays, up to 89% of the people are able to (partly) resume work two years after the diagnosis [5]. However, a long-term follow-up study of employed Dutch cancer survivors reported that about one third of these survivors experience an adverse work outcome 5–10 years after diagnosis, such as job loss or receiving disability pension [8]. In addition, a Danish population-based cohort study showed a significantly increased risk in cancer survivors for taking early retirement up to 8 years after cancer diagnosis [9]. Unfortunately, interventions supporting occupationally active cancer survivors to

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retain work and prevent such adverse work outcomes, beyond RTW, are still scarce. Lessons may be learned though from interventions that have been evaluated in working employees with other chronic diseases than cancer, and translated into vocational cancer rehabilitation.

Being able to work has been proclaimed, not only by cancer survivors, but also by other chronically ill patients, to be a major contributor to their quality of life (QoL). Next to financial benefits of being employed, the opportunity to establish new social relationships through work, to enlarge self-esteem, and to develop abilities and talents in a job have been found to increase QoL as well [10,11]. Moreover, it has been extensively described that employment improves general health [12]. Because little was known about work functioning of cancer survivors after RTW, Dorland et al. [13] decided to establish a large national cohort study of working Dutch cancer survivors, to long-term monitor advantages and difficulties experienced by these survivors while working. In line with this, Duijts et al. (2013) summarized in a systematic review physical and psychosocial functioning of occupationally active cancer survivors and found, among others, that cognitive limitations, fatigue, depression, but also limited physical abilities, influenced sustained employability of survivors, beyond their RTW [14].

The multifactorial concept '*sustainable employability*' has been defined as 'employees having the opportunity to perform work with preservation of health and wellbeing during their working life', and can be assessed with several outcome measures, such as work ability, work functioning, productivity, and absenteeism [15]. While interventions to sustain employability in cancer survivors are still lacking, ample information on how to retain employees with other chronic diseases in work is already available. Successful interventions on how to retain these employees in work may be transferable to the cancer field. Moreover, insight in intervention characteristics and applied generic strategies may support (occupational) health care professionals in developing and

applying such interventions, so cancer survivors may benefit from them.

Hence, to learn how occupationally active cancer survivors may be optimally supported to retain work, a systematic review has been conducted on interventions to sustain RTW and employability in working employees with other chronic diseases.

Material and methods

Search strategy

A systematic search has been performed May 2018 in the electronic databases PubMed (MEDLINE), EMBASE (Ovid) and PsycINFO (Ovid), without any language or year of publication restrictions. Studies were identified using a search syntax based on the PubMed strategy, which uses a combination of MeSH terms and free text terms, and included synonyms of terms related to randomized controlled trial (RCT), chronic disease (e.g., musculoskeletal, mental, cardiovascular, cancer) (>3 months complaints), (occupational) rehabilitation, and sustainable employability. Where necessary, the syntax was adapted for use in the other databases. The PubMed search syntax can be found in Table 1.

Study selection

The initial search captured 560 abstracts, of which 24 were duplicates and thus removed. To assess if the resulting 536 abstracts met the selection criteria, they were independently screened on title and abstract by two authors (SFAD, KMK). Full-text articles were retrieved, when there was not sufficient information to establish appropriateness for inclusion. A manual search of reference lists of selected articles has been performed to identify further relevant studies. Studies were excluded for the following reasons: (1) no RCT; (2) no chronic disease; (3) $\geq 50\%$ of the participants on sick leave at baseline; (4) outcome measures related to RTW instead of

Table 1. PubMed search syntax.

Search
(patients [Title/Abstract] OR chronic disease [Title/Abstract] OR disabled persons [Title/Abstract] OR occupational diseases [Title/Abstract] OR occupational injuries [Title/Abstract] OR ("accidents" [MeSH Terms] OR "accidents" [All Fields]) AND occupational [Title/Abstract] OR musculoskeletal diseases [Title/Abstract] OR cardiovascular diseases [Title/Abstract] OR mental disorders [Title/Abstract] OR neoplasm [Title/Abstract] OR cancer survivors [Title/Abstract] OR worker [Title/Abstract] OR employee [Title/Abstract] OR "self-employed" [Title/Abstract] OR selfemployed [Title/Abstract] OR "benefit recipients" [Title/Abstract] OR beneficiaries [Title/Abstract] AND ((rehabilitation, [All Fields] AND vocational [Title/Abstract] OR occupational health [Title/Abstract] OR occupational medicine [Title/Abstract] OR occupational health services [Title/Abstract] OR "vocational rehabilitation" [Title/Abstract] OR "occupational rehabilitation" [Title/Abstract] OR "work rehabilitation" [Title/Abstract] OR health promotion [Title/Abstract] OR ergonomics [Title/Abstract] OR "workplace intervention" [Title/Abstract] OR "work disability prevention" [Title/Abstract] OR "work disability management" [Title/Abstract] OR ("graded activity" [Title/Abstract] OR "graded work" [Title/Abstract] OR "light duties" [Title/Abstract] OR "light duty" [Title/Abstract] OR "light work" [Title/Abstract] OR "modified duties" [Title/Abstract] OR "modified duty" [Title/Abstract] OR "modified work" [Title/Abstract] OR "Return to work policy" [Title/Abstract] OR "Organisational policy" [Title/Abstract] OR "Personnel management" [Title/Abstract] OR "absence management" [Title/Abstract] OR "attendance management" [Title/Abstract] OR "disability management" [Title/Abstract] OR "disability prevention" [Title/Abstract] OR "disclosure management" [Title/Abstract] OR "employee assistance" [Title/Abstract] OR "employer accommodation" [Title/Abstract] OR "supportive colleagues" [Title/Abstract] OR "supportive manager" [Title/Abstract] OR "supportive supervisor" [Title/Abstract] OR "employment support" [Title/Abstract])) AND (sick leave [Title/Abstract] OR absenteeism [Title/Abstract] OR presenteeism [Title/Abstract] OR employment [Title/Abstract] OR return to work [Title/Abstract] OR work capacity evaluation [Title/Abstract] OR employee performance appraisal [Title/Abstract] OR "Sustainable employment" [Title/Abstract] OR "Sustainable return to work" [Title/Abstract] OR "Employability" [Title/Abstract] OR "Work participation" [Title/Abstract] OR "Work functioning" [Title/Abstract] OR "Work productivity" [Title/Abstract] OR "Work capacity" [Title/Abstract] OR "Work ability" [Title/Abstract] OR Workability [Title/Abstract] OR "Work disability" [Title/Abstract] OR "returning to work" [Title/Abstract] OR "back to work" [Title/Abstract] OR "Partial sick leave" [Title/Abstract] OR "Part-time work" [Title/Abstract] OR "sickness absence" [Title/Abstract] OR "functional capacity assessment" [Title/Abstract] OR "functional capacity evaluation" [Title/Abstract] OR sicklist [Title/Abstract] OR sicklisted [Title/Abstract] OR sicklisting [Title/Abstract] OR sicklistings [Title/Abstract] OR (sick list [Title/Abstract] OR sick listed [Title/Abstract] OR sick listing [Title/Abstract] OR sick listings [Title/Abstract] OR sick lists [Title/Abstract])).
Filters: Randomized Controlled Trial; Adult: 19+ years; Adult: 19–44 years; Middle Aged: 45–64 years.

