Working with pain

de Vries, Haitze

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Sustainable work participation of workers with chronic nonspecific musculoskeletal pain

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Sustainable work participation of workers with chronic nonspecific musculoskeletal pain

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Contents

Voor Rixt, Nynke en Eeke
Haren, september 2012

1

General introduction

Background

Work is generally beneficial for health and well being.[1,2] Unfortunately, not everyone is able to continue working. In the Netherlands, a working life of 40 years is on average reduced with 8 years (20%) due to sick leave and work disability. One of the most disabling public health problems in the Netherlands, and most welfare states, is chronic nonspecific musculoskeletal pain (CMP). CMP is among the most prevalent[3,4] and expensive health conditions.[5] In the Netherlands the prevalence of CMP is 44% in the population aged over 25, and has an impact on health, work, the use of healthcare and social security services.[6] The influence of CMP on the degree of employee absenteeism and disability allowances is high.[6-8] In the Netherlands, 28% of total disability claimants is due to musculoskeletal disorders.[9] Employers, insurance companies and society are confronted with considerable socioeconomic costs for incapacity claimants. The majority of costs is related to temporary or permanent work disability.[10-12] In the Netherlands, indirect costs caused by production losses and work disability represent 88% of the total costs; 12% are direct costs, such as medical costs.[12]

Up until now, the focus of research has generally been on work absenteeism, work disability, early retirement and return to work. Nevertheless, the majority (~70%) of workers reporting CMP manage to work despite pain without known consequences and without sick leave.[6,13-15] Considerable less research has yet been published on preventing workers from sickness absence and how to remain at work with CMP. Attention to the healthy worker, and determinants affecting health and staying healthy, are largely underexposed in teaching and research.[16] Disregarding the amount of people who stay at work might have limited our view on work participation. It is of importance to focus research not only on highly disabled or sick-listed groups, but also on its successful counterpart[17,18] and to learn which factors are associated with SAW despite pain. Research on the positive side of the coin is in accordance with the 'salutogenic' perspective on work participation (salus=health, genesis=origin), firstly described by Antonovsky[19], which attempts to explain the determinants of health, rather than the determinants of illness. A similar approach is the 'Positive Psychology', introduced by Seligman.[20] 'Positive Psychology' investigates optimal human functioning and aims to discover and promote the factors that allow individuals to thrive.[20,21] These orientations might be a powerful guide for research and practice and may emphasize positive aspects of work and positive characteristics of the worker. We may be able to learn from the successful workers' perspective, and identify factors that are essential for SAW. Knowledge of workers who stay at work despite CMP may be useful for research and for the clinical practice of (vocational) rehabilitation, occupational and insurance medicine.

Project 'Working with pain'

To learn more about this large but relative 'unknown' group of people who stay at work despite CMP, and thereby raising our understanding of work participation in workers with CMP, the research project 'Working with pain' was conceived. A range of variables and corresponding measures were investigated in this study, sufficient to cover most essential domains for work participation. The biopsychosocial approach was used to classify the characteristics to be investigated.[22] The biopsychosocial model is widely accepted for the understanding and treatment of chronic pain disorders.[23] According to this model, pain and disability are the result of the dynamic interaction of physiological, psychological, and social factors.[24]

The clinical relevance of this project may be that characteristics of people with CMP who are not disabled for work may serve as reference for professionals working with people who suffer from CMP. When success factors that contribute to SAW are known, it may give new insights for the development of more effective and efficient vocational rehabilitation programs. Knowledge of SAW with CMP potentially contributes to the development of preventive sick leave interventions, useful for occupational medicine. Insurance physicians may use the SAW-associated factors to assist workers with reintegration and sustainable return to work. Eventually, the project 'Working with pain' may enlarge sustainable work participation of people living with CMP. Probably, workers with CMP who are threatened to become disabled for work will be inspired in their efforts to stay at work.

Definitions

This thesis focuses on workers with CMP who stay at work. Because of this focus, it is of importance to define CMP and SAW. CMP was defined as pain that lasts longer than 6 months, without known underlying specific medical cause (e.g. infection, neoplasm, metastasis, osteoporosis, rheumatoid arthritis, fracture, neurological disorders, and serious spinal pathology), located in the back, neck, shoulder, extremities or more sites at the same time (disorders such as widespread pain, fibromyalgia and whiplash were included).

