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Factors associated with return-to-work among people on work absence due to long-term neck/shoulder or back pain: a systematic review

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ABSTRACT

Objective: The purpose of the present review was to systematically summarize prognostic factors for return-to-work (RTW) among people with long-term neck/shoulder or back pain.

Methods: A systematic literature search was performed through three databases (Medline, CINAHL and PsycINFO) for studies published until February, 2016. Only observational studies of people on work absence (WA) due to long-term neck/shoulder or back pain were included. The methodological quality of the included studies was assessed using guidelines of prognostic studies, and results were synthesized from adequate quality studies only.

Results: Seven studies fulfilled the methodological standard to be included. From these, 5 categories of factors were extracted. Sufficient evidence was found to indicate that recovery beliefs, perceived health and work capacity are important for RTW among people with long-term neck/shoulder or back pain. Insufficient or inconclusive evidence was found for behaviors and workplace factors being predictive of RTW.

Conclusions: Our findings that recovery beliefs, perceived health and work capacity are prognostic factors for RTW, may suggest targets of intervention for people with long-term neck/shoulder or back pain. However, more high-quality prospective studies are needed to confirm the results and improve our understanding of what is needed to facilitate RTW in this population.

INTRODUCTION

Work absence (WA) due to musculoskeletal disorders (MSD) is a considerable public health problem because it results in workers' compensation, medical expense and productivity loss [1-5]. Low back pain (LBP) is considered one of the leading causes of WA [6-9] and neck/shoulder disorders are also among most common reasons for WA [10-12]. Despite improvements in objective measures of health, WA has increased substantially in western European countries [4, 13-15]. It may be that workers on WA may have difficulties returning to work for reasons other than their health condition, for instance psychosocial problems [16-19].

It follows that return- to- work (RTW) following MSD is a complex process that is not solely dependent on physical ability. Studies have shown that it may also be affected by recovery beliefs, pain-related behaviors, work-related factors and health-related factors [17, 20-29], but the results differ considerably between studies. Reasons for this may be heterogeneous samples, differences in measurements, and the analytical strategy used for identifying the factors. Moreover, many studies have been conducted to identify risk factors for WA [16, 30-33], but their results cannot readily be inverted to indicate what is needed for people on WA to RTW. To reduce WA among people with MSD, it is important to know which factors are important for RTW, and thereby what should be prioritized in the treatment/rehabilitation.

To date, most empirical studies on pain and RTW have focused on acute pain and LBP [31, 33-35]. Accordingly, most of previous systematic reviews addressing factors of importance for RTW have focused on people with acute pain. For example, Steenstra et al [20] found that workers' recovery expectations are important factors affecting the likelihood and timing of RTW among workers with acute LBP. This was confirmed in a later review of RTW among people with non-chronic non-specific LBP [17]. Hartvigsen et al [36] reviewed the evidence of psychosocial factors at work being important for RTW among people with LBP, and concluded that there is insufficient evidence of it.

To our knowledge, previous studies on factors affecting RTW among people with long-term pain in the neck/shoulder or back have not been systematically reviewed. It is possible that these factors differ from factors considered important for RTW among people with acute pain. Therefore, the aim of the present study was to systematically summarize prognostic factors for RTW among people with long-term neck/shoulder or back pain.

METHODS

Identification of studies

We performed an extensive search through the databases Medline, CINAHL and PsycINFO for studies published in English until February, 2016. A detailed description of the search terms and search strategy is presented in the Appendix I. The search was performed step by step by adding one search term at a time, using the "AND/AND NOT" operator between them. Synonymous terms of RTW were grouped together using "OR" operator. Afterwards, the results were combined. The reference list for each selected study was screened for additional relevant studies. Moreover, a search for studies that have cited each selected study was performed using the Scopus database.

Selection process

A flow diagram of the selection process is shown in Figure 1. In total, 769 studies were identified from the database search. Of these, 51 were considered eligible based on the title and abstract. After screening the 51 full-texts, 7 studies met all of the inclusion criteria. In the additional search through reference lists and citations of the included studies, 3 studies fulfilled the inclusion criteria. As a result, a total of 10 studies [37-46] remained for methodological quality assessment.

All authors independently screened the titles, abstracts and, if necessary, the full text of the articles for eligibility based on the inclusion criteria: subjects' age between 18 and 65 years, WA $\geq$ 2 weeks, and neck/shoulder or back pain. The lower limit of WA was set to exclude studies on subjects with symptoms that are likely to disappear in short time. Studies were excluded based on the exclusion criteria: review or meta-analysis, intervention study, randomized control trial or clinical trial and case report. In case of disagreement, the results were compared and a consensus was reached. The main reasons for exclusion of studies were: (i) WA due to acute pain and (ii) outcome not RTW. Whiplash-related pain was not excluded because neck pain is the main symptom of whiplash patients [47]. Other reasons were: (iii) non-observational study, (iv) confounding rehabilitation program, (v) instrumental validation and (vi) mixed or wrong population. All studies were prospective with a follow-up at 3-24 months. The studies that were included were from Sweden, Belgium, the United States, Canada and the Netherlands (see Table 1).

Quality assessment

Two authors (MR, MH) independently assessed the methodological quality of the included studies using a standardized set of criteria that was adapted from guidelines for assessing the quality of prognostic studies [48]. Six quality assessment criteria with focus on the key areas of potential bias were used (see Table 2). In the second criterion, the limits for response rate and loss to follow-up were set to 65% and 35%, respectively [49]. In the fifth criterion, we considered age, gender, prior WA and comorbidity as potential confounders important to be accounted for in the analysis [23, 26, 50, 51].

Table 1 Characteristics and findings of the included studies

Author (year)	Place of study	Study design	Length of follow-up	Study population	Sample size and drop-out	Significant factors[a]	Non-significant factors	Definition of RTW[b]
Berglind H & Gerner U (2002) [37]	Sweden	Prospective cohort	24 months	Age: 18-55 years Gender: N/A[c] Pain: low back and neck Work absence: ≥ 8 weeks	n= 289 Response rate: N/A Drop-out: N/A	Work motivation		Work status
Du Bois M, et al. (2009) [40]	Belgium	Prospective cohort	6 months	Age:18-64 years Gender: male and female Pain: low back Work absence: ≥ 4 weeks	n= 390 Response rate: 89% Drop-out: 0%	Disability Pain behavior Fear avoidance beliefs Type of work Prior pain duration		Work status
Gallagher RM, et al. (1995) [38]	United States	Prospective cohort	6 months	Age: ≥ 18 years Gender: male and female Pain: low back Work absence : ≥ 24 weeks	n= 169 Response rate: N/A Drop-out: 6%	(Compensation status × Health locus of control)[d]	Compensation status Use of lawyer	Work status
Gross DP, et al. (2004), part-I [41]	Canada	Historical cohort (2 cohorts)	12 months	Age: $\bar{x}$= 41, 40, SD= 10, 9 years Gender: male and female Pain: low back Work absence: ≥ 6 weeks	n= 150 (c1)[e], N/A (c2)[e] Response rate: 76% (c1), N/A (c2) Drop-out: 32% (c1), 34% (c2)	Functional capacity		Time until suspension of time-loss benefits, time until claim closure
Gross DP and Battie´ MC (2005) [42]	Canada	Prospective cohort	12 months	Age: $\bar{x}$= 42, SD= 11 years Gender: male and female Pain: low back Work absence: ≥ 6 weeks	n= 138 Response rate: 70% Drop-out: 54%	Recovery beliefs		Time until suspension of time-loss benefits, time until claim closure
Hansson E, et al. (2006) [43]	Sweden	Prospective cohort	24 months	Age: 18-59 years Gender: male and female Pain: low back or neck Work absence: ≥ 4 weeks	n= 1575 Response rate: 64-79% Drop-out: 28-55%	Quality of life Disability		Prevalence of work resumption

Kuijer PPFM, et al. (2012) [44]	Nether-lands	Prospective cohort	12 months	Age: 18-55 years Gender: male Pain: low back Work absence: ≥ 3 weeks	n= 72 Response rate: N/A Drop-out: 4%	Work ability	Age Functional capacity	Time until working ≥ 4 weeks
Schultz IZ, et al. (2004) [45]	Canada	Prospective cohort	3 months	Age: 18-60 years Gender: male and female Pain: low back Work absence: ≥ 4 weeks	n= 781 Response rate: 32% Drop-out: 15%	Health transition Recovery expectations	Co-worker support	Work status
Schultz IZ, et al. (2005) [39]	Canada	Prospective cohort	3 months	Age: 18-60 years Gender: male and female Pain: low back Work absence: 4-6 weeks	n= 111 Response rate: N/A Drop-out: 9%	Recovery expectations Symptoms/complaints	Vitality Mental health	Work status
van der Giezen AM, et al. (2000) [46]	Nether-lands	Prospective cohort	12 months	Age:18-60 years Gender: male and female Pain: low back Work absence: ≥ 12 weeks	n= 328 Response rate: 91% Drop-out= 9%	Age General health Job satisfaction Bread winner Pain intensity		Work status

[a]In all articles, except Berglind and Gerner (2002) and Hansson et al (2006) $p < 0.05$ has been used as level of significance
[b]Return to work; [c]Not available; [d]Interaction effect (compensation status × health locus of control) on RTW; [e]c1= cohort 1 and c2= cohort 2

The reviewers graded each criterion as yes=2, partly=1 or no/unclear=0 on the basis of information provided in the articles, and a quality score for each selected study was calculated as the sum of all scores (see Table 3). If the two authors scored a study differently, the results were discussed among all authors and a consensus was reached.

Table 2 Quality assessment criteria

1	Did the sample represent the population of interest?
2	Was loss to follow-up <35% and response rate >65%?
3	Were the prognostic factors measured with valid and reliable instruments?
4	Was the outcome of the study objectively measured?
5	Were important potential confounders (i.e. age, gender, prior WA and comorbidity) appropriately accounted for in the analysis?
6	Was the statistical analysis appropriate?

Data synthesis

We identified prognostic factors that were shown to be significantly ($p < 0.05$) or non-significantly associated with RTW in the complete predictive model of each study. Afterwards, we categorized the factors into categories based on similarity in what they represented. Results were not pooled owing to the use of heterogonous statistical methods and different measures of factors and RTW across the studies.

RESULTS

Table 1 describes each of the selected studies in terms of study design, study population, sample size, attrition and factors identified as significant and non-significant, respectively, in relation to the outcome RTW. From the selected studies, we found a total of 28 factors.

Methodological quality

The methodological quality score, as assessed on the basis of the six selected quality criteria, ranged between 0 and 12 points (see Table 3). For the 10 selected studies, the quality scores ranged between 4 and 10 points. Studies were classified as having adequate or good quality if they scored 5-12 points and low quality if they scored less than 5 points. The results from the adequate or good quality studies are summarized below.

Recovery beliefs

Recovery belief was evaluated as a predictor of RTW in two studies. Both studies reported a significant positive association between work-related recovery belief and RTW [42, 45].

Health-related factors

The association between health-related factors and RTW was investigated in three studies. They consistently reported that health, in terms of health-related quality of life, health transition and perceived general health, was an important predictor of RTW [43, 45, 46].