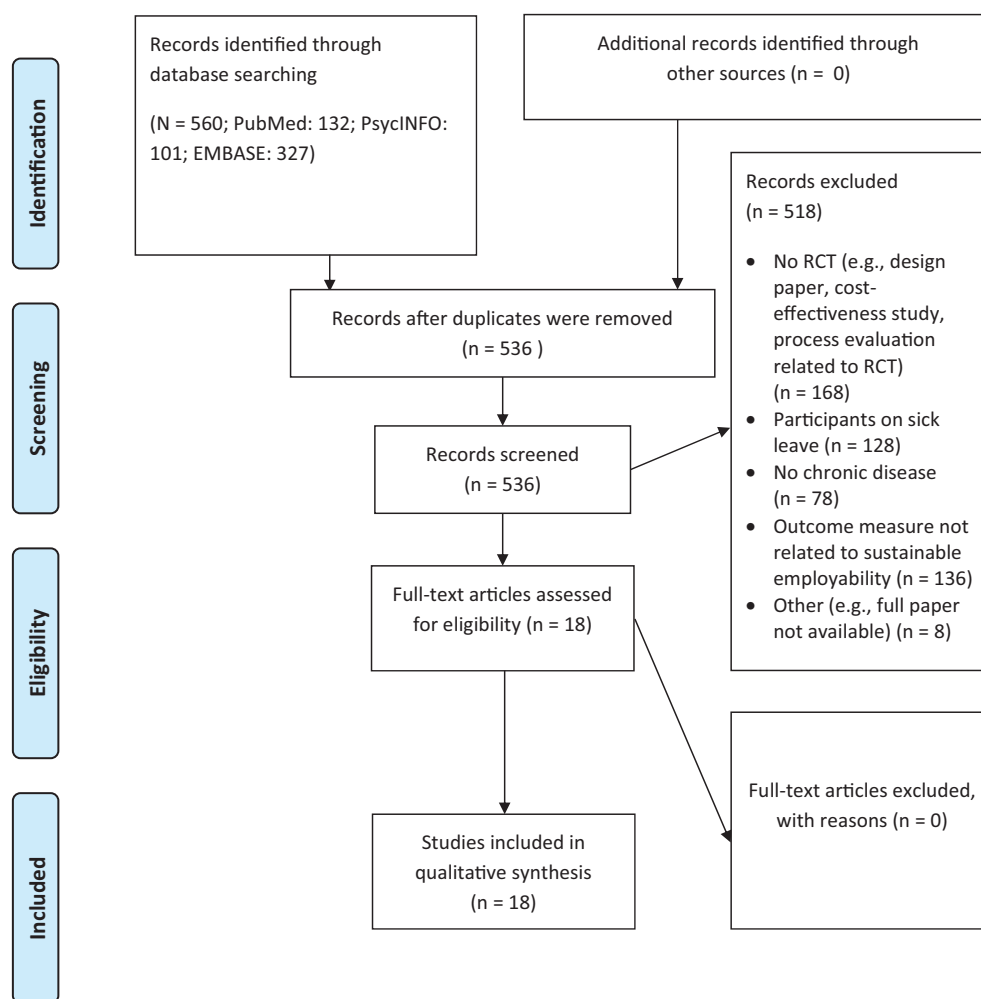


Figure 1. Flow diagram.

staying or retaining work after RTW; and/or (5) other (e.g., full text not available) (Figure 1). In case of disagreement during the selection process, a third author (UB) decided upon the eligibility of a study.

Data extraction and synthesis

A data extraction form was developed to record relevant study details. Data were extracted by one author (SFAD) and checked by a second author (RSR), and included: (1) general study characteristics (e.g., author, year of publication, country), (2) participant characteristics (e.g., age, gender, number, type of chronic disease, percentage working at baseline), (3) intervention characteristics (e.g., aim, type, content, provider), (4) outcome measure(s) (e.g., sick leave, work functioning, work retention), and (5) main findings of the study. If available and presented in the article, only data of participants that were actually occupationally active were extracted. Data from the included German article [16] were extracted by a third, German speaking, author (UB). Finally, all data were synthesized by qualitatively describing the interventions and their effectiveness.

Quality assessment

The risk of bias within studies was scored independently by two authors (SFAD, CMS), according to the procedures described in the *Cochrane Handbook for Systematic Reviews of Interventions* [17]. The risk of bias within the German study was scored solely by UB. Seven domains of risk of bias were assessed: adequacy of sequence generation, allocation concealment, blinding of participants and personnel, blinding of the outcome assessment, how incomplete outcome data (drop-outs) were addressed, evidence of selective outcome reporting, and other biases. Results were summarized in two 'risk of bias' graphs, i.e., an overview of the authors' judgments about each risk of bias item presented as percentages across all included studies, and a summary of all items. Studies were considered to have a high risk of bias when the items for 'random sequence generation', 'allocation concealment' and 'incomplete outcome data for our primary outcome measure' all scored a rating of high risk of bias. In case of disagreement, the criteria were discussed until consensus was reached, or if necessary, a third author (UB) was consulted.

The Preferred Reporting Items for Systematic Reviews (PRISMA statement) was used as a formal guideline for systematic reviews [18].

Results

Search results of characteristics of included studies

A total of 536 unique records were initially found and screened on title and abstract (113 from PubMed, 322 from EMBASE, and 101 from PsycINFO), after which 18 records remained for full-text screening, which all met the inclusion criteria. Checking the references of the 18 articles yielded no additional records. The results of the literature search and study selection are presented in [Figure 1](#).

All 18 studies (publication year range 2003–2017) were performed in Western, high-income countries, i.e., US ($N=5$) [19–23], Scandinavia ($N=5$) [24–28], the Netherlands ($N=4$) [29–32], UK ($N=2$) [33,34], Germany ($N=1$) [16] and Canada ($N=1$) [35], and included a total of 3546 participants. The chronic diseases of the occupationally active participants were, among others, rheumatic diseases, mental disorders and musculoskeletal pain. In 14 studies, 100% of the participants were working at baseline; in four studies, at least 50% of the participants were working at baseline [20,25,26,30]. An overview of the main characteristics of all included studies can be found in [Table 2](#).

Quality assessment

The overall results of the quality assessment are summarized in the ‘risk of bias’ graph ([Figure 2](#)). Further, the ‘risk of bias’ summary of each ‘risk of bias’ item for every included study is presented in [Figure 3](#). The domain with the highest risk of bias in our review was ‘performance bias’, i.e., blinding of participants and personnel. This was expected, as blinding of the type of interventions in the included studies, e.g., vocational counseling or exercise, is hardly possible. Since none of the included studies scored ‘high risk of bias’ on both ‘random sequence generation’, ‘allocation concealment’ and ‘incomplete outcome data for our primary outcome measure’, we rated all included studies in our review as having an overall low risk of bias.

Content and effectiveness of the interventions

The included studies concerned two (psycho-)educational [16,19], three physical [20,24,35], five vocational/work-related [21,23,28,29,34], and eight multidisciplinary interventions [22,25–27,30–33] for chronically ill employees to retain work. Detailed information about the content and effectiveness of all interventions can be found in [Table 3](#). Except for three studies [24,27,31], all had work measures as their primary outcome, such as the prevention of job loss, sickness absence and/or work disability, or the improvement of work ability, work performance, productivity and/or supervisor support.

(Psycho-)educational interventions

Langbrandtner et al. [16] and McGonagle et al. [19] reported on (psycho-)educational interventions to enhance work-related outcomes in participants with inflammatory bowel

disease (IBD) and in participants with different types of chronic illnesses (such as diabetes or neuropathy), respectively. Langbrandtner’s self-management program was provided by a health insurance company, whereas McGonagle’s coaching intervention was guided by a certified coach. While the self-management program for employees with IBD, consisting of an individualized problem profile with recommendations regarding treatment and guidance, showed no positive effects on work-related outcomes [16], the tailored 12-week phone-based coaching (six one-hour sessions) for employees with chronic illnesses showed significantly improved work ability perceptions ($p < .019$) and work resilience ($p < .01$), compared to the control group [19].

Physical interventions

The physical interventions, evaluated by Chopp-Hurley et al. [35], Hoge et al. [20] and Sundstrup et al. [24], for the participants with hip and/or knee osteoarthritis, anxiety disorder, and pain and disability in shoulder, arm and hand, respectively, consisted predominantly of yoga-related exercises [20,35] and resistance training [24]. The interventions in all three studies were provided by skilled training instructors. Significant improvements in work ability were present within Chopp-Hurley’s exercise group (three to four classes per week for 12 weeks, within the workplace, early in the morning) ($p = .049$) [35]. No between-group differences were found though. The participants in Hoge’s intervention group (eight weekly group classes, consisting of breath-awareness, body scan and Hatha yoga, and home practice assignments) reported a significantly greater decrease in partial work days missed, compared to the control group [20]. Further, work disability decreased more in Sundstrup’s supervised 10-week (3×10 min per week) resistance training group compared to usual care ($p = .05$) [24].

Vocational/work-related interventions

Vocational/work-related rehabilitation was the primary type of support in five studies, focusing on participants with common mental disorders [29], autism [23], rheumatoid, psoriatic or inflammatory arthritis [21,34], and musculoskeletal disorders [28]. Job accommodation, vocational counseling and guidance (two 1.5 h sessions) were offered to the participants in Allaire’s intervention, and turned out to be protective against job loss (OR 0.58; 95% CI 0.34–0.99) [21]. Arends et al. (2014) evaluated the effect of a five-step problem-solving process for difficulties experienced when back at work, including consultations between the employee and the supervisor, and two to five occupational physician consultations (30 min duration each), all within the first three months after returning to work after sick leave due to common mental disorders. Both the incidence of (OR 0.40; 95% CI 0.20–0.81) and the time to (HR 0.53; 95% CI 0.33–0.86) recurrent sickness absence decreased compared to the usual care control group [29]. The participants with autism in Gentry’s intervention received training in the use of a Personal Digital Assistant as a vocational aid upon starting a new job. This

Table 2. Characteristics of included studies.