SAW was operationally defined as ≥ 12 months sustainable work participation with a maximum of 5% sick leave due to CMP; the cut-off of 5% sick leave was chosen because it reflected the average amount of sick leave in the Netherlands and Europe.[25,26] Workers who, after a period of sick leave, have returned to work for more than 12 months could also participate into the study.

Aims of this thesis

The first aim of the thesis is to describe physical, psychological and social characteristics of people that continue work despite CMP. The second aim is to compare these characteristics with sick listed workers with CMP admitted for vocational rehabilitation. The third aim is to identify success factors for SAW with CMP. It is intended to learn from a 'successful' working group, and to develop new hypotheses about sustainable work participation of workers with CMP. The expectation is that this thesis will contribute to our knowledge of sustainable work participation in people with CMP, and thereby place the theme 'Working with pain' on the agenda's of researchers, clinicians and policy makers.

Research questions in this thesis

- Which determinants for SAW with CMP are available in literature? (*Chapter 2*)
- What are motivators and success factors to stay at work with CMP? (*Chapter 3*)
- What are the characteristics of workers who stay at work with CMP, and how do these differ from sick listed workers? (*Chapter 4*)
- Which factors are associated with SAW in people with CMP? (*Chapter 2,3,4,5,6,7*)
- What is the level of work ability and work performance in workers who stay at work with CMP, and which factors are associated with work ability and work performance ? (*Chapter 7*)

Methods and subjects used in this thesis

In this thesis different methods were used to examine determinants for SAW in workers with CMP. A systematic review of the literature was used in order to identify known determinants for SAW. Semi-structured interviews were used to identify motivators and success factors for SAW. In a cross-sectional design, the characteristics of workers with CMP who continue work despite pain (SAW group) and sick listed workers referred for vocational rehabilitation (SL-Rehab group) were measured in order to compare both groups. Several instruments were used to compare demographic, physical, psychological and work characteristics.
Eligible participants of the SAW group were recruited from May 2009 to December 2010 by announcements in newspapers, and websites of national patient associations of whiplash and fibromyalgia. Inclusion criteria were being diagnosed as CMP, age 20 to 60 years, and performing paid work for 20 hours or more with a maximum of 5% sick leave ascribed to CMP during the 12 months before participation into the study. Exclusion criteria in this study were relevant co-morbidities with severe negative consequences for physical and/or mental functioning (for example severe psychiatric disease or addiction to drugs), pregnancy, and

insufficient knowledge of the Dutch language. Inclusion and exclusion criteria for the SL-Rehab group were the same as for the SAW group, except for absence at work due to the pain in the SL-Rehab group was higher than 5% in the year prior to participation. A Functional Capacity Evaluation (FCE) was used to measure functional capacity. Accelerometers were used to assess physical activity.