Table 3 Methodological quality scores of the included studies

Author (Year)	Representative sample of relevant population	Study attrition (loss to follow-up and response rate)	Valid and reliable instruments for predictors	Objectively measured outcomes	Controlled for age/gender/prior WA[a]/comorbidity	Appropriate statistical analysis	Quality score
Berglind H & Gerner U (2002) [37]	2	0	0	2	0	0	4
Du Bois M, et al. (2009) [40]	2	2	0	0	0	1	5
Gallagher RM, et al. (1995) [38]	1	1	0	0	1	1	4
Gross DP, et al. (2004), part-I [41]	2	2	1	2	1	2	10
Gross DP, et al. (2005) [42]	2	1	1	1	0	2	7
Hansson E, et al. (2006) [43]	2	1	0	2	0	0	5
Kuijer PPFM, et al. (2012) [44]	1	1	0	2	1	2	7
Schultz IZ, et al. (2004) [45]	2	2	0	1	0	1	6
Schultz IZ, et al. (2005) [39]	2	1	0	0	0	1	4
Van der Giezen AM, et al. (2000) [46]	2	2	0	0	1	1	6

2=criterion is satisfied**;** 1=criterion is partly satisfied**;** 0= criterion is not satisfied or cannot be determined
Maximum quality score = 12; 0-4 points were considered low quality, and 5-12 points were considered adequate or better quality
[a]Work absence

Workplace factors

Three studies investigated the association between workplace factors and RTW. Two of them showed that type of work and job satisfaction, respectively, significantly related to RTW [40, 46], whereas one study found no significant association between co-worker support and RTW [45].

Work capacity

Five studies reported pain intensity, prior pain duration, work ability, disability and functional capacity, respectively, to be obstacles for RTW [40, 41, 43, 44, 46], whereas one study found functional capacity to be a non-significant factor for sustainable RTW [44].

Behavior

Behavior, measured as pain behavior as well as fear avoidance beliefs, was found to be significantly associated with RTW [40]. However, these results were reported only in one study.

DISCUSSION

In the present systematic review, we synthesized the results from observational studies of prognostic factors for RTW among people with long-term neck/shoulder or back pain. A total of ten studies were included from the literature search. Seven of the studies were found to have adequate or good quality according to our quality assessment criteria. From these, 5 categories of factors were extracted: recovery beliefs, health-related factors, workplace factors, work capacity, and behavior.

Recovery beliefs

Our findings, suggesting that recovery beliefs are important for RTW, are consistent with previous reviews of people with back pain showing that recovery beliefs are associated with better health outcomes and RTW [17, 22]. One possible explanation for recovery beliefs being related to RTW is that when people believe that they will not recover from the illness, they may experience lower competence and motivation for returning to work [17, 21, 52]. In the two studies included in the present review, recovery beliefs were assessed using 3 items about work-related recovery expectations [42] and 6 items covering recovery beliefs in general [45]. This may suggest that recovery beliefs can be assessed easily in practice, when determining which treatment/rehabilitation to apply.

Health-related factors

Our results showed that health, in terms of health-related quality of life, health transition and perceived general health, was a predictor of RTW [43, 45, 46]. This finding is consistent with previous reviews of people with acute, sub-acute and non-specific LBP [17, 53]. It seems reasonable that perceived health is positively associated with RTW, since healthy people are more likely to feel capable of working [20, 23, 54]. For rehabilitation purposes, however, more information about which aspects of health are important for RTW is needed to provide targeted interventions for reducing WA among people with long-term neck/shoulder or back

pain. To achieve this, more in-depth analyses of components of health that are important for RTW are needed.

Workplace factors

Among the three studies involving workplace factors, one investigated job satisfaction and found it to be associated with RTW [46]. A systematic review by Iles et al. [17] on psychosocial predictors of failure to RTW in non-chronic non-specific LBP found strong evidence that job satisfaction is not a predictor of work outcome. The remaining two studies reported that type of work was associated with RTW, while support from co-workers was not [40, 45]. The latter finding is inconsistent with reports of co-worker support being important for work disability following low back injury [16, 55]. Taken together, our results concerning the importance of workplace factors for RTW among people with long-term neck/shoulder or back pain are inconclusive. More research is needed to confirm or refute this.

Work capacity

The majority of the studies investigating factors that reflect individual work capacity, namely work ability, disability, functional capacity, pain intensity and prior pain duration, found them to be significantly associated with RTW [40, 41, 43, 44, 46]. The results are in agreement with previous reviews. For example, Crook et al [56] found that functional disability was an important prognostic factor of work outcome for people with low-back injury, and Verkerk et al [57] found evidence of a positive influence of lower pain intensity on return to work among people with nonspecific low back pain. It appears therefore that work capacity is important to be considered in the treatment/rehabilitation of people with musculoskeletal disorders in the neck, shoulders or back.

Behavior

In this review, we found indications of pain behavior being important for RTW. However, this was only reported in one study [40]. Since pain is a distressing feeling and aversive stimulus, pain-related fear may lead to perceived disability, decreased functional performance, and behavior change. Our result is consistent with a previous review concluding that fear avoidance beliefs are predictive of RTW among people with non-chronic non-specific LBP [17, 58]. However, Pincus et al. [59] found little evidence to link fear of pain with poor outcome in acute LBP. This discrepancy may be due to differences in the populations studied and/or in the methods used for assessing the factors.

In two of the included studies, the impact of age on RTW was reported [44, 46]. In most studies, however, age is treated as a confounding factor, and the significance of it is not specifically reported. For that reason, and the fact that it cannot be targeted in treatment/rehabilitation, we have refrained from drawing conclusions from the reported findings. Interestingly, the study by van der Giezen et al [46] reported that being a bread winner was positively associated with RTW among people with LBP. As it is the only study that has addressed the importance of responsibilities towards others in returning to work, no solid conclusions can be drawn about its importance. However, it may be an important factor to adjust for in future studies of RTW among people with MSD.

Methodological considerations regarding the articles in the review

In most of the studies we retrieved during our literature search, no distinction was made between sick leave, absenteeism, work absence and time out of work. These are not standardized terms, but rather vary from country to country. For consistency, we used work absence (WA) throughout the paper. In addition, there is no standard definition of long-term pain. In this study, we attempted to exclude studies performed on people with acute pain by setting a lower limit on WA of two weeks. Although pain patients were investigated in all included studies, the etiology of the pain was likely different. Some of the studies reported the origin of the pain [40, 41], but others did not do so specifically [43]. This may have affected our results.

Return to work can be described as an individual's cognitive and behavioral response to no longer being absent from work due to sickness [60]. Consequently, it can be measured in different ways, for example not receiving welfare payments [19, 61, 62], or self-reported work status [19, 60]. Furthermore, some studies have differentiated between part-time RTW and full-time RTW [63, 64]. While all of the included studies in the review used an indicator of being in work, some studies based it on records [37, 42, 43] and others on self-report [40, 42, 44-46], and the studies differed in the duration and proportion of work needed to be defined as RTW. It is possible that more consistent use of definitions across studies would have affected the results obtained in the present study.

As effect sizes were not reported consistently in the studies, our conclusions were based on the information provided concerning the significant and non-significant factors for RTW. Only one study received a high quality score based on the 6 methodological criteria for assessing the quality of prognostic studies. Surprisingly, no study reported the statistical power of the analysis performed, and in most of the studies the validity and reliability of the instruments used was not reported.

Strengths and limitations of the systematic review

The strength of the present systematic review is that we searched for studies in three databases covering a wide range of research papers, and that we used a long time interval for each of the databases so as to access as much as possible of relevant literature. We used clear inclusion and exclusion criteria with respect to the population, exposures and study outcome. We also assessed the quality of the studies and confirmed our findings among the authors. Only observational studies were included to minimize potential sources of bias and study the natural course of RTW.

The quality of the studies was assessed by considering six important potential sources of bias in studies of prognostic factors [48]. Since we considered them to be equally important for study quality, they were summarized into a single quality score. The quality score was divided into tertiles to indicate the level of quality (low/adequate/good) of the studies, so that low quality studies could be excluded from the analysis.

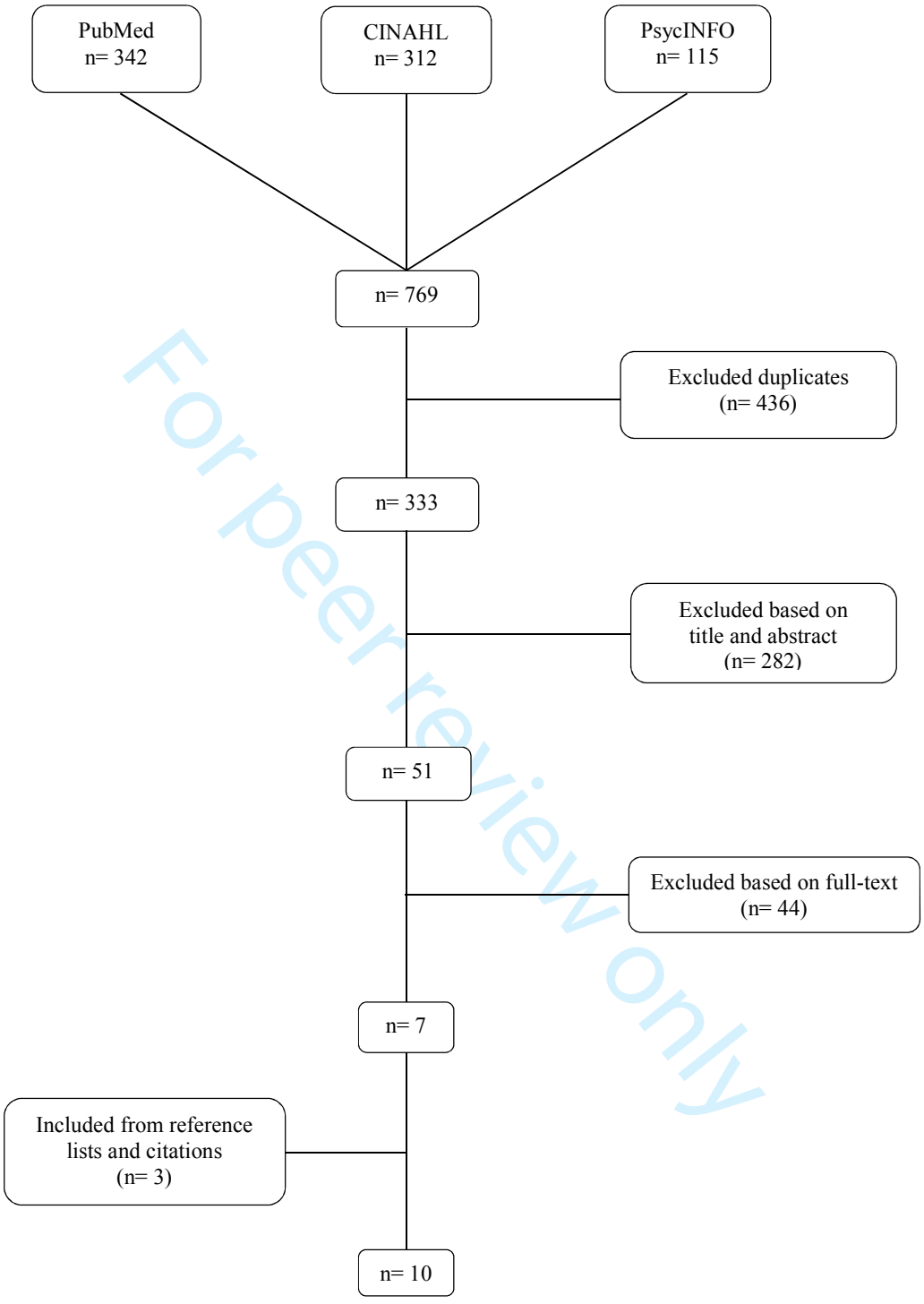

Figure 1: Flow diagram of the selection process

One potential limitation is that only journals publishing studies in English were included, which may have led to the exclusion of important studies from our search. Furthermore, the small number of published studies on prognostic factors for RTW among people with long-term neck/shoulder or back pain prevents us from drawing solid conclusions concerning predictive factors of RTW in this population. Moreover, as most of the included studies concerned low back pain only, our results may be less applicable to people with neck/shoulder pain.