General			Participant characteristics				
Author (ref)	Year	Country	Age	Gender	<i>N</i>	Chronic disease	% working at baseline
Allaire et al. [21]	2003	USA	Mean 49, 5 years (range 24–66)	81% female	242 (I = 122; C = 120)	Rheumatic diseases	100%
Arends et al. [29]	2013	The Netherlands	Mean 42, 3 years	59% female	158 (I = 80; C = 78)	Common mental disorders	100%
Bohman et al. [22]	2011	USA	Mean 47,0 years (range 21–60)	77% female	1616 (I = 904; C = 712)	Chronic mental, behavioral and physical health conditions	100%
Calner et al. [25]	2017	Sweden	Mean 42, 9 years (SD 10, 7)	85% female	99 (I = 55; C = 44)	Persistent musculoskeletal pain from the back, neck, and shoulders, and/ or a generalized pain condition	More than 50% in both study groups were working at least 25 percent at baseline, and around 75 percent of the participants had an employment.
Chopp-Hurley et al. [35]	2017	Canada	Mean 53, 9 years	79% female	24 (I = 12; C = 12)	Hip and/or knee osteoarthritis	100%
De Buck et al. [30]	2005	The Netherlands	Mean 43, 5 years (range 21–58)	56% female	140 (I = 74; C = 66)	Chronic rheumatic disease	In the intervention group, 21 participants (28%) were on complete sick leave at baseline; in the control group, 20 participants (30%) were on complete sick leave at baseline.
Gentry et al. [23]	2015	USA	Mean 24, 0 years (range 18–60)	16% female	50 (I = 26; C = 24)	Autism spectrum disorder	100%
Hammond et al. [34]	2017	UK	Mean 49, 0 years (SD 8.8)	76% female	55 (I = 29; C = 26)	Rheumatoid, psoriatic or inflammatory arthritis	100% (no one had extended sick leave of > three months)
Hoge et al. [20]	2017	USA	Mean 39, 0 years	56% female	57 (I = 27; C = 30)	Generalized anxiety disorder	100% (in the control group, one person was unemployed)
Hubbard et al. [33]	2013	UK	Mean 55, 5 years (SD 5.5)	100% female	22 (I = 8; C = 14)	Breast cancer	100%
Hutting et al. [31]	2015	The Netherlands	Mean 46, 3 years	75% female	118 (I = 64; C = 53)	Non-specific complaints of arm, neck or shoulder	100%
Langbrandtner et al. [16]	2016	Germany	Mean 41, 2 years	50% female	337 (I = 164; C = 173)	Inflammatory Bowel Disease	Gainfully employed for at least 50% of the time (self-reported)
Linton et al. [26]	2005	Sweden	Mean 48, 2 years	85% female	185 (I = 47; I2 = 69; I3 = 69)	Non-specific back or neck pain.	100% (in the CBT group, three persons (4%) were unemployed)
McGonagle et al. [19]	2014	USA	Mean 38, 7 years	86% female	59 (I = 30; C = 29)	All types of chronic illnesses (e.g., diabetes, multiple sclerosis, neuropathy, psychiatric illness)	100%
Sundstrup et al. [24]	2014	Denmark	Mean 45, 5 years	23% female	66 (I = 33; C = 33)	Pain and disability of the arm, shoulder, and hand	100%
Suni et al. [27]	2006	Finland	Mean 47, 3 years	100% men	106 (I = 52; C = 54)	Low back pain	100%
van Vilsteren et al. [32]	2017	The Netherlands	Mean 49, 7 years	84% female	150 (I = 75; C = 75)	Rheumatoid arthritis	100%
Viikari-Juntura et al. [28]	2012	Finland	Mean 44, 3 years	97% female	62 (I = 31; C = 31)	Musculoskeletal disorders	100%

group required significantly less hours of job coaching support during the first 12 weeks on the job, compared to those who had not received the intervention ($p = .013$) [23]. Further, 4.5 h of 1:1 vocational rehabilitation, consisting of an assessment of a person's job, roles and responsibilities in

relation to the health condition, disease severity and activity limitations, and a detailed assessment of work barriers, was offered to the participants with rheumatic diseases in Hammond's intervention group. This group showed significant improvements regarding presenteeism, absenteeism,

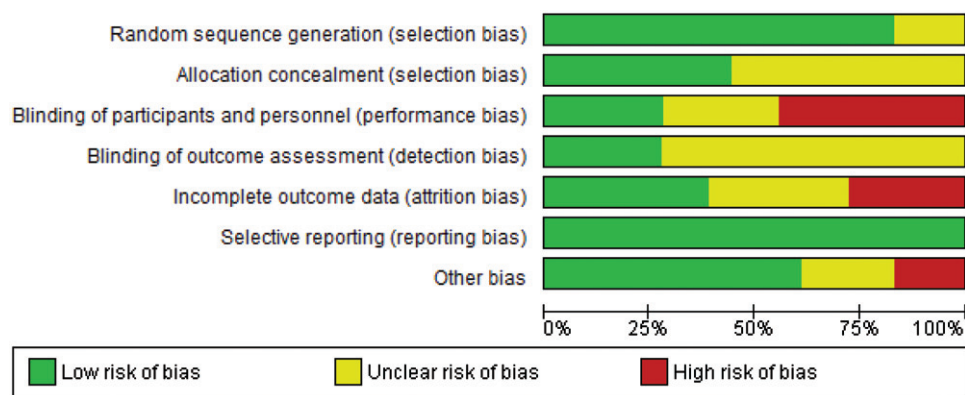


Figure 2. 'Risk of bias' graph.

risk of job loss, productivity and confidence regarding management of the disease at work, compared to the control group [34]. Finally, restriction of working time and workload was successfully tested in Viikari-Juntura's study. Total sickness absence during the 12-months follow-up was about 20% lower in the intervention group than the control group [28]. Important stakeholders, such as (specifically trained) rehabilitation counselors, occupational physicians, job coaches, occupational therapists and employers provided and/or were otherwise involved in the abovementioned interventions.

Multidisciplinary interventions

The eight multidisciplinary interventions all consisted of (psycho-)educational components, combined with either vocational/work-related counseling [22,32] or with physical exercises [25–27,31], or both [30,33].

In Bohman's study in employees with chronic mental, behavioral and physical conditions, no significant differences were reported between the group who received (psycho-)educational and vocational/work-related support from a case manager and the control group, regarding total hours worked and periods of unemployment. However, a small, but statistically significant, difference was found in receiving disability pension (6% intervention, 8% control; $p = .02$) [22]. A 12-weeks integrated care and a participatory workplace intervention for employees with rheumatoid arthritis was evaluated by van Vilsteren et al. (2016), and showed a significant effect of the intervention program on supervisor support (B 0.19; 95% CI 0.01–0.38), but no effects on work instability or work productivity [32].

Four studies combined (psycho-)educational components with physical exercises, all aimed at employees with musculoskeletal complaints, such as nonspecific shoulder or back pain. While Calner et al. [25] did not find any effects of the web behavioral change program on top of the regular multimodal rehabilitation treatment regarding work-related outcomes, the effects of the self-management intervention (six weekly group sessions of 2.5 h each and an eHealth module) of Hutting et al. [31] were only minor. Linton et al. [26] reported on a three-armed RCT, comparing a six-session cognitive behavioral therapy (CBT) program (group of 6–10

people; once a week for 2 h), the CBT program combined with a preventive physical therapy (PT) program, and a control group. Both the CBT and the CBT + PT groups had fewer days on sick leave during follow-up than the control group. In addition, the risk for developing long-term disability leave was more than five-fold higher in the control group than in the other two groups (OR 5.33; 95% CI 1.53–17.98) [26]. Further, the 12-months neuromuscular training and counseling intervention (twice a week, once guided, once independently) of Suni et al. [27] resulted in a statistically significant greater decrease in negative expectations about future work ability in the training group, compared to the control group (OR 0.31; 95% CI 0.11–0.88).