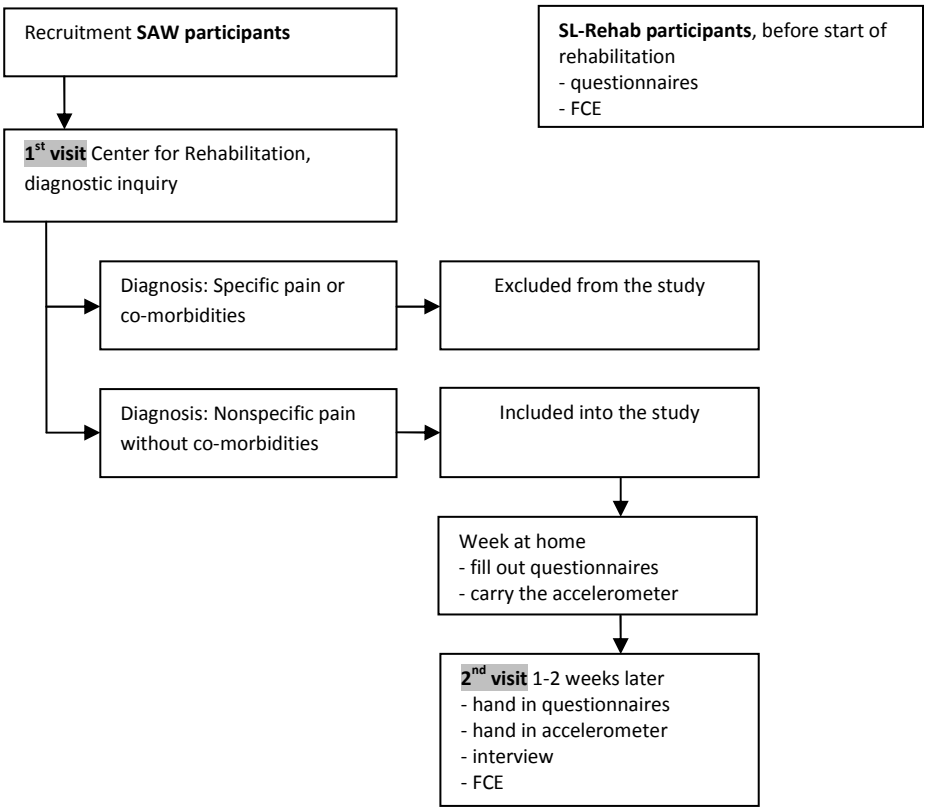

Figure 1: Routing of participants

To diagnose the type of pain and the existence of co-morbidities, all participants from both groups received medical examination performed by a physiatrist. All participants completed questionnaires assessing demographic, physical, psychological and work characteristics, and performed an FCE. All subjects in the SAW group carried an accelerometer for one week. The route of each participant within this project is presented in Figure 1.

The measures presented in Figure 2 were used to assess several variables potentially associated with SAW.

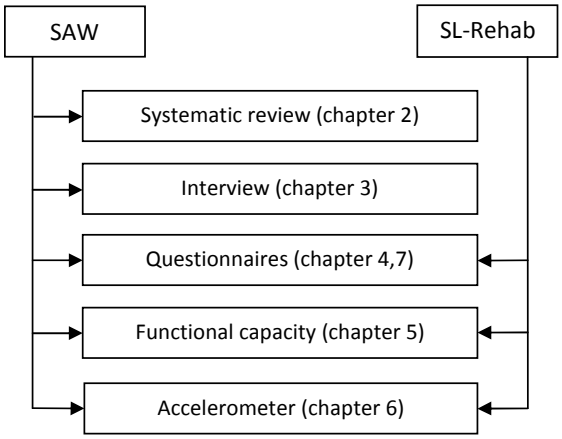

Figure 2: Methods used in this thesis

Outline of this thesis

In this thesis, multiple studies were used to investigate determinants for SAW with CMP. In *Chapter 2*, a systematic literature review is described, investigating determinants for SAW in people with CMP. The purpose of this review was to identify determinants of SAW in people with CMP.

In *Chapter 3*, a qualitative study is described. By means of semi-structured interviews participants were questioned about two major themes: motives to, and success factors for continuing work with CMP. Taken into account that knowledge of workers who stay at work despite their pain is scarce, a qualitative research approach was chosen as starting point for exploration into research hypotheses. This design is meant to offer a deeper understanding of perceived motives and success factors for SAW despite CMP.

In *Chapter 4*, a wide range of characteristics of workers who stay at work despite CMP are presented. A comparison is made with sick-listed workers due to CMP who were admitted to vocational rehabilitation. Differences between these groups, also compared with reference data of healthy working controls, are discussed. The characteristics of subjects who stay at work with CMP may be used by clinicians to estimate the relevance of scores of their patients.

In *Chapter 5*, the functional capacity of three working groups is compared: sick-listed workers with CMP who are admitted to vocational rehabilitation, workers who stay at work despite CMP, and healthy working controls. It is investigated whether functional capacity in this three groups is 'sufficient' to perform work.

In *Chapter 6*, the physical activity level and pattern of workers and sick-listed patients, all suffering from CMP, is described. Although robust knowledge on daily physical activity levels is lacking, a widespread therapeutic use of the construct is observed in daily clinical pain rehabilitation.
Chapter 7 focuses on work ability and work performance in workers who stay at work with CMP. Although this group of workers may be successful in terms of low absenteeism, their levels of work ability and work performance remain unclear.
In *Chapter 8*, the findings of this thesis are integrated and reflected on. Implications of the findings for clinical practice are discussed. Recommendations for furthers research are made.