Conclusion

In the present review, we identified 5 categories of factors from studies on RTW among people on WA due to long-term neck/shoulder or back pain. Sufficient evidence was found to indicate that recovery beliefs, perceived health and work capacity are important for RTW in this population. However, few studies have been conducted on this population, and the quality of the studies was generally not high. Thus, we call for more high quality prospective studies that can improve our understanding of what is needed to facilitate RTW for people with long-term neck/shoulder or back pain.

Competing interests:

All authors declare no conflicts of interest with regards to the source of funding for the research or any other support that would have biased the research.

Authors' contributions to the study

MR co-developed the search strategy, performed the search, screened and quality assessed the articles, and drafted the manuscript. **M-L K** co-developed the search strategy, screened articles, contributed to the quality assessment of the articles, and reviewed the initial drafts of the manuscript. **AN** co-developed the search strategy, screened articles, contributed to the quality assessment of the articles, and reviewed the initial drafts of the manuscript. **MH** conceived of the study, co-developed the search strategy, screened and quality assessed the articles, and reviewed the initial drafts of the manuscript. All authors have read and approved the final manuscript.

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Appendix- I

Search history from PubMed:

Search	Search words	No. of articles
#1	neck OR back OR shoulder OR lumbar OR spine OR spinal	640 124
#2	pain OR ache	480 193
#3	factor* OR prognos*	2 855 696
#4	"return* to work" OR "return-to-work" OR "job re-entry" OR "work absence" OR "work ability" OR "ability to work"	9 146
#1 AND #2		96 755
#1 AND #2 AND #3		14 969
#1 AND #2 AND #3 AND #4		412
#1 AND #2 AND #3 AND #4 NOT acute		342

Search history from CINAHL:

Search	Search words	No. of articles
#1	neck OR back OR shoulder OR lumbar OR spine OR spinal	114,940
#2	pain OR ache	140,366
#3	factor* OR prognos*	697,302
#4	"return* to work" OR "return-to-work" OR "job re-entry" OR "work absence" OR "work ability" OR "ability to work"	6,483
#1 AND #2		35,759
#1 AND #2 AND #3		8,895
#1 AND #2 AND #3 AND #4		370
#1 AND #2 AND #3 AND #4 NOT acute		312

Search history from PsycINFO:

Search	Search words	No. of articles
#1	neck OR back OR shoulder OR lumbar OR spine OR spinal	86,952
#2	pain OR ache	92,828
#3	factor* OR prognos*	848,437
#4	"return* to work" OR "return-to-work" OR "job re-entry" OR "work absence" OR "work ability" OR "ability to work"	4,265
#1 AND #2		16,448
#1 AND #2 AND #3		4,646
#1 AND #2 AND #3 AND #4		148
#1 AND #2 AND #3 AND #4 NOT acute		115

*, Used for single key word; "", used if more than a key word.

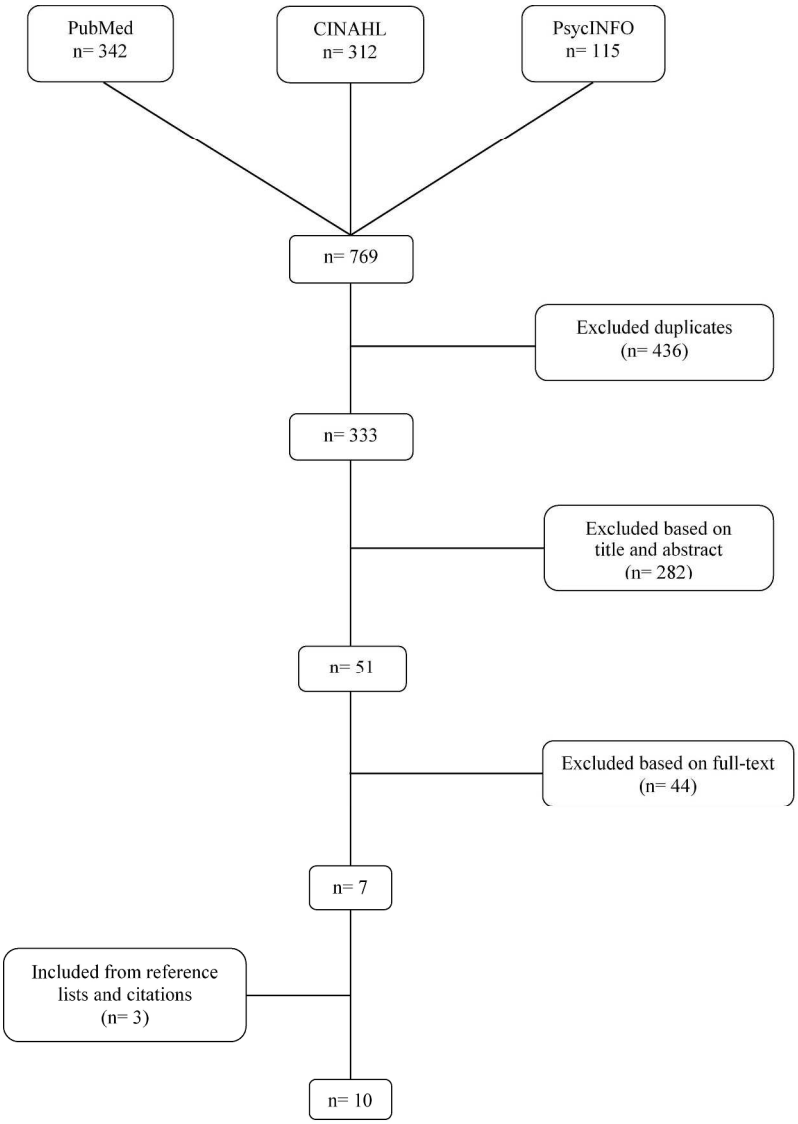

Figure 1: Flow diagram of the selection process

Figure

218x331mm (300 x 300 DPI)

Appendix- I

Search history from PubMed:

Search	Search words	No. of articles
#1	neck OR back OR shoulder OR lumbar OR spine OR spinal	640 124
#2	pain OR ache	480 193
#3	factor* OR prognos*	2 855 696
#4	"return* to work" OR "return-to-work" OR "job re-entry" OR "work absence" OR "work ability" OR "ability to work"	9 146
#1 AND #2		96 755
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*, Used for single key word; "", used if more than a key word.

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Factors associated with return-to-work among people on work absence due to long-term neck or back pain: a narrative systematic review

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Factors associated with return-to-work among people on work absence due to long-term neck or back pain: a narrative systematic review

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Word count: 3431

ABSTRACT

Objective: The purpose of this narrative systematic review was to summarize prognostic factors for return-to-work (RTW) among people with long-term neck/shoulder or back pain.

Methods: A systematic literature search was performed through three databases (Medline, CINAHL and PsycINFO) for studies published until February 2016. Only observational studies of people on work absence (≥ 2 weeks) due to neck/shoulder or back pain were included. The methodological quality of the included studies was assessed using guidelines for assessing quality in prognostic studies on the basis of Framework of Potential Biases. Factors found in the included studies were grouped into categories based on similarities and then labelled according to the aspects covered by the factors in the category.

Results: Nine longitudinal prospective cohort studies and one retrospective study fulfilled the inclusion criteria. From these, 5 categories of factors were extracted. Our findings indicate that recovery beliefs, health-related factors and work capacity are important for RTW among people with long-term neck or back pain. We did not find support for workplace factors and behavior being predictive of RTW.

Conclusions: Our findings suggest that recovery beliefs, perceived health and work capacity, may be important targets of intervention for people with long-term neck or back pain. However, more high-quality prospective studies are needed to confirm the results and improve our understanding of what is needed to facilitate RTW in this population.

Strengths and limitations of this study

- This review focuses on people with long-term pain in the neck or back.
- It contributes to previous findings by addressing prognostic factors of importance for the natural course of return to work.
- Quality assessment of studies was performed by considering areas of potential bias.

INTRODUCTION

Work absence due to musculoskeletal disorders (MSDs) is a considerable public health problem, as it results in workers' compensation, medical expense as well as productivity loss [1-5]. Low back pain (LBP) is considered one of the leading causes of work absence [6-9] and neck/shoulder disorders are also among most common reasons for being absent from work [10-12]. Despite improvements in objective measures of health, work absence has increased substantially in western European countries [4, 13-15]. It may be that workers have difficulties returning to work for reasons other than their health condition, for instance psychosocial problems [16-19].

It follows that return- to- work (RTW) following MSD is a complex process that is not solely dependent on physical ability. Studies have shown that it may also be affected by recovery beliefs, pain-related behaviors, work-related factors and health-related factors [17, 20-29], but the results differ considerably between studies. Reasons for this may be heterogeneous samples, differences in measurements, and the analytical strategy used for identifying the factors. Moreover, many studies have been conducted to identify risk factors for work absence [16, 30-33], but their results cannot readily be inverted to indicate what is needed for people to RTW. To reduce work absence among people with MSD, it is important to know which factors are important for RTW, and thereby what should be prioritized in the treatment/rehabilitation.

To date, most empirical studies on pain and RTW have focused on acute pain and LBP [31, 33-35]. Accordingly, most of previous systematic reviews addressing factors of importance for RTW have focused on people with acute pain. For example, Steenstra et al [20] found that workers' recovery expectations are important factors affecting the likelihood and timing of RTW among workers with acute LBP. This was confirmed in a later review of RTW among people with non-chronic non-specific LBP [17]. Hartvigsen et al [36] reviewed the evidence of psychosocial factors at work being important for RTW among people with LBP, and concluded that there is insufficient evidence of it.

To our knowledge, previous studies on factors affecting RTW among people with long-term (i.e., not acute) pain in the neck/shoulder or back have not been systematically reviewed. It is possible that these factors differ from factors considered important for RTW among people with acute pain. Therefore, the aim of the present systematic review was to

narratively summarize prognostic factors for RTW among people with long-term neck/shoulder or back pain.

METHODS

Identification of studies

We performed an extensive search through each of the databases Medline, CINAHL and PsycINFO from its inception until February 2016 for observational studies published in English of prognostic factors for RTW among people with pain in the neck/shoulder or back. A detailed description of the search terms and search strategy is presented in the Appendix I. The terms used in the search were defined based on the ideas behind the PICO model [37]. We selected suitable keywords for P (population), I (intervention), O (outcome), while C (comparison) was excluded since comparison studies were not the focus for this study. Afterwards, the results from the three databases were combined. The reference list for each selected study was screened for additional relevant studies. Moreover, a search for studies that have cited each selected study was performed using the Scopus database, and reviews or meta-analyses were screened for relevant references or included studies.