Finally, two studies included more than two components in their interventions. The vocational rehabilitation program (4–12 weeks) of De Buck et al. [30] was tailored to the individual rheumatic patient and consisted of education, counseling, guidance and treatment (such as physical exercises). No differences between the two groups regarding work-related outcomes were found [30]. Hubbard et al. [33] was the only study aimed at working cancer patients, but showed no statistically significant effects of their intervention as well.

Almost all multidisciplinary interventions involved a range of health care professionals, such as occupational and physical therapists, social workers, counselors, nurses, and medical specialists.

Discussion

Main findings

Numerous interventions for chronically ill employees, other than cancer survivors, have been developed with the aim to sustain their employability, e.g., through the prevention of job loss or the improvement of work ability. Next to a relatively small number of interventions with merely (psycho-)educational or physical components, most of the identified interventions completely focused on vocational/work-related components, or were multidisciplinary by nature. The majority of interventions involved trained, professional stakeholders, such as occupational therapists. Small sample sizes in the included studies may have caused imprecise effect estimates though. Overall, both the vocational rehabilitation interventions and the multidisciplinary interventions showed

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Allaire, 2003	?	+	-	?	+	+	+
Arends, 2013	+	+	+	?	?	+	?
Bohman, 2011	?	?	?	?	+	+	-
Calner, 2017	+	+	?	?	?	+	?
Chopp-Hurley, 2017	+	+	-	+	-	+	+
De Buck, 2005	+	?	+	?	+	+	+
Gentry, 2015	+	?	?	?	+	+	+
Hammond, 2017	+	+	-	+	-	+	?
Hoge, 2017	?	?	+	?	?	+	+
Hubbard, 2013	+	+	-	+	-	+	+
Hutting, 2015	+	+	-	+	-	+	+
Langbrandtner, 2016	+	?	?	?	?	+	-
Linton, 2005	+	?	-	?	+	+	+
McGonagle, 2014	+	?	?	?	-	+	+
Sundstrup, 2014	+	?	+	+	+	+	?
Suni, 2006	+	?	-	?	?	+	+
Van Vilsteren, 2017	+	?	-	?	?	+	-
Viikari-Juntura, 2012	+	+	+	?	+	+	+

Figure 3. Risk of bias summary.

the most promising effects in retaining chronically-ill employees. We believe that generic strategies and elements of these interventions can be transferred to occupationally active cancer survivors.

Interpretation of the findings

Occupational health and rehabilitation towards RTW are widely understood as a complex field, in which the disabled worker and his/her personal characteristics interact with the workplace, the healthcare and the social security system, as well as economic and legislative conditions [36]. We set out to explore whether effective interventions to sustain

employability in working employees with chronic diseases, other than cancer, could be transferred to working cancer survivors. A one-to-one knowledge transfer should be avoided though, as cancer survivors have lower work ability compared to their colleagues without a history of cancer, and also compared to those with other chronic conditions [37]. Furthermore, workplace adjustments for a person suffering from chronic low back pain evidently differs from supporting a person who has returned to work, after having endured long-term treatment for a life-threatening disease. Nonetheless, in general, the successful enhancement of work participation includes identification of rehabilitation needs, goal setting and taking action accordingly, thus restore the balance between personal resources and job demands [38].

In the present systematic review, only one study focused on cancer survivors’ occupational rehabilitation needs at work, beyond the initial RTW [33]. Some women in this study experienced more occupational needs than others and therefore received more extensive support from the case manager consisting of telephone conversations, face-to-face meetings and referral to social security opportunities [33]. As such, a one-size-fit-all approach should be avoided in interventions aiming at sustainable employability, because the needs vary considerably. That is, patients may experience difficulties with adhering to multicomponent intervention, while health care professionals might encounter problems with the organization of such multidisciplinary programs. This may be why results from our systematic review did not show any effects of multidisciplinary interventions, encompassing more than two components [30,33].

This is further substantiated in a study that identified three work functioning trajectories in cancer survivors during the first year post RTW [13]. Persistent low work functioning was found for 32% of the study population and was associated with cognitive problems at RTW, whereas for the 16% with persistently high work functioning (and the remainder 52% as well), the time to RTW from diagnosis was shorter and their meaning of work changed less frequently [13]. Thus, sustained work participation in some cancer patients may call for multidisciplinary interventions due to complex needs and require the involvement of different stakeholders. A case manager with cancer insight and the authority to refer to relevant occupational rehabilitation stakeholders may be pivotal in the decision making of who is in need of which type of intervention.

In a recent Cochrane review, de Boer et al. [7] showed that multidisciplinary interventions, involving physical, psycho-educational and vocational components led to more cancer patients returning to work compared to care as usual. However, they reported that there were no studies included, merely focusing on vocational interventions [7]. We identified a number of effective vocational/work-related interventions for chronically ill employees on continuation of work [21,23,28,29,34]. Presumably, the majority of occupationally active employees with a chronic disease should not be overburdened with too extensive multi-component interventions, and support should be aimed at the barriers and demands they are actually facing while working.

Table 3. Content and effectiveness of interventions.

General Author (ref)	Intervention characteristics			Main findings
	Type	Content	Provider	
Allaire et al. [21]	(Vocational) Two 1.5 hour sessions of vocational rehabilitation/Participants in the control group received print materials about disability employment issues and resources by mail within 1 month after randomization.	The intervention included three components: (1) job accommodation (i.e., assessment of possible health-related workplace barriers to job performance (e.g., difficulty handling objects, working the required number of hours, doing repetitive tasks) and development of solutions to the barriers that a participant identified (via the Work Experience Survey tool)), (2) vocational counseling and guidance (i.e., counselor and participant evaluated the individual's job in light of his/her disease; possible job alternatives, requirements, and relevant resources were identified; the counselor conveyed positive messages about the participant's ability to work), and (3) education and self-advocacy (i.e., information about legal rights and responsibilities; guidance regarding disclosure issues; skills training to increase the participant's ability to request a job accommodation in an appropriate manner). In addition, the counselors gave the participants pamphlets and flyers about how to manage health-related employment problems and about other available resources.	Rehabilitation counselors	Job loss was delayed in the experimental group compared with the control group ($p = .03$). After adjustment for confounders, participation in the experimental group was found to be protective against job loss (OR 0.58; 95% CI 0.34–0.99; $p = .05$).
Arends et al. [29]	(Vocational) A five-steps problem-solving intervention, which started during the first two weeks of RTW and included two to five occupational physician (OP) consultations (each of 30 minutes duration) within 3 months after RTW/Participants in the control group received care as usual according to the guideline on 'Management of mental health problems of workers by OPs'.	A five-steps problem-solving process to find and implement solutions for problems experienced when back at work, including consultations between the worker and the supervisor; (1) make an inventory of problems and/or opportunities encountered at work after RTW; (2) brainstorm about solutions; (3) write down solutions and the support needed and assess the applicability of these solutions; (4) discuss solutions and make an action plan with the supervisor; (5) evaluate the action	OPs who received a 2-day intervention training in Stimulating Healthy Participation And Relapse Prevention at work.	Primary outcome: Time to first job loss (permanent disability, premature retirement or a period of unemployment); Secondary outcomes: Permanent job loss alone, differences in the counts of permanent and temporary job losses combined (12–48 months follow-up post intervention). Primary outcomes: Incidence of and time to recurrent sickness absence; Secondary outcomes: Mental health complaints; work functioning and coping behavior (3, 6 and 12 months follow-up after baseline). Adjusted OR for incidence of recurrent sickness absence was 0.40 (95% CI 0.20–0.81); adjusted HR for time to recurrent sickness absence was 0.53 (95% CI 0.33–0.86). No clear differences were found between the two groups on mental health complaints at the follow-up measurements. No significant group \times time interaction was found for mental health complaints, work functioning and coping behavior.

(continued)

Table 3. Continued.