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2

Factors promoting staying at work in people with chronic nonspecific musculoskeletal pain: a systematic review

Disability & Rehabilitation 2011; 34(6):443-458

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Abstract

Purpose: To identify determinants for staying at work (SAW) in workers with chronic musculoskeletal pain (CMP).

Method: A systematic review of factors that promote SAW in workers with CMP. We searched the databases of PubMed, EMBASE, PsycInfo, CINAHL and the Cochrane Library. We included studies reporting on working subjects without present CMP-related sick leave. A quality assessment of GRADE criteria and evidence synthesis was performed.

Results: We identified 5 cross-sectional studies and 2 qualitative studies reporting on factors associated with SAW in workers with CMP. Consistent association with SAW was found for low perceived physical disability and low emotional distress (low-level evidence). Duration of pain, catastrophizing, self-esteem and marital status were not associated with SAW (low-level evidence). Qualitative studies indicated that personal adjustments and workplace interventions are important determinants for SAW (evidence not graded).

Conclusions: No high-level evidence for SAW determinants for workers with CMP was identified. Future interventions aimed at promoting SAW could consider reducing perceived physical disability and emotional distress, and promoting adjustment latitude at work, support from supervisors, and the workers' motivation and self-management skills. Further research is required because knowledge of SAW in workers with CMP is scarce, and the relevance of the subject is high.

Key words: staying at work; musculoskeletal pain; chronic pain; work status

Introduction

The prevalence of chronic nonspecific musculoskeletal pain (CMP) in western societies is high, ranging from 30-70% of the population in different countries.[1-4] In the Netherlands the prevalence of CMP is 44% in the population aged over 25, and has an impact on health, work and the use of healthcare services.[4] Many people with CMP report decreased levels of participation in work or incapacity.[5-7] These people become eligible for income support to compensate for their financial losses. Employers, insurance companies and society are confronted with considerable socioeconomic costs for incapacity claimants.[8-10]

Although many people with CMP are confronted with decreased work participation, a majority stays at work (SAW) and reports no sick leave for pain reasons.[1,2,4,5,11-14] The factors that distinguish people who stay at work despite pain from those who do not are currently unknown. The majority of existing studies in the field of rehabilitation and occupational medicine investigated the perspectives of individuals who were no longer capable of doing their job or who had returned to work[15-21], which has significantly contributed to the secondary prevention of work disability.[22-25] However, this group is not representative of all people with CMP. Therefore, it is essential to also focus on people with CMP who are able to stay at work despite pain, and to discover SAW determinants[22,23], because this could contribute to prevention of incapacity.

SAW is a relatively new concept, which is not uniformly defined in the literature. Several terms are used for working with pain, such as staying at work[26,27], remaining or continuing a work role[28], working despite pain[29-31], continuing work with pain[32,33], remaining in employment[34], work maintenance[35], staying on the job[36], retaining work[26] and keeping on working.[37] For the purpose of this review, staying at work was defined as sustained work participation despite CMP for at least 1 year, without present sick leave due to CMP. This strict definition was chosen because we aimed to focus on a successful group. When modifiable factors that promote SAW can be identified, interventions can be developed to support the ability of workers with CMP to stay at work. Specific attention to the people who stay at work despite CMP will contribute to broadening our views on chronic pain and work. It was assumed that lessons can be learned from this successful group of workers.

The objective of the present systematic review was to provide an overview of the evidence in the literature of SAW determinants for people with CMP, and to grade the level of evidence. It investigates the 'positive side of the coin', which represents an unusual viewpoint underrepresented in literature. To our knowledge, no systematic review assessing determinants for SAW with CMP has been conducted before. The International Classification

of Functioning, Disability and Health (ICF) was used as a tool to frame the evidence.[38] All the factors identified and associated with SAW were classified under the various components of the ICF framework (health state, body functions/structures, activities and participation, and contextual factors such as personal and environmental factors), which could reveal gaps in our knowledge of SAW.