Selection of studies

All authors independently screened the titles, abstracts and, if necessary, the full text of the articles for eligibility based on the inclusion criteria:

- Subjects' age between 18 and 65 years
- Work absence ≥ 2 weeks
- Neck/shoulder or back pain

Work absence was defined as part-time or full-time absenteeism from work. The lower limit of 2 weeks was set to avoid inclusion of studies on prognostic factors related to acute injury or trauma, since they might differ substantially from prognostic factors related to long-term (i.e., not acute) pain. Reasons for the work absence had to be pain in the neck, shoulders or back that was not attributed to acute injury or trauma. Hence, the exclusion criteria were:

- Work absence due to acute pain or trauma
- Outcome not RTW

- Non-observational study (i.e., review/meta-analysis, intervention study or clinical trial)
- Confounding rehabilitation program
- Instrumental validation
- Mixed or wrong population

RTW can be described as an individual's cognitive and behavioral response to no longer being absent from work due to sickness [38]. Consequently, it can be measured in different ways. In the present review, RTW was defined as being back at work (part-time or full-time) for at least 1 day. Following this definition, any indicator of work resumption was acceptable.

Quality assessment

Two reviewers (MR, MH) independently assessed the methodological quality of the included studies using a set of criteria that was adapted from 'guidelines for assessing the quality in prognostic studies on the basis of Framework of Potential Biases' [39]. It included six quality assessment criteria with focus on the key areas of potential bias in prognostic studies: study population, study attrition, measurement of prognostic factors, measurement of outcomes, measurement of and controlling for confounding variables, and analysis approaches (see Table 1). In the second criterion, the limits for response rate and loss to follow-up were set to 65% and 35%, respectively. They were considered relevant in light of declining participation rates in epidemiologic studies, and have been used in previous health-related research [40, 41]. In the fifth criterion, we considered age, gender, prior work absence and comorbidity as potentially important confounders to be accounted for in the analysis, as their association with RTW in people with neck/shoulder or back pain has previously been demonstrated [23, 26, 42-44].

The reviewers graded each criterion as yes=2, partly=1 or no/unclear=0 on the basis of information provided in the articles. Criterion 1 (study population) was graded "partly" if a subgroup of the population fulfilled our inclusion criteria. Criterion 2 (study attrition) was graded "partly" if either the response rate exceeded 65% or the loss to follow-up was less than 35%. Criterion 3 (prognostic factors) was graded "partly" if the validity and/or reliability was reported for some, but not all, measurements of prognostic factors.

Table 1. Quality assessment criteria

1	Did the sample represent the population of interest?
2	Was loss to follow-up < 35% and response rate > 65%?
3	Were the prognostic factors measured with valid and reliable instruments?
4	Was the outcome of the study objectively measured?
5	Were important potential confounders (i.e. age, gender, prior WA and comorbidity) appropriately accounted for in the analysis?
6	Was the statistical analysis appropriate?

Criterion 4 (outcomes) was graded "partly" if some, but not all, outcomes were measured objectively. Criterion 5 (confounders) was graded "partly" if some, but not all, listed variables were controlled for in the analysis. Criterion 6 (analysis) was graded "yes" if a multiple regression model corresponding to the outcome measurement was used and the predictors were selected without relying on empirical information about the measured exposure [45], "partly" if a multiple regression model corresponding to the outcomes measurement was used and stepwise or bivariate statistical analysis of each potential predictor's association with the outcome was used to guide the selection of predictors in the model, and "no/unclear" otherwise. In case of disagreement between the two reviewers, remaining reviewers also reviewed the article, and the judgement made by the majority of the reviewers determined the quality rating. A quality score for each study was calculated as the sum of all scores, thus ranging between 0 and 12 points where higher scores indicate better quality. No weighting was used, as we did not consider any area of potential bias to be more important than another.

Data synthesis

We identified main factors that were shown to be significantly ($p < 0.05$) or non-significantly associated with RTW in the included studies. Factors that expressed related meanings, i.e., based on similarities, were grouped together into categories. Afterwards, we labelled each category according to the aspects covered by the factors in the category.

RESULTS

A flow diagram of the selection process is shown in Figure 1. In total, 769 studies were identified from the database search. After removing the duplicates, 333 studies remained. Out of these, 51 were considered eligible based on the title and abstract. When screening the 51 full-texts, 7 studies met all of the inclusion criteria (see Appendix II). In the additional search through reference lists and citations of the included studies, 3 studies fulfilled the inclusion criteria. As a result, a total of 10 studies [46-55] remained for methodological quality assessment and synthesis of results.

Table 2. Characteristics and findings of the included studies

Author (year)	Place of study	Study design	Length of follow-up	Study population	Sample size and drop-out	Significant main factors[a]	Non-significant main factors	Measurements of RTW[b]
Berglind H & Gerner U (2002) [46]	Sweden	Prospective cohort	24 months	Age: 18-55 years Gender: N/A[c] Pain: low back and neck Work absence: ≥ 8 weeks Pain duration: ≥ 8 weeks	n= 289 Response rate: N/A Drop-out: N/A	Work motivation		Work status (Yes/No)
Du Bois M, et al. (2009) [49]	Belgium	Prospective cohort	6 months	Age:18-64 years Gender: male and female Pain: low back Work absence: ≥ 4 weeks Pain duration: ≥ 4 weeks	n= 390 Response rate: 89% Drop-out: 0%	Disability Pain behavior Fear avoidance beliefs Type of work Prior pain duration		Work status (Yes/No)
Gallagher RM, et al. (1995) [47]	United States	Prospective cohort	6 months	Age: ≥ 18 years Gender: male and female Pain: low back Work absence : ≥ 24 weeks Pain duration: ≥ 24 weeks	n= 169 Response rate: N/A Drop-out: 6%		Compensation status Use of lawyer	Work status (Yes/No)
Gross DP, et al. (2004), part-I [50]	Canada	Retrospective cohort (2 cohorts)	12 months	Age: $\bar{x}$= 41, 40, SD= 10, 9 years Gender: male and female Pain: low back Work absence: ≥ 6 weeks Pain duration: ≥ 6 weeks	n= 150 (c1)[d], N/A (c2)[d] Response rate: 76% (c1), N/A (c2) Drop-out: 32% (c1), 34% (c2)	Functional capacity		Time until suspension of time-loss benefits, time until claim closure
Gross DP and Battie´ MC (2005) [51]	Canada	Prospective cohort	12 months	Age: $\bar{x}$= 42, SD= 11 years Gender: male and female Pain: low back Work absence: ≥ 6 weeks Pain duration: ≥ 6 weeks	n= 138 Response rate: 70% Drop-out: 54%	Recovery beliefs		Time until suspension of time-loss benefits, time until claim closure
Hansson E, et al. (2006) [52]	Sweden	Prospective cohort	24 months	Age: 18-59 years Gender: male and female Pain: low back or neck Work absence: ≥ 4 weeks Pain duration: ≥ 4 weeks	n= 1575 Response rate: 64-79% Drop-out: 28-55%	Quality of life Disability		Prevalence of work resumption

Kuijer PPFM, et al. (2012) [53]	Nether-lands	Prospective cohort	12 months	Age: 18-55 years Gender: male Pain: low back Work absence: ≥ 6 weeks Pain duration: ≥ 6 weeks	n= 72 Response rate: N/A Drop-out: 4%	Work ability	Age Functional capacity	Time until working ≥ 4 weeks
Schultz IZ, et al. (2004) [54]	Canada	Prospective cohort	3 months	Age: 18-60 years Gender: male and female Pain: low back Work absence: ≥ 4 weeks Pain duration: ≥ 4 weeks	n= 781 Response rate: 32% Drop-out: 15%	Health transition Recovery expectations	Co-worker support	Work status (Yes/No)
Schultz IZ, et al. (2005) [48]	Canada	Prospective cohort	3 months	Age: 18-60 years Gender: male and female Pain: low back Work absence: 4-6 weeks Pain duration: ≥ 4 weeks	n= 111 Response rate: N/A Drop-out: 9%	Recovery expectations Symptoms/complaints	Vitality Mental health	Work status (Yes/No)
van der Giezen AM, et al. (2000) [55]	Nether-lands	Prospective cohort	12 months	Age:18-60 years Gender: male and female Pain: low back Work absence: ≥ 12 weeks Pain duration: ≥ 12 weeks	n= 328 Response rate: 91% Drop-out= 9%	Age General health Job satisfaction Bread winner Pain intensity		Work status (Yes/No)

[a]In all articles, except Berglind and Gerner (2002) and Hansson et al (2006) p <0.05 has been used as level of significance
[b]Return to work; [c]Not available; [d]c1= cohort 1 and c2= cohort 2

These ten studies originated from Sweden, Belgium, the United States, Canada, and the Netherlands (see Table 2). All of them were longitudinal prospective cohort studies with a follow-up of 3-24 months, except one that was retrospective. They were conducted on populations with pain in the neck or low back that had been absent from work for at least 4 weeks. Table 2 describes each of the selected studies in terms of study design, study population, sample size, attrition and factors identified as significant and non-significant, respectively, in relation to the outcome RTW.

Quality scores

For the 10 selected studies, the quality scores ranged between 4 and 9 points. The studies were classified as low quality (0-4 points), medium quality (5-8 points), and high quality (9-12 points) (Table 3).

In the synthesis of results, 5 categories of the factors were extracted: recovery beliefs, health-related factors, workplace factors, work capacity and behavior (Table 4). Each of them is described in detail below.

Recovery beliefs

Recovery beliefs comprise many aspects, such as believing that you will be able to function or work in the presence or absence of pain, or that you will be in control of your situation [56]. They were evaluated as predictors of RTW in two low and two medium quality studies [46, 48, 51, 54]. All studies reported a significant positive association between recovery belief and RTW, when the predictor was measured by the Expectations of Recovery Scale, the Work-related Recovery Expectations Questionnaire, and single questions, respectively (Table 4).

Health-related factors

Health is a multifaceted concept, and more than merely the absence of disease [57]. It involves several dimensions, for example quality of life and vitality. It can also be separated into physical and mental components. Among the reviewed studies, the association between health-related factors and RTW was investigated in four studies of low and medium quality. The medium quality studies consistently reported that health, in terms of health-related quality of life, health transition and general health, was a significant predictor of RTW [52, 54, 55]. In the low quality study, no significant association between vitality, mental health and RTW was found [48]. Table 4 shows the instruments used to measure the health-related factors.

Workplace factors

Three medium quality studies investigated the association between workplace factors and RTW. Two of them showed that type of work (blue color work) and job satisfaction, respectively, significantly related to RTW [49, 55], whereas one study found no significant association between co-worker support and RTW [54]. The different predictors were measured using single questions and the Job Satisfaction Scale (Table 4).

Work capacity

Several studies investigated the predictive ability of factors related to work capacity for RTW. Among them, two medium quality studies found that pain intensity and prior pain duration were significantly associated with RTW [49, 55]. In one low quality and two medium quality studies, self-rated disability was also identified as a significant predictor of RTW [48, 49, 52]. Work ability, measured by the Work Ability Index, contributed significantly to RTW in one medium quality study [53]. One high quality and one medium quality study investigated the prognostic value of functional capacity tests for RTW, and found different results [50, 53]. In the high quality study, findings from functional capacity lifting tests significantly predicted RTW, whereas in the medium quality study, findings from functional capacity evaluation involving several tasks showed no significant association with RTW. More information about the measurement of the factors is presented in Table 4.