General Author (ref)	Intervention characteristics			Main findings	
	Type	Content	Provider		
Bohman et al. [22]	(Multi-disciplinary) 1-2 contacts per month with a case manager / The control group continued to receive the usual Gold Card services available through Harris County Hospital District.	The Working Well group received access to enhanced mental health services, substance abuse assessment and referral services, dental and vision care, expedited clinic appointments, fully subsidized prescriptions and medical visits (no co-payments), durable medical equipment, podiatry and transportation assistance at no cost. Case managers used motivational interviewing, and services were tailored to participants' individual needs and included goalsetting and planning, advocacy, help with navigating the health care system, connection to community resources, employment/vocational supports, and health education.	Case management services were delivered by nurses, social workers, and vocational specialists, hired and specially trained for Working Well.	Employment, measured by total hours worked and by the percentage of unemployment in the past 6 months (measured from 13-18 months after enrollment). Disability was defined as the percentage who had applied for, and the percentage who had received disability benefits in the past 6 months, based on self-report. Other outcomes were access to health, service use, satisfaction with health care, and income.*	There were no significant differences between the groups in the total hours worked (which averaged about 29 h per week over the past 6 months) ($p = .52$), or whether they had experienced any period of unemployment (10% of each group) ($p = .99$), during the 6-month study period. Self-reported applications for federal disability benefits during months 13-18 were relatively few: 9% for both intervention and control participants ($p = .94$). However, there was a statistically significant difference between the groups in receiving disability benefits (6% intervention, 8% control) ($p = .02$). Further, intervention group participants reported greater access to care, greater likelihood of outpatient medical visits and greater satisfaction with their access to health care and with the health care they had received.
Calner et al. [28]	(Multi-disciplinary) Access to the web behavioral change program for activity (Web-BCPA) 24 hours a day, 7 days a week, for 16 weeks/ Participants in both study groups participated in a multimodal rehabilitation (MMR) treatment at the healthcare center.	The web program consisted of eight modules (one new module per week during the first eight weeks): (1) pain, (2) activity, (3) behavior, (4) stress and thoughts, (5) sleep and negative thoughts, (6) communication and self-esteem, (7) solutions, and (8) maintenance and progress. Each module contained information, assignments, and exercises that could be assimilated via educational texts, films, and writing tasks. The MMR consisted of treatment from at least three different healthcare professionals with a minimum of two or three treatment sessions a week for at least six weeks.	The rehabilitation coordinator at participating healthcare centers was responsible for providing administrative support regarding the web intervention to participants. The MMR was guided by at least three different healthcare professionals (physiotherapist, physician, occupational therapist, psychologist, or psychosocial counselor, nurse).	Primary outcomes: Work ability, working percentage. Secondary outcomes: Average pain intensity, pain-related disability, and health-related quality of life (4 and 12 months follow-up after randomization). There was an increase from 36% (baseline) to 43% (12 month) in participants working 100% in the MMR-web group, and from 32% to 43% in the MMR group; there were no overall significant differences between the groups (Time*Group) for pain intensity (VAS 7 days; $p = .48$); also for pain related disability, no significant differences between the groups (Time*Group; $p = .61$) were found; no overall significant differences were observed between the groups over time for any of the quality of life domains).	

(continued)

Table 3. Continued.

Intervention characteristics					
General Author (ref)	Type	Content	Provider	Outcome measures	Main findings
Chopp-Hurley et al. [35]	(Physical) Three to four exercise classes per week early in the morning, before work, within the workplace/Participants in the control group were asked to maintain their existing exercise level for the 12 week intervention period.	The classes consisted of static leg strengthening exercises (yoga poses), progressing over the 12 weeks.	Instructor of the on-campus sport and recreation facility at McMaster University.	Primary outcome: Work resilience, work ability. Secondary outcomes: Physical function, pain, depressive symptoms, self-efficacy, hip and knee function, mobility performance (12 weeks follow-up, following the intervention period).	No significant between-group differences were demonstrated for work resilience ($p = .849$) and work ability ($p = .16$). However, a medium-large effect size was present for work ability. Also, significant improvements in work ability were present within the exercise group ($p = .049$). Significant between-group effects were present for secondary outcome measures pain and depressive symptoms, with larger reduction in pain and depressive symptoms in the exercise group (p -value range .004-.034). Further, significant within-group effects were present for measures of pain and daily function (p -value range .002-.046) as well as for depressive symptoms ($p = .026$). No within-group differences were present in the no exercise group with regard to neither work resilience, work ability or the secondary outcome measures pain and depressive symptoms. There were no significant between-group or within group effects present for any of the strength or mobility measures. There was no difference between the two groups regarding the proportion of patients having lost their job at any time point, with 24% and 23% of the patients in the vocational rehabilitation group and the usual care group, respectively, having lost their job after 24 months. Patients in the vocational rehabilitation group showed a significantly greater improvement in fatigue, depression, anxiety, and mental health, compared to patients in the control group (all p -values $< .05$).
De Buck et al. [30]	(Multi-disciplinary) The job retention vocational rehabilitation program (between 4-12 weeks) consisted of a systematic assessment, followed by education, vocational counseling, guidance and medical or non-medical treatment. All patients made at least two visits to the hospital in connection with the program/Participants in the usual care outpatient group were referred to health professionals in relation to their working problem if regarded necessary by their rheumatologist. All participants received the same written information about the Dutch Social Security System.	The basic assessment was performed by the rheumatologist and the general coordinator. If necessary, additional team members were asked to see the patient, to gather more information about specific aspects of the work situation. Depending on the specific problems of the individual patient, the intervention further consisted of education, counseling, guidance (e.g., identification of resources for adapting the work environment), or treatment (e.g., exercise therapy).	The organization of the program was in hands of a coordinator. Team members were the rheumatologist, a social worker, physical therapist, occupational therapist and a psychologist.	Primary outcome: Occurrence of job loss. Secondary outcomes: Satisfaction with the job, pain, fatigue, anxiety, depression, physical functioning and quality of life. (6, 12, 18 and 24 months follow-up after baseline).	

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Table 3. Continued.

General Author (ref)	Intervention characteristics				Main findings
	Type	Content	Provider	Outcome measures	
Gentry et al. [23]	(Vocational) Training in the use of an Apple iPod Touch Personal Digital Assistant (PDA) as a vocational aid upon starting a new job/ Participants in the control group received the training after working 12 weeks without PDA support.	(1) A detailed workplace assistive technology assessment conducted by an occupational therapist in collaboration with the participant, job coach and employer took place; (2) Identification of an individualized suite of iPod Touch based applications and strategies appropriate to support the participant in the workplace; (3) Training of the participant by the occupational therapist in the use of an Apple iPod Touch and the selected apps on the job; and (4) Follow-along and fading of occupational therapy supports as the worker incorporated the device into her/his workday. PDA-based applications and strategies included: (1) task reminders, (2) task lists, (3) picture prompts, (4) video-based task-sequencing prompts, (4) behavioral self-management adaptations, (5) way-finding tools, (6) communication with the job coach via Wi-Fi, when available on the jobsite, and other supports.	A job coach coordinated the intervention, and received help from an occupational therapist and the employer.	Hours worked, job coach hours worked, support needs and work performance (5, 12 and 24 weeks follow-up post-intervention). *	Workers who received PDA training at the beginning of their job placement required significantly less hours of job coaching support ($p = .013$) during their first 12 weeks on the job than those who had not yet received the intervention. Functional performance and hours worked between the two groups was not significantly different at any time. The significant difference in hours of job coaching support persisted during the subsequent 12 weeks, in which both groups used a PDA ($p = .017$).
Hammond et al. [34]	(Vocational) Up to 4.5 hours of 1:1 vocational rehabilitation (VR) meetings; up to 1.5 hours extra contact was also possible, as well as optional work site visits. Written work self-help information and usual care were also provided/Participants in the control group only received written work self-help information (i.e., a cover letter, self-help flowchart and two work advice booklets) and usual care.	VR started within four weeks of referral with a structured work interview and job discussion (i.e., an assessment of the person's job, roles and responsibilities in relation to their condition, disease severity and activity limitations), and detailed assessment of work barriers. This was followed by mutually agreeing priority work problems, action planning, and then a tailored, individualized program including self-management at work, job accommodations, employment rights information and other strategies as relevant. Participants were offered a work site visit, if this was identified as relevant to their needs. The intervention ended with a telephone review.	Occupational therapists, who had received three days of VR training.	Presenteeism, employment status, work self-efficacy, satisfaction with work rehabilitation advice received, health, psychological status, pain, quality of life, time to temporary or permanent job loss, absenteeism (6 and 9 months follow-up after baseline). *	Outcome assessment indicated vocational rehabilitation was better than written advice in reducing presenteeism (Work Limitations Questionnaire (WLQ); change score mean: VR = -12.4 (SD 13.2); control = -2.5 (SD 15.9)); absenteeism; perceived risk of job loss and improving pain, productivity, confidence managing arthritis at work, physical ability, pain and perceived health.