Methods

Search strategy

To identify studies of SAW in workers with CMP, an electronic search was performed of bibliographic literature databases (PubMed, EMBASE, PsycInfo, CINAHL and Cochrane) from the date of commencement to 1 October 2009. Controlled vocabulary search terms (MeSH terms, Emtree terms, PsycInfo Descriptors and CINAHL headings) and free text words were used. Two main categories – terms about work participation[39] and pain – were combined with the Boolean operator 'AND' to identify studies (appendix 1). Letters to the editor, guidelines, case reports and editorials were excluded. No other study design exclusion criteria were used, to ensure that no information on SAW determinants was missed. The search excluded all studies not aimed at working-age adults (19-64 years). We also contacted experts in the field of rehabilitation and occupational medicine for relevant studies and performed a manual search in the reference lists of studies selected for full-text reading.

Selection of studies

The selection of studies on title was pilot tested (n=100) by two reviewers (HdV, MR). The agreement of scoring the studies on title was K=0.92, justifying that further selection on title could be performed by one reviewer (HdV). In doubtful cases, the article in question was included for further assessment using the abstract. The same two reviewers independently performed the screening of the abstracts and ultimately the full text of the studies, to determine whether the studies met the inclusion criteria. Studies were excluded when both reviewers considered that they did not fulfil the inclusion criteria. In case of disagreement or doubt, consultation of a third reviewer (SB) was decisive. The reviewers were blinded for authors, affiliations, journal name and publication date. Only studies written in English or Dutch were included in the review.

Inclusion criteria

Subjects

We included studies reporting on working subjects with CMP. Chronic was defined as more than 3 months. Nonspecific was defined as pain without known underlying specific medical cause (e.g. infection, neoplasm, metastasis, osteoporosis, rheumatoid arthritis, fracture, neurological disorders, and serious spinal pathology). Musculoskeletal pain in the following locations was included – the back, the pelvic area, the neck, or the shoulders – and disorders such as widespread pain, fibromyalgia, whiplash and complaints of the arms, neck and shoulders (CANS). The subjects had to perform paid work and not be recorded as sick with CMP. Part-time work and full-time work were included.

Outcome measures

Studies were included if at least one of the outcome measures was sick leave, SAW, sustained return to work (RTW), work participation, work disability or work status. SAW was operationalized as sustained work participation despite CMP for at least 1 year, without present sick leave due to CMP. Sustained RTW was considered as a relevant outcome in the present study when the RTW lasted longer than 6 months with no sick leave due to CMP. Studies with a negative outcome measure in terms of work participation – such as sick leave or incapacity – were only included when the control group consisted of a working group with CMP. In the present study, a person was considered to have a disability if he or she reported a limitation in working. All studies in which disability was not defined in terms of a limitation in working were excluded.

Extraction of data

One reviewer (HdV) extracted the data from the selected studies using an extraction form. Accuracy was verified by a second reviewer (MR). The following characteristics of the included studies were extracted and described: study design, aim of the study, diagnosis, number of subjects, gender distribution, percentage of working subjects, outcome measures, investigated SAW factors, univariate and multivariate results, and association with SAW.

Assessment of risk of bias

To assess the risk of bias of the included studies, two reviewers (HdV, MR) independently used an adapted version of the checklist recommended in the Cochrane Handbook for Systematic Reviews of Interventions[40], also suitable for assessing observational studies. This checklist identified selection bias, performance bias, attrition bias, detection bias, use of valid measurements and appropriate statistics. The following criteria were assessed:

- Were the groups similar, except on the outcome (work status) being investigated?
- Were there systematic differences in the care provided to the participants in the comparison groups other than the intervention under investigation?
- Was loss to follow-up or response rate acceptable?
- Were the participants entered into the study based on knowledge of the outcome of interest?
- Were standardized and valid measurements used?
- Were the statistics used appropriate to answer the research question?

Risk of bias was considered to be low when all the criteria were unaffected or unlikely to seriously alter the results. Moderate risk of bias was determined when bias that could raise some doubt about the result was noted for one or more criteria. High risk of bias was determined when bias that seriously weakens confidence in the results was noted in one or more criteria. Consensus was reached by consultation, and if necessary by the decisive view of a third reviewer (SB). Information was obtained from corresponding authors when essential data was missing.