Behavior

Pain behavior and fear avoidance beliefs were investigated in one medium quality study, where both were identified as significant predictors for RTW [49]. In the study, pain behavior was measured by the Pain Behavior Scale, and fear avoidance beliefs with the Fear Avoidance Beliefs Questionnaire (Table 4).

DISCUSSION

In the present systematic review, we synthesized the results from observational studies of prognostic factors for RTW among people with long-term neck or back pain. A total of ten studies were included from the literature search. Among them, one was classified as high quality, six as medium quality, and three as low quality studies according to our quality assessment criteria. From the studies, 5 categories of factors were extracted: recovery beliefs, health-related factors, workplace factors, work capacity, and behavior.

Table 3. Methodological quality scores of the included studies

Author (Year)	Representative sample of relevant population	Study attrition (loss to follow-up and response rate)	Valid and reliable instruments for predictors	Objectively measured outcomes	Controlled for age/gender/prior WA[a]/comorbidity	Appropriate statistical analysis	Quality score
Berglind H & Gerner U (2002) [46]	2	0	0	2	0	0	4
Du Bois M, et al. (2009) [49]	2	2	0	0	0	1	5
Gallagher RM, et al. (1995) [47]	1	1	0	0	1	1	4
Gross DP, et al. (2004), part-I [50]	2	2	1	2	1	1	9
Gross DP, et al. (2005) [51]	2	1	1	1	0	0	5
Hansson E, et al. (2006) [52]	2	1	0	2	0	0	5
Kuijer PPFM, et al. (2012) [53]	1	1	0	2	1	2	7
Schultz IZ, et al. (2004) [54]	2	2	0	1	0	1	6
Schultz IZ, et al. (2005) [48]	2	1	0	0	0	1	4
Van der Giezen AM, et al. (2000) [55]	2	2	0	0	1	1	6

2=criterion is satisfied**;** 1=criterion is partly satisfied**;** 0= criterion is not satisfied or cannot be determined

Maximum quality score = 12; 0-4 points were considered low quality, and 5-8 points were considered medium quality, and 9-12 points were considered as high quality

[a]Work absence

Recovery beliefs

Our findings, suggesting that recovery beliefs are important for RTW, are consistent with previous reviews of people with back pain showing that recovery beliefs are associated with better health outcomes and RTW [17, 22]. One possible explanation for recovery beliefs being related to RTW is that when people believe that they will not recover from the illness, they may experience lower competence and motivation for returning to work [17, 21, 58]. The fact that simple measurements of recovery beliefs can be used to predict RTW may be useful in practice, when determining which treatment/rehabilitation to apply.

Health-related factors

Previous reviews of people with acute, sub-acute and non-specific LBP [17, 59] have shown that health is an important predictor of RTW. Among the studies included in this review, the results were not entirely consistent. Considering the quality of the studies, and the different aspects of health investigated, it appears that health-related factors should be paid attention to in relation to RTW. It seems reasonable that perceived health is positively associated with RTW, since healthy people are more likely to feel capable of working [20, 23, 60]. For rehabilitation purposes, however, more information about which aspects of health are important for RTW is needed to provide targeted interventions for reducing work absence among people with long-term neck or back pain. To achieve this, more in-depth analyses of components of health that are important for RTW are needed.

Workplace factors

The diversity in results as well as workplace factors investigated in the studies prevents any solid conclusions from being drawn. While it is conceivable that type of work performed is important for RTW, it would likely depend upon which types of work are considered, and it is not clear how this information could be useful in practice without more knowledge about the work demands involved. Previous reviews have found that job satisfaction cannot predict failure to RTW in non-chronic non-specific LBP patients [17], and that co-worker support is important for work disability following low back injury [16, 61]. Taken together, our results concerning the importance of workplace factors for RTW among people with long-term neck or back pain are inconclusive. More research is needed to confirm or refute this.

Table 4. Categorization of factors

Factors	Measurement	Categories
Recovery beliefs [46, 51]	Expectations of Recovery Scale, Single questions	Recovery beliefs
Recovery expectations [48, 54]	Work-related Recovery Expectations Questionnaire	
Quality of life [52]	EuroQol	Health-related factors
Health transition [54]	Short Form (36) Health Survey	
Vitality [48]	Short Form (36) Health Survey	
Mental health [48]	Short Form (36) Health Survey	
General health [55]	Short Form (36) Health Survey	
Type of work [49]	Single question	Workplace factors
Co-worker support [54]	Single question	
Job satisfaction [55]	Job Satisfaction Scale	
Disability [49, 52]	Von Korff's pain and disability score, single questions	Work capacity
Prior pain duration [49]	Single question	
Functional capacity [50, 53]	Functional Capacity Evaluation lifting tests, Isernhagen Work System FCE	
Work ability [53]	Work Ability Index	
Pain intensity [55]	Pain complaint questionnaire	
Symptoms/complaints [48]	Single questions	
Pain behavior [49]	Pain Behavior Scale	Behavior
Fear avoidance beliefs [49]	Fear Avoidance Beliefs Questionnaire	

Work capacity

Among the studies of factors related to work capacity, the findings were mostly consistent. While self-rated measures of work capacity in terms of pain, disability or work ability can significantly predict RTW among people with long-term pain in the neck or back, the ability of functional capacity evaluation tests to do so may be affected by how the tests are performed. Our results are in agreement with previous reviews. For example, Crook et al [62] found that functional disability was an important prognostic factor of work outcome for people with low-back injury, and Verkerk et al [63] found evidence of a positive influence of lower pain intensity on RTW among people with nonspecific low back pain. It appears therefore that work capacity is important to be considered in the treatment/rehabilitation of people with MSDs in the neck or back.

Behavior

Since factors relating to behavior were investigated in only one study, no solid conclusions about its relation to RTW in this population can be drawn. Previous reviews are also inconsistent. Iles et al. [17] concluded that fear avoidance beliefs are predictive of RTW among people with non-chronic non-specific LBP. However, Pincus et al. [64] found little evidence to link fear of pain with poor outcome in acute LBP. This discrepancy may be due to differences in the populations studied and/or in the methods used for assessing the factors.

In two of the included studies, the impact of age on RTW was reported [53, 55]. In most studies, however, age is treated as a confounding factor, and the significance of it is not specifically reported. For that reason, and the fact that it cannot be targeted in treatment/rehabilitation, we have refrained from drawing conclusions from the reported findings. Interestingly, the study by van der Giezen et al [55] reported that being a breadwinner was positively associated with RTW among people with LBP. As it is the only study that has addressed the importance of responsibilities towards others in returning to work, no solid conclusions can be drawn about its importance. However, it may be an important factor to adjust for in future studies of RTW among people with MSDs.

Methodological considerations regarding the articles in the review

In most of the studies we retrieved during our literature search, no distinction was made between sick leave, absenteeism, work absence and time out of work. These are not standardized terms, but rather vary from country to country. For consistency, we used work absence throughout the paper.

Our definition of RTW allowed it to be measured differently in the studies. Some studies based it on records [46, 51, 52] and others on self-report [49, 51, 53-55], and the studies differed in the duration and proportion of work needed to be defined as RTW. It is possible that more consistent use of definitions across studies would have affected the results obtained in the present study.

As effect sizes were not reported consistently in the studies, our conclusions were based on the information provided concerning the significant and non-significant factors for RTW. Only one study received a high quality score based on the 6 methodological criteria for assessing the quality of prognostic studies. Surprisingly, no study reported the statistical power of the analysis performed, and in most of the studies the validity and reliability of the instruments used was not reported.

Strengths and limitations of the systematic review

Previous reviews on prognostic factors of RTW have focused largely on people with acute pain. The present review highlights predictors for RTW among people with long-term pain in the neck or back by considering observational studies only. Thereby, it contributes to previous findings by addressing factors of importance for patients with long lasting pain in their natural course of RTW.

The strength of the present systematic review is that we searched for studies in three databases covering a wide range of research papers, and that we used a long time interval for each of the databases so as to access as much as possible of relevant literature. We used clear inclusion and exclusion criteria with respect to the population, exposures and study outcome. We also assessed the quality of the studies and confirmed our findings among the authors. Only observational studies were included to minimize potential sources of bias and study the natural course of RTW. The quality of the studies was assessed by considering six important potential sources of bias in studies of prognostic factors [39]. Since we considered

them to be equally important for study quality, they were summarized into a single quality score. The quality score was then divided into tertiles to indicate the level of quality (low/medium/high) of the studies, thereby allowing quality as well as quantity to be considered in the synthesis of results.

One potential limitation is that only journals publishing studies in English were included, which may have led to the exclusion of important studies from our search. Furthermore, the small number of published studies on prognostic factors for RTW among people with long-term neck or back pain prevents us from drawing solid conclusions concerning predictive factors of RTW in this population. Moreover, as most of the included studies concerned low back pain only, our results may be less applicable to people with neck/shoulder pain. Although pain patients were investigated in all included studies, the etiology of the pain was likely different. Some of the studies reported the origin of the pain [49, 50], but others did not do so specifically [52]. This may have affected our results.

Conclusion

In the present review, we identified 5 categories of factors from studies of RTW among people absent from work (≥ 2 weeks) due to long-term neck or back pain. Our results indicate that recovery beliefs, health-related factors and work capacity are important for RTW in this population. However, few studies have been conducted on this population, and the quality of the studies was generally not high. Thus, we call for more high quality prospective studies that can improve our understanding of what is needed to facilitate RTW for people with long-term neck or back pain.

Authors' contributions

MR co-developed the search strategy, performed the search, screened and quality assessed the articles, and drafted the manuscript. **M-L K** co-developed the search strategy, screened articles, contributed to the quality assessment of the articles, and reviewed the initial drafts of the manuscript. **AN** co-developed the search strategy, screened articles, contributed to the quality assessment of the articles, and reviewed the initial drafts of the manuscript. **MH** conceived of the study, co-developed the search strategy, screened and quality assessed the articles, and reviewed the initial drafts of the manuscript. All authors have read and approved the final manuscript.

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Competing interests:

All authors declare no conflicts of interest with regards to the source of funding for the research or any other support that would have biased the research.

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Data sharing statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author upon request.

Figure 1. Flow diagram of the selection process. All authors independently screened the titles, abstracts and, if necessary, the full text of the articles.