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Table 3. Continued.

General Author (ref)	Intervention characteristics				Main findings
	Type	Content	Provider	Outcome measures	
Hoge et al. [20]	(Physical) Group classes of mindfulness based stress reduction during 8 weeks/Participants in the control group received stress management education for 8 weeks, which did not include any mindfulness components.	The weekly group classes included breath-awareness, a body scan, and gentle Hatha yoga. These practices were used in order to cultivate an awareness of individuals' internal present-moment experiences with acceptance and non-judgment. The individuals also participated in a "retreat" day and were given daily home practice assignments guided by audio recordings / Participants in the control group also had homework exercises and a weekend "special class" so the time spent in this group matched the intervention group.	An instructor with 8 years of experience in mindfulness based stress reduction.	Absenteeism, entire workdays missed, partial workdays missed, and healthcare utilization patterns (8 week and 24 week follow-up after baseline).*	Compared to the attention control class, participation in the mindfulness based stress reduction group was associated with a significantly greater decrease in partial work days missed for adults with generalized anxiety disorder ($t = 2.734$, $df = 51$, $p = .009$). A dose effect was observed during the 24-week post-treatment follow-up period: among the mindfulness based stress reduction participants, greater home mindfulness meditation practice was associated with less work loss ($p = .08$) and with fewer mental health professional visits ($p = .066$).
Hubbard et al. [33]	(Multi-disciplinary) Case management vocational rehabilitation service/The participants in the control group received usual care.	Participants were allocated a 'case manager' who conducted a telephone assessment of supportive care needs to facilitate work retention or return. Based on this assessment (where appropriate), individuals were signposted or referred to relevant services that could support patients with cancer-related and treatment side effects (e.g., fatigue, mood changes) as well as job-related issues (e.g., liaison with employers to enable work adjustments such as changes to hours worked or job role) in order to decrease duration of sickness absence or increase overall quality of (work) life.	Case manager of the 'Working Health Services'.	Primary outcome: Sick leave days. Secondary outcomes: Change in employment pattern, quality of life and fatigue (every 4 weeks during the first 6 months post-surgery and at 12 months follow-up).	Participants in the intervention group reported, on average, 53 fewer days of sick leave over the first 6 months post-surgery than those in the control group; however, this difference was not statistically significant $p = .122$; 95% confidence interval -15.8 , 122.0 . No statistically significant differences were found for secondary outcomes.
Hutting et al. [31]	(Multi-disciplinary) A self-management intervention (SG) consisting of six weekly group sessions of 2.5 hours each and an eHealth module/Participants in the usual care control group (UCG) could use all usual care and information available within the organization of the participant. They were also allowed to use all care available outside the organization.	The first session started with an introduction to the program and of the participants. Each subsequent session started with summary reflection on the action plans made in the previous session. After this, the relevant topics were discussed. At the end of each session, participants were asked to set targets (Specific, Measurable, Acceptable, Realistic, Time-bound) and formulated in terms of behavior), and action plans were made. The group sessions were	Physical therapists were involved in recruitment and group sessions were guided by experienced moderators.	Primary outcome: Disabilities of the Arm, Shoulder and Hand (DASH). Secondary outcomes: absenteeism, pain in the previous week, quality of life, pain catastrophizing, self-efficacy, work style, presenteeism, fatigue, burnout, and limitations experienced during work (3, 6 and 12 months follow-up after baseline).	No significant difference between intervention and the control group was detected regarding the general module of DASH. On most of the other outcome measures, there were no significant between-group differences as well. In the DASH work module, the between-group effect was -3.82 (95% CI -7.46 to -0.19 , $p = .04$). For limitations experienced in job-related activities the between-group effect was -1.01 (95% CI -1.97 to -0.04 , $p = .04$). The mean hours

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Table 3. Continued.

General Author (ref)	Intervention characteristics			Main findings
	Type	Content	Provider	
Langbrandtner et al. [16]	(Psycho-education) A self-management intervention consisting of a screening questionnaire enquiring about 22 disease-related bio-psycho-social problems. The intervention group received individualized (problem-adapted) written recommendations/Participants in the control group received usual care.	Participants received an individualized problem profile based on a screening questionnaire/assessment instrument from a health insurance company on 22 health-related problems. The recommendations included information regarding treatment and guidance offers. Moreover, they received a 19-page information brochure with easy to read information about the health care paths. It was recommended that the participants shared this information with their GP. If no problems were detected the participants received that information as well. After 12 months, the participants received the assessment instrument again. Participants in I1 received a free medical examination to detect red flags (e.g., fractures) and information regarding managing acute neck and back pain; participants in I2 received minimal treatment as described under I1 and CBT, consisting of general information, introduction of the topic of the session, problem solving and skills training, including homework; each session focused on a particular area of relevance and participants developed a personal coping program; participants in I3 received the I1 and I2 interventions and preventive physical therapy aimed at providing information about the cause of the problem as well as advice about maintaining or resuming activities. After a physical exam, the physical exercise training was tailored to the individual according to the results of the examination.	Health insurance company.	<p>of sport activities in the past 3 months, measured at 12 months, was 1.00 hour (95% CI -1.90 to -0.12 hour, $p = .03$) less in the SG compared with the UCG.</p> <p>No positive intervention effects on work-related outcomes (subjective prognosis of gainful employment; episodes and days of sick leave) were detected. The intervention group showed beneficial effects in quality of life, participation restriction and number of self-reported disability days. All effect sizes were small - quality of life ($p = .025$), participation restriction ($p = .016$) and number of self-reported disability days ($p = .013$).</p>
Linton et al. [26]	(Multi-disciplinary) A 6-session structured cognitive behavioral therapy (CBT) (I2) program, in groups of 6-10 people, once a week for 2 hours/a cognitive behavioral therapy program and a preventive physical therapy (PT) program (I3)/Participants in the control group received a minimal treatment program (MT) (I1).	Participants in I1 received a free medical examination to detect red flags (e.g., fractures) and information regarding managing acute neck and back pain; participants in I2 received minimal treatment as described under I1 and CBT, consisting of general information, introduction of the topic of the session, problem solving and skills training, including homework; each session focused on a particular area of relevance and participants developed a personal coping program; participants in I3 received the I1 and I2 interventions and preventive physical therapy aimed at providing information about the cause of the problem as well as advice about maintaining or resuming activities. After a physical exam, the physical exercise training was tailored to the individual according to the results of the examination.	Trained primary care physicians, therapists trained in cognitive behavioral therapy and in administering this intervention, and physical therapists.	<p>Significant differences were observed on the key outcome variables of future health-care utilization and work absenteeism. For health-care utilization, the CBT + PT group had significantly fewer healthcare visits than did the MT group ($p = .003$). For work absenteeism, the CBT and CBT + PT had fewer days on sick leave during the 12-month follow-up than did the MT group. The risk for developing long-term sick disability leave was more than five-fold higher in the MT group as compared with the other 2 groups (OR = 5.33; 95% CI = 1.53-17.98). However, there was no difference between the CBT group and the CBT + PT group on sick leave.</p>

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Table 3. Continued.