Assessment of qualitative studies was done using criteria derived from Cochrane[41-44]. This checklist identified credibility, transferability, dependability, confirmability and sampling method. The following criteria were assessed:

- Were the data collection and analysis procedures systematic (was an audit trail provided such that someone else could repeat each stage, including the analysis)?
- Was the method of data collection described in detail (did the method section provide information about data collection method, taping and transcribing interviews, the iterative analysis process, coding and saturation)?
- Were strategies used to validate the findings, e.g. triangulation, member checking?
- Did the researchers present a self-critical account of the research process, aware of personal experiences and biases?
- Did two researchers independently analyze the data?
- Was the context or setting adequately described so that the reader could relate the study findings to other settings?
- Was the sample adequate and sufficiently varied?

High quality was determined when all criteria were unlikely to seriously alter the results. Moderate quality was determined when flaws were identified in one or more criteria that raised some doubt about the results. Low quality was determined when flaws were identified in one or more criteria that seriously weakened confidence in the results. All criteria lists used for quality assessment were pilot tested in an assessment of three studies, which were not included in the review, and further operationalized until consensus was reached.

Grading the level of evidence

For grading the levels of evidence we used the GRADE criteria[45,46], where the overall quality of evidence is based on four criteria presented in Box 1. Qualitative studies were not considered in grading the evidence.

The design of the study prescribes the level of evidence in an important sense. The study quality was assessed as a secondary criterion. Studies with low risk of bias raise the level of evidence, whereas studies with a high risk of bias reduce the level of evidence. Consistency was assessed to be high when 75% or more of the studies found significant association of a factor in agreement.

A. Study design	lower if
Randomized trial = high-quality evidence	study quality
Observational study = low-quality evidence	-1 serious limitation
Any other evidence = very low-quality evidence	-2 very serious limitations
	-1 important inconsistency
B. Study quality (risk of bias)	-1 indirect evidence
low = plausible bias unlikely to seriously alter the results	-1 sparse data
moderate = plausible bias that raises some doubt about the results	-1 high probability of reporting bias
high = plausible bias that seriously weakens confidence in the results	
C. Consistency	raise if
Differences in direction of effect/association, the size and significance of these differences lead to the conclusion whether inconsistency exists	+1 strong association OR>2(<0.5) based on consistent evidence from two or more observational studies
	+2 very strong association OR>5 (<0.2) based on direct evidence with no major threats to validity
D. Directness	
Were participants, interventions and outcome measures similar to those defined in the inclusion criteria of the review?	+1 evidence of a dose response gradient
	+1 all plausible confounders would have reduced the effect

High	= Further research is very unlikely to change our confidence in the estimate
Moderate	= Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate
Low	= Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate
Very low	= Any estimate of effect is very uncertain

Box 1: Criteria for assigning grade of evidence

Data synthesis

The results of the quantitative and qualitative studies were synthesized separately, after which the findings were integrated according to the synthesizing process described by Thomas et al. [47]

Results

Selection of studies

The results of the literature search are presented in Figure 1. A total of 4,658 studies were screened on title and abstract to yield 92 studies that possibly met the inclusion criteria. After a reference check, 151 studies remained for full-text assessment. After this full-text screening 144 studies were excluded. The main reason for exclusion was unspecified duration of pain, which made it impossible to confirm the chronic pain inclusion criterion. Studies were also excluded because they did not concern non-specific musculoskeletal pain, their sample contained only workers without pain or no working sample, or their outcomes were unrelated to work status. The third reviewer was consulted for the assessment of 4 studies, after which agreement was reached. We felt it necessary to contact the authors for additional information for 12 studies, to allow us to decide on inclusion. Ultimately, 7 studies met the inclusion criteria and were critically appraised by a risk of bias assessment.[29,31,32,37,48-50]

Study characteristics

No relevant (systematic) reviews or Randomized Controlled Trials (RCT) were identified. Only observational studies were retrieved: five cross-sectional studies[29,31,48-50] and two qualitative studies.[32,37] The main characteristics of the studies are outlined in Tables 1a-b. SAW factors are presented, with corresponding univariate and multivariate results and confidence intervals if provided. For studies with qualitative design, only the direction of association is presented. In 6 out of 7 studies the main aim was to report on factors associated with SAW. In 1 article, SAW factors were reported as secondary outcomes.[48] Five cross-sectional studies reported overall on 78 (31 significant and 47 non-significant) associated SAW factors (Table 1a). Two qualitative studies reported on 34 SAW factors (Table 1b).