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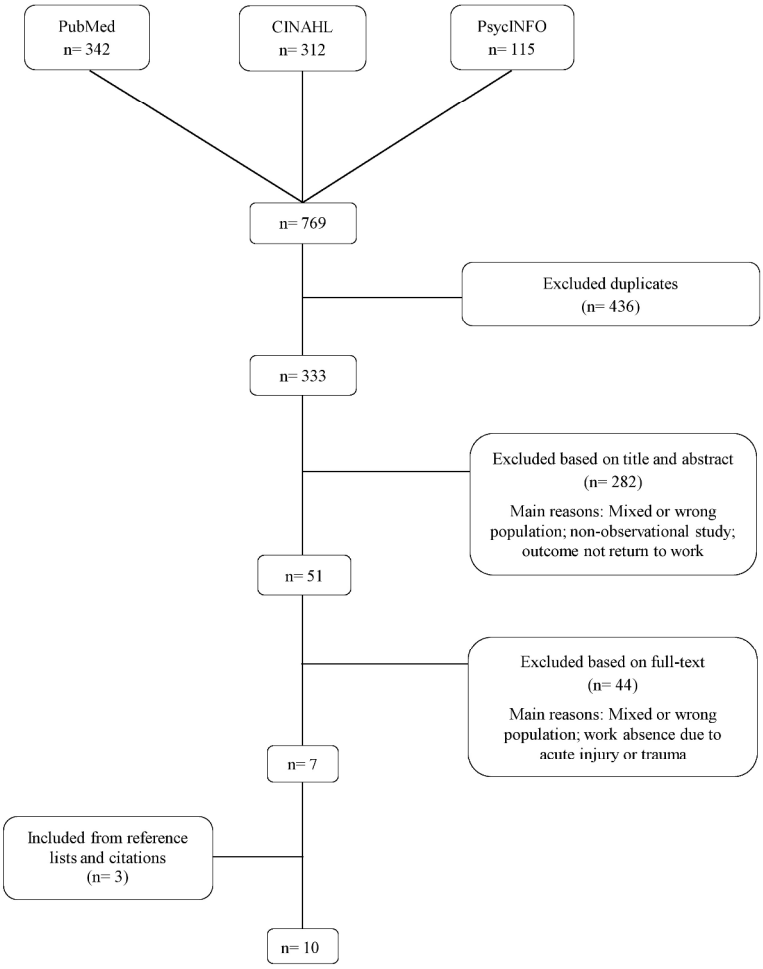

254x338mm (300 x 300 DPI)

Appendix- I

Search history from PubMed:

Search	Search words	No. of articles
#1	neck OR back OR shoulder OR lumbar OR spine OR spinal	640 124
#2	pain OR ache	480 193
#3	factor* OR prognos*	2 855 696
#4	"return* to work" OR "return-to-work" OR "job re-entry" OR "work absence" OR "work ability" OR "ability to work"	9 146
#1 AND #2		96 755
#1 AND #2 AND #3		14 969
#1 AND #2 AND #3 AND #4		412
#1 AND #2 AND #3 AND #4 NOT acute		342

Search history from CINAHL:

Search	Search words	No. of articles
#1	neck OR back OR shoulder OR lumbar OR spine OR spinal	114,940
#2	pain OR ache	140,366
#3	factor* OR prognos*	697,302
#4	"return* to work" OR "return-to-work" OR "job re-entry" OR "work absence" OR "work ability" OR "ability to work"	6,483
#1 AND #2		35,759
#1 AND #2 AND #3		8,895
#1 AND #2 AND #3 AND #4		370
#1 AND #2 AND #3 AND #4 NOT acute		312

Search history from PsycINFO:

Search	Search words	No. of articles
#1	neck OR back OR shoulder OR lumbar OR spine OR spinal	86,952
#2	pain OR ache	92,828
#3	factor* OR prognos*	848,437
#4	"return* to work" OR "return-to-work" OR "job re-entry" OR "work absence" OR "work ability" OR "ability to work"	4,265
#1 AND #2		16,448
#1 AND #2 AND #3		4,646
#1 AND #2 AND #3 AND #4		148
#1 AND #2 AND #3 AND #4 NOT acute		115

*, Used for single key word; "", used if more than a key word.

Appendix- II

Reasons of exclusion	Number of full-texts
Mixed or wrong population	16
Work absence due to acute pain or trauma	11
Non-observational studies (e.g., review/met-analysis, intervention study or clinical trial)	4
Work absence duration was not clear	4
Outcome not RTW	3
Confounding rehabilitation program	2
Instrumental validation	2
Not in English language	2

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	

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Factors associated with return-to-work among people on work absence due to long-term neck or back pain: a narrative systematic review

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Factors associated with return to work among people on work absence due to long-term neck or back pain: a narrative systematic review

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ABSTRACT

Objective: The purpose of this narrative systematic review was to summarize prognostic factors for return to work (RTW) among people with long-term neck/shoulder or back pain.

Methods: A systematic literature search was performed through three databases (Medline, CINAHL and PsycINFO) for studies published until February 2016. Only observational studies of people on work absence (≥ 2 weeks) due to neck/shoulder or back pain were included. The methodological quality of the included studies was assessed using guidelines for assessing quality in prognostic studies on the basis of Framework of Potential Biases. Factors found in the included studies were grouped into categories based on similarities and then labelled according to the aspects covered by the factors in the category.

Results: Nine longitudinal prospective cohort studies and one retrospective study fulfilled the inclusion criteria. From these, 5 categories of factors were extracted. Our findings indicate that recovery beliefs, health-related factors and work capacity are important for RTW among people with long-term neck or back pain. We did not find support for workplace factors and behavior being predictive of RTW.

Conclusions: Our findings suggest that recovery beliefs, perceived health and work capacity, may be important targets of intervention for people with long-term neck or back pain. However, more high-quality prospective studies are needed to confirm the results and improve our understanding of what is needed to facilitate RTW in this population.

Strengths and limitations of this study

- The review identifies prognostic factors of importance for the natural course of return to work in people with long-term pain.
- Findings are based on quality-assessed studies considering areas of potential bias.
- Few high-quality studies prevent solid conclusions about prognostic factors in this population.
- Since most studies concerned low back pain only, the results are less applicable to people with neck/shoulder pain.

INTRODUCTION

Work absence due to Musculoskeletal Disorders (MSDs) is a considerable public health problem, as it results in workers' compensation, medical expense as well as productivity loss [1-5]. Low back pain (LBP) is considered one of the leading causes of work absence [6-9] and neck/shoulder disorders are also among most common reasons for being absent from work [10-12]. Despite improvements in objective measures of health, work absence has increased substantially in western European countries [4, 13-15]. It may be that workers have difficulties returning to work for reasons other than their health condition, for instance psychosocial problems [16-19].

It follows that return to work (RTW) following MSDs is a complex process that is not solely dependent on physical ability. Studies have shown that it may also be affected by recovery beliefs, pain-related behaviors, work-related factors and health-related factors [17, 20-29], but the results differ considerably between studies. Reasons for this may be heterogeneous samples, differences in measurements, and the analytical strategy used for identifying the factors. Moreover, many studies have been conducted to identify risk factors for work absence [16, 30-33], but their results cannot readily be inverted to indicate what is needed for people to RTW. To reduce work absence among people with MSDs, it is important to know which factors are important for RTW, and thereby what should be prioritized in the treatment/rehabilitation.

To date, most empirical studies on pain and RTW have focused on acute pain and LBP [31, 33-35]. Accordingly, most of previous systematic reviews addressing factors of importance for RTW have focused on people with acute pain. For example, Steenstra et al [20] found that workers' recovery expectations are important factors affecting the likelihood and timing of RTW among workers with acute LBP. This was confirmed in a later review of RTW among people with non-chronic non-specific LBP [17]. Hartvigsen et al [36] reviewed the evidence of psychosocial factors at work being important for RTW among people with LBP, and concluded that there is insufficient evidence of it.

To our knowledge, previous studies on factors affecting RTW among people with long-term (i.e., not acute) pain in the neck/shoulder or back have not been systematically reviewed. It is possible that these factors differ from factors considered important for RTW among people with acute pain. Therefore, the aim of the present systematic review was to

narratively summarize prognostic factors for RTW among people with long-term neck/shoulder or back pain.

METHODS

Identification of studies

We performed an extensive search through each of the databases Medline, CINAHL and PsycINFO from its inception until February 2016 for observational studies published in English of prognostic factors for RTW among people with pain in the neck/shoulder or back. A detailed description of the search terms and search strategy is presented in the Appendix I. The terms used in the search were defined based on the ideas behind the PICO model [37]. We selected suitable keywords for P (population), I (intervention), O (outcome), while C (comparison) was excluded since comparison studies were not the focus for this study. Afterwards, the results from the three databases were combined. The reference list for each selected study was screened for additional relevant studies. Moreover, a search for studies that have cited each selected study was performed using the Scopus database, and reviews or meta-analyses were screened for relevant references or included studies.

Selection of studies

All authors independently screened the titles, abstracts and, if necessary, the full text of the articles for eligibility based on the inclusion criteria:

- Subjects' age between 18 and 65 years
- Work absence ≥ 2 weeks
- Neck/shoulder or back pain

Work absence was defined as part-time or full-time absenteeism from work. The lower limit of 2 weeks was set to avoid inclusion of studies on prognostic factors related to acute injury or trauma, since they might differ substantially from prognostic factors related to long-term pain. Accordingly, long-term pain in the neck, shoulder or back was defined as pain that was not attributed to acute injury or trauma requiring at least 2 weeks part-time or full-time absenteeism from work. The exclusion criteria were:

-
- Outcome not RTW

- Non-observational study (i.e., review/meta-analysis, intervention study or clinical trial)
- Confounding rehabilitation program
- Instrumental validation
- Population partly consisting of subjects fitting the inclusion criteria but for whom the results were not reported specifically

RTW can be described as an individual's cognitive and behavioral response to no longer being absent from work due to sickness [38]. Consequently, it can be measured in different ways. In the present review, RTW was defined as being back at work (part-time or full-time) for at least 1 day. Following this definition, any indicator of work resumption was acceptable.

Quality assessment

Two reviewers (MR, MH) independently assessed the methodological quality of the included studies using a set of criteria that was adapted from 'guidelines for assessing the quality in prognostic studies on the basis of Framework of Potential Biases' [39]. It included six quality assessment criteria with focus on the key areas of potential bias in prognostic studies: study population, study attrition, measurement of prognostic factors, measurement of outcomes, measurement of and controlling for confounding variables, and analysis approaches (see Table 1). In the second criterion, the limits for response rate and loss to follow-up were set to 65% and 35%, respectively. They were considered relevant in light of declining participation rates in epidemiologic studies, and have been used in previous health-related research [40, 41]. In the fifth criterion, we considered age, gender, prior work absence and comorbidity as potentially important confounders to be accounted for in the analysis, as their association with RTW in people with neck/shoulder or back pain has previously been demonstrated [23, 26, 42-44].

The reviewers graded each criterion as yes=2, partly=1 or no/unclear=0 on the basis of information provided in the articles. Criterion 1 (study population) was graded "partly" if a subgroup of the population fulfilled our inclusion criteria. Criterion 2 (study attrition) was graded "partly" if either the response rate exceeded 65% or the loss to follow-up was less than 35%. Criterion 3 (prognostic factors) was graded "partly" if the validity and/or reliability was reported for some, but not all, measurements of prognostic factors.

Table 1. Quality assessment criteria

1	Did the sample represent the population of interest?
2	Was loss to follow-up < 35% and response rate > 65%?
3	Were the prognostic factors measured with valid and reliable instruments?
4	Was the outcome of the study objectively measured?
5	Were important potential confounders (i.e. age, gender, prior WA and comorbidity) appropriately accounted for in the analysis?
6	Was the statistical analysis appropriate?

Criterion 4 (outcomes) was graded "partly" if some, but not all, outcomes were measured objectively. Criterion 5 (confounders) was graded "partly" if some, but not all, listed variables were controlled for in the analysis. Criterion 6 (analysis) was graded "yes" if a multiple regression model corresponding to the outcome measurement was used and the predictors were selected without relying on empirical information about the measured exposure [45], "partly" if a multiple regression model corresponding to the outcomes measurement was used and stepwise or bivariate statistical analysis of each potential predictor's association with the outcome was used to guide the selection of predictors in the model, and "no/unclear" otherwise. In case of disagreement between the two reviewers, remaining reviewers also reviewed the article, and the judgement made by the majority of the reviewers determined the quality rating. A quality score for each study was calculated as the sum of all scores, thus ranging between 0 and 12 points where higher scores indicate better quality. No weighting was used, as we did not consider any area of potential bias to be more important than another.