Intervention characteristics		Main findings	
General Author (ref)	Type	Content	Provider
McGonagle et al. [19]	(Psycho-education) A 12-week, 6-session, phone-based coaching intervention / Participants in the control group received the coaching intervention after the intervention group completed the coaching.	Each individual received six 1-hour coaching sessions (one session every other week for 12 weeks). The content was tailored to each individual's needs and goals. The coach and client agree on the topic(s) for discussion, and the objectives and desired outcomes for each session. The components of the coaching are goal, reality, options, way forward. Toward the end of each coaching session, the stated goals for the session are reviewed and assignments are developed for the client to complete prior to the next call. The final session included a discussion about lessons learned during coaching and insights or perspectives that were helpful.	Certified coach by the International Coach Federation who followed their competency guidelines.
			Outcome measures Work ability perceptions, exhaustion and disengagement burnout, job satisfaction, job self-efficacy, core self-evaluations, resilience, mental resources, illness severity, psychological distress, general self-rated health (12 weeks post-intervention follow up). *
			Compared with the control group, the coaching group showed significantly improved work ability perceptions ($p < .019$), exhaustion burnout ($p < .01$), mental resources ($p < .001$), core self-evaluations ($p < .01$), and resilience ($p < .01$). Yet, no significant improvements were found for job self-efficacy, disengagement burnout, or job satisfaction. Indirect effects of coaching on work ability, exhaustion and disengagement burnout, and job satisfaction were observed through job self-efficacy, core self-evaluations, resilience, and mental resources. The positive effects of coaching were stable 12 weeks after coaching ended.
Sundstrup et al. [24]	(Physical) A 10-weeks specific resistance training for the shoulder, arm, and hand muscles for 3 × 10 minutes per week/The participants in the control group received ergonomic training and education (usual care).	Participants in the intervention group performed supervised high-intensity resistance training for the shoulder, arm, and hand muscles for 10 minutes 3 times a week. The training program consisted of 8 resistance exercises. Training intensity was progressively increased. All training sessions were supervised. At the first training session each participant received exercise equipment for home training. The participants in the ergonomic group received ergonomic training and education based on the practical outcomes of a worksite analysis and hazard prevention system.	A skilled training instructor.
			Primary outcome: Pain intensity (average of shoulder, arm, and hand, scale 0 – 10; DASH). Secondary outcomes: Work disability, and isometric shoulder and wrist muscle strength (10 weeks after randomization).
			Pain intensity, work disability, and muscle strength improved more following resistance training than usual care ($p < .001$, $p = .05$, $p < .0001$, respectively). Pain intensity decreased by 1.5 points (95% confidence interval –2.0 to –0.9; $p < .0001$) following resistance training compared with usual care, corresponding to an effect size of 0.91 (Cohen's d).
Suni et al. [27]	(Multi-disciplinary) A 12-months neuromuscular training and counseling intervention, training twice a week, once guided and once independently/The participants in the control group received care as usual and were encouraged to continue their usual physical activity.	The intervention included neuromuscular training and counseling with cognitive-behavioral learning goals for improved movement patterns (i.e., better control of the lumbar neutral zone and lumbar stability) in daily life. The training program consisted of 10 exercises. The subjects were provided with a training book including information on lumbar neutral zone (NZ)	Physical therapists
			Changes in intensity of LBP, disability, self-evaluated future work ability and neuromuscular fitness (6 and 12 months follow-up after baseline).*
			The intensity of LBP decreased significantly more (39%) in the intervention group compared with the control group at 12 months ($p = .032$). The proportion of subjects with negative expectations about their future work ability decreased in both groups at 6 and 12 months; however, the proportion was significantly bigger in intervention group (OR = 0.31, 95% CI =

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Table 3. Continued.

General Author (ref)	Intervention characteristics			Type	Provider	Outcome measures	Main findings
	Content			Provider	Outcome measures	Main findings	
van Vilsteren et al. [32]	<p>and instructions and pictures for all exercises and training log sheets for recording the dosage of each exercise at each exercise session. Systematic counseling on the principles and practical applications of the control of lumbar neutral zone was given as well. The learning goal for the first 6 months was to be able to control the lumbar NZ in all exercises. During the last 6 months, the physical therapist introduced the advantages of one-leg performances and gave personal guidance on how to apply the new skills, learned in neuromuscular training, to all kinds of activities of daily life.</p> <p>The care manager started the intervention with an intake session (history, physical examination; to identify functional limitations at work and factors that could influence functioning at work) and proposed a treatment plan. After the patient's consent, the care manager sent the treatment plan to the other members of the multidisciplinary team. The patients visited the care manager again after 6 and 12 weeks to evaluate, and, if necessary, adjust the treatment plan. The occupational therapist started the participatory workplace intervention, which is based on active participation and strong commitment of both the patient and supervisor. The workplace intervention was based on methods used in participatory ergonomics. The occupational therapist, patient and supervisor agreed on which solutions had to be implemented and described these in a plan of action, which was evaluated during the intervention. All patients (the participants in the control group as well) received usual rheumatologist-led care.</p>	<p>(Multi-disciplinary) A 12 weeks integrated care and a participatory workplace intervention/The participants in the control group received care as usual.</p>	<p>A multidisciplinary team, consisting of a trained clinical occupational physician (who acted as care manager), a trained occupational therapist and the patients' own rheumatologist.</p>	<p>Supervisor support, work productivity, work instability (6 months follow-up after randomization).*</p>	<p>A statistically significant effect of the intervention program was found on supervisor support in favor of the intervention group (B = 0.19; 95% CI 0.007–0.38). Analyses revealed no effects on work instability and at-work productivity.</p>		

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Table 3. Continued.

Intervention characteristics		Outcome measures		Main findings	
General Author (ref)	Type	Content	Provider	Primary outcome: Time to return to regular work activities. Secondary outcomes: Number of sickness absence days (part-time and full time) and recurrence of sick leaves (for any cause) (12-month follow-up after randomization).	Time to RTW sustained for ≥ 4 weeks was shorter in the intervention group (median 12 versus 20 days, $p = .10$). Hazard ratio for RTW adjusted for age was 1.60 (95% CI 0.98–2.63). After further adjustment for pain interference with sleep and previous sickness absence at baseline the Hazard ratio for RTW was 1.76 (95% CI 1.21–2.56). Total sickness absence during the 12-month follow-up was about 20% lower in the intervention than the control group.
Vilkkari-Juntura et al. [28]	(Vocational) A restriction of working time and workload (part time sick leave)/The participants in the control group were advised to go on full time sick leave.	In the intervention group, the recommendation was to reduce daily working time by about a half and this was achieved in most cases (70% of subjects). The physician gave the patient a fit note, indicating the duration of partial work disability, whether certain physical loads should be reduced, and whether any additional work modifications were deemed necessary. Part-time sick leave could be extended up to two months, if necessary. Full-time sick leave was prescribed for the control group.	Occupational health physicians		

*Primary and secondary outcomes not separately described.

Implications for practice and research

Based on the findings of this systematic review, and to answer the question if identified interventions could be transferred to cancer survivors, we propose seven generic elements to take into account when supporting occupationally active cancer survivors to retain work. These elements were extracted from effective interventions, assessed in this review, and should merely be considered as recommendations:

1. Aim to prevent job loss, (recurrent) sickness absence and/or work disability, or to improve work ability, work functioning, productivity and/or supervisor support;
2. Involve important stakeholders, such as employers, occupational and physical therapists, social workers, counselors, nurses, and medical specialists;
3. One-size-does-not-fit-all: assess the occupationally active cancer survivor’s job, roles and responsibilities, in relation to the severity of diagnosis and/or treatment and in relation to (work) activity limitations, and assess perceived work barriers;
4. Focus on vocational/work-related components in the intervention (potentially as part of a multidisciplinary intervention with (psycho-)educational or exercise components; avoid overburdening the working cancer survivor);
5. Monitor the occupationally active cancer survivor during several months, immediately after returning to work;
6. Make the workplace part of the intervention (e.g., consultations with the supervisor or occupational physician/occupational health services);
7. Engage skilled and experienced trainers to guide the intervention.

Clearly, rigorous research is needed to evaluate the effectiveness of newly developed interventions for occupationally active cancer survivors on their sustained employability. Preferably, studies need to adopt a RCT design, and risk of bias should be kept to a minimum by applying, e.g., adequate allocation procedures, sufficient sample sizes and blinding, if possible.

Strengths and limitations

A strength of this systematic review is that we applied a systematic search process, with no restriction on language and publication year, providing to the best of our knowledge a complete overview of interventions aiming at sustained RTW and employability among chronically-ill. Further, a transparent selection procedure, as well as data extraction and risk of bias assessments were carried out by at least two independent researchers.

However, since we focused our review on a relatively new research area, only a limited body of evidence regarding effective interventions for working chronically-ill employees was found. We cannot rule out that the search syntax

missed relevant interventions due to the way chronic disease was specified and the use of the RCT filter. Regarding whether relevant studies were missed, the different types of interventions were conducted in individuals with multiple types of diagnoses, which in our opinion reflected a search that managed to identify more than mental and musculoskeletal disorders. Regarding the RCT filter, RCT studies have been shown to be identified with high precision using the RCT filter option in PubMed [39]. Moreover, the included studies used a variety of intervention elements, which made effectiveness inferences impossible. Instead, the described elements for working cancer survivors should be viewed as propositions that call for rigorous tests in future RCTs.

Conclusion

In this systematic review, we propose a set of elements, extracted from interventions to support chronically ill employees to retain work, and support their transferability to working cancer survivors. These survivors should be offered tailored interventions, by skilled trainers, to sustain their employability. Also, shared goal setting, with relevant stakeholders, and vocational components should be included, potentially as part of a multidisciplinary intervention. As the number of working cancer survivors will grow rapidly in the near future, (occupational) health care professionals should make an effort to support their work functioning, and here-with their quality of life. Doing so will impact individual survivors and the society at large.