Risk-of-bias analysis of quantitative studies

The results of the risk-of-bias analysis for each included article are presented in Table 2a. The agreement of the two reviewers on items A, B, C, D and F was high (K=1.00). In the assessment of criterion E (valid measurement), agreement was initially low. There was a dispute about how to assess the dichotomous outcome of work status. After consultation with the third reviewer, we decided that if the nonworking group contained unemployed subjects or subjects on temporary sick leave of a few hours, E was rated as high risk of bias for the purpose of this review criterion.

The risk of bias of the quantitative studies ranged from low to high. No selection bias, performance bias or detection bias was noted, and the statistics used were appropriate. A risk of attrition bias was noted in two studies because information about dropout or response rate was missing.[49,50]

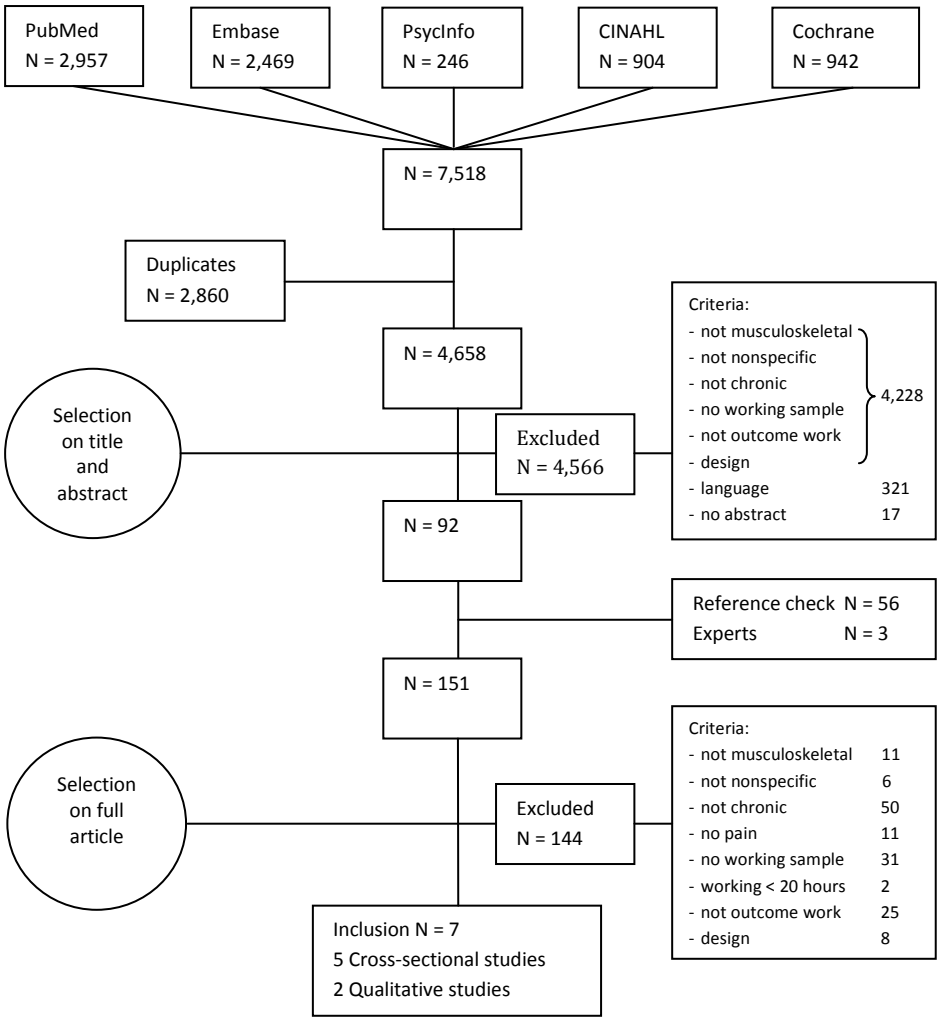

Figure 1: Flow diagram of the search process.