Data synthesis

We identified main factors that were shown to be significantly ($p < 0.05$) or non-significantly associated with RTW in the included studies. Factors that expressed related meanings, i.e., based on similarities, were grouped together into categories. Afterwards, each category was labelled according to the factors investigated in the studies.

RESULTS

A flow diagram of the selection process is shown in Figure 1. In total, 769 studies were identified from the database search. After removing the duplicates, 333 studies remained. Out of these, 51 were considered eligible based on the title and abstract. When screening the 51 full-texts, 7 studies met all of the inclusion criteria (see Appendix II). In the additional search through reference lists and citations of the included studies, 3 studies fulfilled the inclusion criteria. As a result, a total of 10 studies [46-55] remained for methodological quality assessment and synthesis of results.

Table 2. Characteristics and findings of the included studies

Author (year)	Place of study	Study design	Length of follow-up	Study population	Sample size and drop-out	Significant main factors[a]	Non-significant main factors	Measurements of RTW[b]
Berglind H & Gerner U (2002) [46]	Sweden	Prospective cohort	24 months	Age: 18-55 years Gender: N/A[c] Pain: low back and neck Work absence: ≥ 8 weeks Pain duration: ≥ 8 weeks	n= 289 Response rate: N/A Drop-out: N/A	Work motivation		Work status (Yes/No)
Du Bois M, et al. (2009) [49]	Belgium	Prospective cohort	6 months	Age:18-64 years Gender: male and female Pain: low back Work absence: ≥ 4 weeks Pain duration: ≥ 4 weeks	n= 390 Response rate: 89% Drop-out: 0%	Disability Pain behavior Fear avoidance beliefs Type of work Prior pain duration		Work status (Yes/No)
Gallagher RM, et al. (1995) [47]	United States	Prospective cohort	6 months	Age: ≥ 18 years Gender: male and female Pain: low back Work absence : ≥ 24 weeks Pain duration: ≥ 24 weeks	n= 169 Response rate: N/A Drop-out: 6%		Compensation status Use of lawyer	Work status (Yes/No)
Gross DP, et al. (2004), part-I [50]	Canada	Retrospective cohort (2 cohorts)	12 months	Age: $\bar{x}$= 41, 40, SD= 10, 9 years Gender: male and female Pain: low back Work absence: ≥ 6 weeks Pain duration: ≥ 6 weeks	n= 150 (c1)[d], N/A (c2)[d] Response rate: 76% (c1), N/A (c2) Drop-out: 32% (c1), 34% (c2)	Functional capacity		Time until suspension of time-loss benefits, time until claim closure
Gross DP and Battie´ MC (2005) [51]	Canada	Prospective cohort	12 months	Age: $\bar{x}$= 42, SD= 11 years Gender: male and female Pain: low back Work absence: ≥ 6 weeks Pain duration: ≥ 6 weeks	n= 138 Response rate: 70% Drop-out: 54%	Recovery beliefs		Time until suspension of time-loss benefits, time until claim closure
Hansson E, et al. (2006) [52]	Sweden	Prospective cohort	24 months	Age: 18-59 years Gender: male and female Pain: low back or neck Work absence: ≥ 4 weeks Pain duration: ≥ 4 weeks	n= 1575 Response rate: 64-79% Drop-out: 28-55%	Quality of life Disability		Prevalence of work resumption

Kuijer PPFM, et al. (2012) [53]	Nether-lands	Prospective cohort	12 months	Age: 18-55 years Gender: male Pain: low back Work absence: ≥ 6 weeks Pain duration: ≥ 6 weeks	n= 72 Response rate: N/A Drop-out: 4%	Work ability	Age Functional capacity	Time until working ≥ 4 weeks
Schultz IZ, et al. (2004) [54]	Canada	Prospective cohort	3 months	Age: 18-60 years Gender: male and female Pain: low back Work absence: ≥ 4 weeks Pain duration: ≥ 4 weeks	n= 781 Response rate: 32% Drop-out: 15%	Health transition Recovery expectations	Co-worker support	Work status (Yes/No)
Schultz IZ, et al. (2005) [48]	Canada	Prospective cohort	3 months	Age: 18-60 years Gender: male and female Pain: low back Work absence: 4-6 weeks Pain duration: ≥ 4 weeks	n= 111 Response rate: N/A Drop-out: 9%	Recovery expectations Symptoms/complaints	Vitality Mental health	Work status (Yes/No)
van der Giezen AM, et al. (2000) [55]	Nether-lands	Prospective cohort	12 months	Age:18-60 years Gender: male and female Pain: low back Work absence: ≥ 12 weeks Pain duration: ≥ 12 weeks	n= 328 Response rate: 91% Drop-out= 9%	Age General health Job satisfaction Bread winner Pain intensity		Work status (Yes/No)

[a]In all articles, except Berglind and Gerner (2002) and Hansson et al (2006) $p < 0.05$ has been used as level of significance
[b]Return to work; [c]Not available; [d]c1= cohort 1 and c2= cohort 2

These ten studies originated from Sweden, Belgium, the United States, Canada, and the Netherlands (see Table 2). All of them were longitudinal prospective cohort studies with a follow-up of 3-24 months, except one that was retrospective. They were conducted on populations with pain in the neck or low back that had been absent from work for at least 4 weeks. Table 2 describes each of the selected studies in terms of study design, study population, sample size, attrition and factors identified as significant and non-significant, respectively, in relation to the outcome RTW.

Quality scores

For the 10 selected studies, the quality scores ranged between 4 and 9 points. The studies were classified as low quality (0-4 points), medium quality (5-8 points), and high quality (9-12 points) (Table 3).

In the synthesis of results, 5 categories of the factors were extracted: recovery beliefs, health-related factors, workplace factors, work capacity and behavior (Table 4). Each of them is described in detail below.

Recovery beliefs

Recovery beliefs comprise many aspects, such as believing that you will be able to function or work in the presence or absence of pain, or that you will be in control of your situation [56]. They were evaluated as predictors of RTW in two low and two medium quality studies [46, 48, 51, 54]. All studies reported a significant positive association between recovery belief and RTW, when the predictor was measured by the Expectations of Recovery Scale, the Work-related Recovery Expectations Questionnaire, and single questions, respectively (Table 4).

Health-related factors

Health is a multifaceted concept, and more than merely the absence of disease [57]. It involves several dimensions, for example quality of life and vitality. It can also be separated into physical and mental components. Among the reviewed studies, the association between health-related factors and RTW was investigated in four studies of low and medium quality. The medium quality studies consistently reported that health, in terms of health-related quality of life, health transition and general health, was a significant predictor of RTW [52, 54, 55]. In the low quality study, no significant association between vitality, mental health and RTW was found [48]. Table 4 shows the instruments used to measure the health-related factors.

Workplace factors

Three medium quality studies investigated the association between workplace factors and RTW. Two of them showed that type of work (blue color work) and job satisfaction, respectively, significantly related to RTW [49, 55], whereas one study found no significant association between co-worker support and RTW [54]. The different predictors were measured using single questions and the Job Satisfaction Scale (Table 4).

Work capacity

Several studies investigated the predictive ability of factors related to work capacity for RTW. Among them, two medium quality studies found that pain intensity and prior pain duration were significantly associated with RTW [49, 55]. In one low quality and two medium quality studies, self-rated disability was also identified as a significant predictor of RTW [48, 49, 52]. Work ability, measured by the Work Ability Index, contributed significantly to RTW in one medium quality study [53]. One high quality and one medium quality study investigated the prognostic value of functional capacity tests for RTW, and found different results [50, 53]. In the high quality study, findings from functional capacity lifting tests significantly predicted RTW, whereas in the medium quality study, findings from functional capacity evaluation involving several tasks showed no significant association with RTW. More information about the measurement of the factors is presented in Table 4.

Behavior

Pain behavior and fear avoidance beliefs were investigated in one medium quality study, where both were identified as significant predictors for RTW [49]. In the study, pain behavior was measured by the Pain Behavior Scale, and fear avoidance beliefs with the Fear Avoidance Beliefs Questionnaire (Table 4).

DISCUSSION

In the present systematic review, we synthesized the results from observational studies of prognostic factors for RTW among people with long-term neck or back pain. A total of ten studies were included from the literature search. Among them, one was classified as high quality, six as medium quality, and three as low quality studies according to our quality assessment criteria. From the studies, 5 categories of factors were extracted: recovery beliefs, health-related factors, workplace factors, work capacity, and behavior.

Table 3. Methodological quality scores of the included studies

Author (Year)	Representative sample of relevant population	Study attrition (loss to follow-up and response rate)	Valid and reliable instruments for predictors	Objectively measured outcomes	Controlled for age/gender/prior WA[a]/comorbidity	Appropriate statistical analysis	Quality score
Berglind H & Gerner U (2002) [46]	2	0	0	2	0	0	4
Du Bois M, et al. (2009) [49]	2	2	0	0	0	1	5
Gallagher RM, et al. (1995) [47]	1	1	0	0	1	1	4
Gross DP, et al. (2004), part-I [50]	2	2	1	2	1	1	9
Gross DP, et al. (2005) [51]	2	1	1	1	0	0	5
Hansson E, et al. (2006) [52]	2	1	0	2	0	0	5
Kuijer PPFM, et al. (2012) [53]	1	1	0	2	1	2	7
Schultz IZ, et al. (2004) [54]	2	2	0	1	0	1	6
Schultz IZ, et al. (2005) [48]	2	1	0	0	0	1	4
Van der Giezen AM, et al. (2000) [55]	2	2	0	0	1	1	6

2=criterion is satisfied**;** 1=criterion is partly satisfied**;** 0= criterion is not satisfied or cannot be determined

Maximum quality score = 12; 0-4 points were considered low quality, and 5-8 points were considered medium quality, and 9-12 points were considered as high quality

[a]Work absence

Recovery beliefs

Our findings, suggesting that recovery beliefs are important for RTW, are consistent with previous reviews of people with back pain showing that recovery beliefs are associated with better health outcomes and RTW [17, 22]. One possible explanation for recovery beliefs being related to RTW is that when people believe that they will not recover from the illness, they may experience lower competence and motivation for returning to work [17, 21, 58]. The fact that simple measurements of recovery beliefs can be used to predict RTW may be useful in practice, when determining which treatment/rehabilitation to apply.

Health-related factors

Previous reviews of people with acute, sub-acute and non-specific LBP [17, 59] have shown that health is an important predictor of RTW. Among the studies included in this review, the results were not entirely consistent. Considering the quality of the studies, and the different aspects of health investigated, it appears that health-related factors should be paid attention to in relation to RTW. It seems reasonable that perceived health is positively associated with RTW, since healthy people are more likely to feel capable of working [20, 23, 60]. For rehabilitation purposes, however, more information about which aspects of health are important for RTW is needed to provide targeted interventions for reducing work absence among people with long-term neck or back pain. To achieve this, more in-depth analyses of components of health that are important for RTW are needed.