Disclosure statement

The authors declare no conflicts of interest. The authors alone are responsible for the content and writing of this article.

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References

- [1] de Boer AGEM. The european cancer and work network: CANWON. *J Occup Rehabil*. 2014;24:393–398.
- [2] Ferlay J, Steliarova-Foucher E, Lortet-Tieulent J, et al. Cancer incidence and mortality patterns in Europe: estimates for 40 countries in 2012. *Eur J Cancer*. 2013;49:1374–1403.
- [3] IKNL. [Internet] [cited Jul 2018]. Available from: <https://www.cijfer-soverkanker.nl/> [Dutch cancer figures].
- [4] Talbäck M, Klint A, Bray F, et al. The NORDCAN project. Association of Nordic Cancer Registries (ANCR). [Internet]. Available from: <http://www-dep.iarc.fr/NORDCAN/English/frame.asp>.
- [5] Mehnert A. Employment and work-related issues in cancer survivors. *Crit Rev Oncol Hematol*. 2011;77:109–130.
- [6] Van Muijen P, Weevers NLE, Snels IAK, et al. Predictors of return to work and employment in cancer survivors: a systematic review. *Eur J Cancer Care (Engl)*. 2013;22:144–160.
- [7] de Boer AEM, Taskila TK, Tamminga SJ, et al. Interventions to enhance return-to-work for cancer patients. *Cochrane Database Syst Rev*. 2015;CD007569.
- [8] Paalman CH, Van Leeuwen FE, Aaronson NK, et al. Employment and social benefits up to 10 years after breast cancer diagnosis: a population-based study. *Br J Cancer* 2016;114:81–87.
- [9] Carlsen K, Oksbjerg Dalton S, Frederiksen K, et al. Cancer and the risk for taking early retirement pension: a Danish cohort study. *Scand J Public Health*. 2008;36:117–125.
- [10] Wells M, Williams B, Firnigl D, et al. Supporting ‘work-related goals’ rather than ‘return to work’ after cancer? A systematic review and meta-synthesis of 25 qualitative studies. *Psychooncology*. 2013;22:1208–1219.
- [11] Barofsky I. *Work and illness: the cancer patient*. New York: Praeger; 1989.
- [12] Ross CE, Mirowsky J. Does employment affect health? *J Health Soc Behav*. 1995;36:230.
- [13] Dorland HF, Abma FI, Roelen CAM, et al. Work functioning trajectories in cancer patients: results from the longitudinal Work Life after Cancer (WOLICA) study. *Int J Cancer*. 2017;141:1751–1762.
- [14] Duijts SFA, van Egmond MP, Spelten E, et al. Physical and psychosocial problems in cancer survivors beyond return to work: a systematic review. *Psychooncology*. 2013;22:327–328.
- [15] van Holland BJ, de Boer MR, Brouwer S, et al. Sustained employability of workers in a production environment: design of a stepped wedge trial to evaluate effectiveness and cost-benefit of the POSE program. *BMC Public Health*. 2012;12:1003.
- [16] Langbrandtner J, Raspe H, Huppe A. [Employees with chronic diseases – additional results of randomized controlled trial among adult members of a German statutory health insurance with inflammatory bowel diseases]. *Z Gastroenterol*. 2016;54:139–145.
- [17] Higgins JPT, Green S (Eds.). *Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0* [updated March 2011]. The Cochrane Collaboration, 2011. Available from <http://handbook.cochrane.org>
- [18] Moher D. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ*. 2009;339:332–336.
- [19] McGonagle AK, Beatty JE, Joffe R. Coaching for workers with chronic illness: evaluating an intervention. *J Occup Health Psychol*. 2014;19:385–398.
- [20] Hoge EA, Guidos BM, Mete M, et al. Effects of mindfulness meditation on occupational functioning and health care utilization in individuals with anxiety. *J Psychosom Res*. 2017;95:7–11.
- [21] Allaire SH, Li W, LaValley MP. Reduction of job loss in persons with rheumatic diseases receiving vocational rehabilitation: a randomized controlled trial. *Arthritis Rheum*. 2003;48:3212–3218.
- [22] Bohman TM, Wallisch L, Christensen K, et al. Working well—the texas demonstration to maintain independence and employment: 18-month outcomes. *J Vocat Rehabil*. 2011;34:97–106.
- [23] Gentry T, Kriner R, Sima A, et al. Reducing the need for personal supports among workers with autism using an iPod Touch as an assistive technology: delayed randomized control trial. *J Autism Dev Disord*. 2015;45:669–684.
- [24] Sundstrup E, Jakobsen MD, Andersen CH, et al. Effect of two contrasting interventions on upper limb chronic pain and disability: a randomized controlled trial. *Pain Physician*. 2014;17:145–154.
- [25] Calner T, Nordin C, Eriksson MK, et al. Effects of a self-guided, web-based activity programme for patients with persistent musculoskeletal pain in primary healthcare: a randomized controlled trial. *Eur J Pain*. 2017;21:1110–1120.
- [26] Linton SJ, Boersma K, Jansson M, et al. The effects of cognitive-behavioral and physical therapy preventive interventions on pain-related sick leave: a randomized controlled trial. *Clin J Pain*. 2005;21:109–119.
- [27] Suni J, Rinne M, Natri A, et al. Control of the lumbar neutral zone decreases low back pain and improves self-evaluated work ability: a 12-month randomized controlled study. *Spine (Phila Pa 1976)* 2006;31:E611–E620.
- [28] Viikari-Juntura E, Kausto J, Shiri R, et al. Return to work after early part-time sick leave due to musculoskeletal disorders: a randomized controlled trial. *Scand J Work Environ Health*. 2012;38:134–143.

- [29] Arends IA, van der Klink JJ, van Rhenen W, et al. Prevention of recurrent sickness absence among workers with common mental disorders: Results of a cluster-randomised controlled trial. *Occup Environ Med.* 2014;71:21–29.
- [30] De Buck PDM, Le Cessie S, Van Den Hout WB, et al. Randomized comparison of a multidisciplinary job-retention vocational rehabilitation program with usual outpatient care in patients with chronic arthritis at risk for job loss. *Arthritis Rheum.* 2005;53:682–690.
- [31] Hutting N, Staal B, Engels JA, et al. Effect evaluation of a self-management programme for employees with complaints of the arm, neck or shoulder: a randomised controlled trial. *Occup Environ Med.* 2015;72:852–861.
- [32] van Vilsteren M, Boot CRL, Twisk JWR, et al. Effectiveness of an integrated care intervention on supervisor support and work functioning of workers with rheumatoid arthritis. *Disabil Rehabil.* 2016;8288:1–9.
- [33] Hubbard G, Gray N, Ayansina D, et al. Case management vocational rehabilitation for women with breast cancer after surgery: a feasibility study incorporating a pilot randomised controlled trial. *Trials.* 2013;14:175.
- [34] Hammond A, O'Brien R, Woodbridge S, et al. Job retention vocational rehabilitation for employed people with inflammatory arthritis (WORK-IA): a feasibility randomized controlled trial. *BMC Musculoskelet Disord.* 2017;18:315.
- [35] Chopp-Hurley JN, Brennenan EC, Wiebenga EG, et al. Randomized controlled trial investigating the role of exercise in the workplace to improve work ability, performance, and patient-reported symptoms among older workers with osteoarthritis. *J Occup Environ Med.* 2017;59:550–556.
- [36] Schultz IZ, Stowell AW, Feuerstein M, et al. Models of return to work for musculoskeletal disorders [corrected] [published erratum appears in *J OCCUP REHABIL* Dec 17(4):782]. *J Occup Rehabil.* 2007;17:327–352.
- [37] Munir F, Yarker J, McDermott H. Employment and the common cancers: correlates of work ability during or following cancer treatment. *Occup Med (Lond).* 2009;59:381–389.
- [38] Vooijs M, Leensen MCJ, Hoving JL, et al. Interventions to enhance work participation of workers with a chronic disease: a systematic review of reviews. *Occup Environ Med.* 2015;72:820–826.
- [39] Hoogendam A, de Vries Robbé PF, Stalenhoef AFH, et al. Evaluation of PubMed filters used for evidence-based searching: validation using relative recall. *J Med Libr Assoc.* 2009;97:186–193.