Workplace factors

The diversity in results as well as workplace factors investigated in the studies prevents any solid conclusions from being drawn. While it is conceivable that type of work performed is important for RTW, it would likely depend upon which types of work are considered, and it is not clear how this information could be useful in practice without more knowledge about the work demands involved. Previous reviews have found that job satisfaction cannot predict failure to RTW in non-chronic non-specific LBP patients [17], and that co-worker support is important for work disability following low back injury [16, 61]. Taken together, our results concerning the importance of workplace factors for RTW among people with long-term neck or back pain are inconclusive. More research is needed to confirm or refute this.

Table 4. Categorization of factors

Factors	Measurement	Categories
Recovery beliefs [46, 51]	Expectations of Recovery Scale, Single questions	Recovery beliefs
Recovery expectations [48, 54]	Work-related Recovery Expectations Questionnaire	
Quality of life [52]	EuroQol	Health-related factors
Health transition [54]	Short Form (36) Health Survey	
Vitality [48]	Short Form (36) Health Survey	
Mental health [48]	Short Form (36) Health Survey	
General health [55]	Short Form (36) Health Survey	
Type of work [49]	Single question	Workplace factors
Co-worker support [54]	Single question	
Job satisfaction [55]	Job Satisfaction Scale	
Disability [49, 52]	Von Korff's pain and disability score, single questions	Work capacity
Prior pain duration [49]	Single question	
Functional capacity [50, 53]	Functional Capacity Evaluation lifting tests, Isernhagen Work System FCE	
Work ability [53]	Work Ability Index	
Pain intensity [55]	Pain complaint questionnaire	
Symptoms/complaints [48]	Single questions	
Pain behavior [49]	Pain Behavior Scale	Behavior
Fear avoidance beliefs [49]	Fear Avoidance Beliefs Questionnaire	

Work capacity

Among the studies of factors related to work capacity, the findings were mostly consistent. While self-rated measures of work capacity in terms of pain, disability or work ability can significantly predict RTW among people with long-term pain in the neck or back, the ability of functional capacity evaluation tests to do so may be affected by how the tests are performed. Our results are in agreement with previous reviews. For example, Crook et al [62] found that functional disability was an important prognostic factor of work outcome for people with low-back injury, and Verkerk et al [63] found evidence of a positive influence of lower pain intensity on RTW among people with nonspecific low back pain. It appears therefore that work capacity is important to be considered in the treatment/rehabilitation of people with MSDs in the neck or back.

Behavior

Since factors relating to behavior were investigated in only one study, no solid conclusions about its relation to RTW in this population can be drawn. Previous reviews are also inconsistent. Iles et al. [17] concluded that fear avoidance beliefs are predictive of RTW among people with non-chronic non-specific LBP. However, Pincus et al. [64] found little evidence to link fear of pain with poor outcome in acute LBP. This discrepancy may be due to differences in the populations studied and/or in the methods used for assessing the factors.

In two of the included studies, the impact of age on RTW was reported [53, 55]. In most studies, however, age is treated as a confounding factor, and the significance of it is not specifically reported. For that reason, and the fact that it cannot be targeted in treatment/rehabilitation, we have refrained from drawing conclusions from the reported findings. Interestingly, the study by van der Giezen et al [55] reported that being a breadwinner was positively associated with RTW among people with LBP. As it is the only study that has addressed the importance of responsibilities towards others in returning to work, no solid conclusions can be drawn about its importance. However, it may be an important factor to adjust for in future studies of RTW among people with MSDs.

Methodological considerations regarding the articles in the review

In most of the studies we retrieved during our literature search, no distinction was made between sick leave, absenteeism, work absence and time out of work. These are not standardized terms, but rather vary from country to country. For consistency, we used work absence throughout the paper.

Our definition of RTW allowed it to be measured differently in the studies. Some studies based it on records [46, 51, 52] and others on self-report [49, 51, 53-55], and the studies differed in the duration and proportion of work needed to be defined as RTW. It is possible that more consistent use of definitions across studies would have affected the results obtained in the present study.

As effect sizes were not reported consistently in the studies, our conclusions were based on the information provided concerning the significant and non-significant factors for RTW. Only one study received a high quality score based on the 6 methodological criteria for assessing the quality of prognostic studies. Surprisingly, no study reported the statistical power of the analysis performed, and in most of the studies the validity and reliability of the instruments used was not reported.

Strengths and limitations of the systematic review

Previous reviews on prognostic factors of RTW have focused largely on people with acute pain. The present review highlights predictors for RTW among people with long-term pain in the neck or back by considering observational studies only. Thereby, it contributes to previous findings by addressing factors of importance for patients with long lasting pain in their natural course of RTW.

The strength of the present systematic review is that we searched for studies in three databases covering a wide range of research papers, and that we used a long time interval for each of the databases so as to access as much as possible of relevant literature. We used clear inclusion and exclusion criteria with respect to the population, exposures and study outcome. We also assessed the quality of the studies and confirmed our findings among the authors. Only observational studies were included to minimize potential sources of bias and study the natural course of RTW. The quality of the studies was assessed by considering six important potential sources of bias in studies of prognostic factors [39]. Since we considered

them to be equally important for study quality, they were summarized into a single quality score. The quality score was then divided into tertiles to indicate the level of quality (low/medium/high) of the studies, thereby allowing quality as well as quantity to be considered in the synthesis of results.

One potential limitation is that only journals publishing studies in English were included, which may have led to the exclusion of important studies from our search. Furthermore, the small number of published studies on prognostic factors for RTW among people with long-term neck or back pain prevents us from drawing solid conclusions concerning predictive factors of RTW in this population. Moreover, as most of the included studies concerned low back pain only, our results may be less applicable to people with neck/shoulder pain. Although pain patients were investigated in all included studies, the etiology of the pain was likely different. Some of the studies reported the origin of the pain [49, 50], but others did not do so specifically [52]. This may have affected our results.

Conclusion

In the present review, we identified 5 categories of factors from studies of RTW among people absent from work (≥ 2 weeks) due to long-term neck or back pain. Our results indicate that recovery beliefs, health-related factors and work capacity are important for RTW in this population. However, few studies have been conducted on this population, and the quality of the studies was generally not high. Thus, we call for more high quality prospective studies that can improve our understanding of what is needed to facilitate RTW for people with long-term neck or back pain.

Authors' contributions

MR co-developed the search strategy, performed the search, screened and quality assessed the articles, and drafted the manuscript. **M-L K** co-developed the search strategy, screened articles, contributed to the quality assessment of the articles, and reviewed the initial drafts of the manuscript. **AN** co-developed the search strategy, screened articles, contributed to the quality assessment of the articles, and reviewed the initial drafts of the manuscript. **MH** conceived of the study, co-developed the search strategy, screened and quality assessed the articles, and reviewed the initial drafts of the manuscript. All authors have read and approved the final manuscript.

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Competing interests:

All authors declare no conflicts of interest with regards to the source of funding for the research or any other support that would have biased the research.

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Data sharing statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author upon request.

Figure 1. Flow diagram of the selection process. All authors independently screened the titles, abstracts and, if necessary, the full text of the articles.

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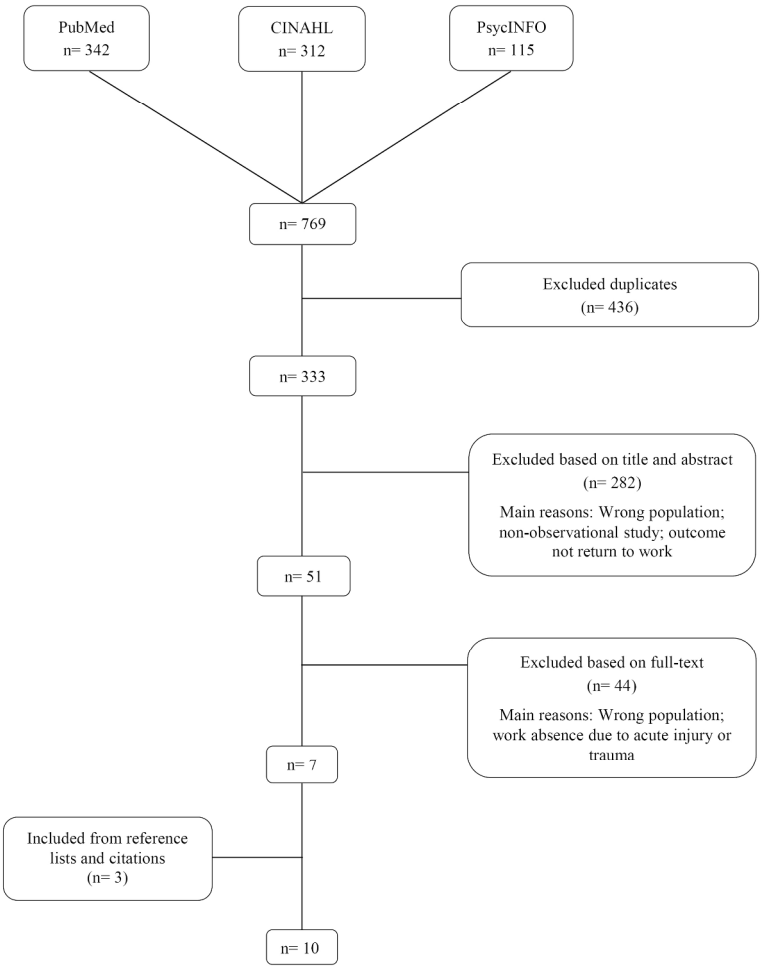

254x316mm (300 x 300 DPI)

Appendix- I

Search history from PubMed:

Search	Search words	No. of articles
#1	neck OR back OR shoulder OR lumbar OR spine OR spinal	640 124
#2	pain OR ache	480 193
#3	factor* OR prognos*	2 855 696
#4	"return* to work" OR "return-to-work" OR "job re-entry" OR "work absence" OR "work ability" OR "ability to work"	9 146
#1 AND #2		96 755
#1 AND #2 AND #3		14 969
#1 AND #2 AND #3 AND #4		412
#1 AND #2 AND #3 AND #4 NOT acute		342

Search history from CINAHL:

Search	Search words	No. of articles
#1	neck OR back OR shoulder OR lumbar OR spine OR spinal	114,940
#2	pain OR ache	140,366
#3	factor* OR prognos*	697,302
#4	"return* to work" OR "return-to-work" OR "job re-entry" OR "work absence" OR "work ability" OR "ability to work"	6,483
#1 AND #2		35,759
#1 AND #2 AND #3		8,895
#1 AND #2 AND #3 AND #4		370
#1 AND #2 AND #3 AND #4 NOT acute		312

Search history from PsycINFO:

Search	Search words	No. of articles
#1	neck OR back OR shoulder OR lumbar OR spine OR spinal	86,952
#2	pain OR ache	92,828
#3	factor* OR prognos*	848,437
#4	"return* to work" OR "return-to-work" OR "job re-entry" OR "work absence" OR "work ability" OR "ability to work"	4,265
#1 AND #2		16,448
#1 AND #2 AND #3		4,646
#1 AND #2 AND #3 AND #4		148
#1 AND #2 AND #3 AND #4 NOT acute		115

*, Used for single key word; "", used if more than a key word.

Appendix- II

Reasons of exclusion	Number of full-texts
Wrong population	16
Work absence due to acute pain or trauma	11
Non-observational studies (e.g., review/met-analysis, intervention study or clinical trial)	4
Work absence duration was not clear	4
Outcome not RTW	3
Confounding rehabilitation program	2
Instrumental validation	2
Not in English language	2