In two studies the work status was measured in a way that seriously weakened confidence in the results: the nonworking group contained unemployed subjects or subjects on temporary sick leave for a few hours a week.[49,50] The basis for distinguishing the working and non-working groups remained unclear in one study, even after correspondence with the author[29]: we considered this unlikely to seriously alter the results. Three studies were rated with low[29,31,48], and two with high risk of bias.[49,50]

Table 1a: Characteristics of included cross-sectional studies

Author Year [Ref no.] Country	Study Design	Aim of study	Diagnosis	Subjects	Outcome	Factors investigated	Univariate Results (crude estimates, significant differences or associations)	Multivariate Results (adjusted estimates and 95% CI)	Association with SAW
Feuerstein and Thebarge 1991 [29] USA	Cross-sectional	To investigate the role of perceived disability, occupational stress, pain, and distress in patients with chronic pain disorders who work despite pain and patients who are work disabled	Chronic musculo-skeletal pain	N = 165 Male 40% Working 46% Participants evaluated at a multidisciplinary pain treatment Center	Work status, defined as working (either full-time or part-time) or work disabled	Age	NS		
						Duration of pain	NS		
						Gender	NS		
						Level of education	NS		
						Marital status	NS		
						Diagnosis low back pain	X2= 12.2, p<0.05		-
						Insurance coverage	X2=17.40, p<0.001		-
						Pain severity	T-test: t=-2.41, p<0.05		-
						Distress	T-test: t=-3.77, p<0.001		-
						Perceived physical disability	T-test: t=-7.80, p<0.001		-
						Perceived psychosocial disability	T-test: t=-4.10, p<0.001		-
						Work environment		F=2.03	
						- Peer cohesion	T-test: t=2.51, p<0.05		+
						- Supervisor support	T-test: t=3.36, p<0.001		+
						- Autonomy	T-test: t=2.89, p<0.01		+
						- Work pressure	T-test: t=-2.99, p<0.01		-
						- Supervisor control	T-test: t=-2.01, p<0.05		-
						- Involvement	NS		
						- Task orientation	NS		
						- Clarity	NS		
						- Innovation	NS		
						- Physical comfort	NS		
								Discriminate function analysis classified 76% of cases correct with these variables (Wilks' Lambda=0.6348, X2=39.99, p<0.0001)	

Linton and Buer 1995 [31], Sweden	Cross-sectional	To examine possible differences between back pain sufferers who were working (Copers group) and those who were off work (Dysfunctional group)	Chronic back pain	N = 63 Male 0% Working 59% Participants employed at large hospital as licensed nurses or nurse's aids	Work status defined as a Dysfunctional group (a median of 25 pain-related sick days (m=90 days) during the past year) and a Copers group (not been off work for pain during the past year)	Age Perceived work load Work situation Duke Health Profile - Physical health - Mental health - Perceived health - Social health - Self-esteem - Anxiety - Depression Coping strategies questionnaire - Diverting attention - Reinterpretation - Self-statements - Ignoring - Praying/hoping - Catastrophizing - Increased behavioural activity - Pain behaviours - Control - Coping Duke Social support Modified somatic perception Pain attitudes - Pain discomfort scale - Time stability - Pain as a mystery - Self-blame Pain and Impairment Relationship	NS NS NS NS F=10.66 (p<0.002) NS NS NS NS NS NS NS F=7.37 (p<0.01) NS NS NS NS NS F=3.78 (p<0.05) NS F=14.58 (p<0.001) NS NS F=6.83 (p<0.013) F=15.91 (p<0.001)	 Wilks' Lambda 0.88; p<0.7 Wilks' Lambda 0.53;p<0.003 Wilks' Lambda 0.59; p<0.04 Wilks' Lambda 0.99; p<0.73 Wilks' Lambda 0.62;p<0.002 Discriminate function analysis classified 83% of cases correct with these variables (Wilks' Lambda=0.483, X2=23.99, p<0.0005)	 + + + + - - -

Table 1a: Continued

Author Year [Ref no.] Country	Study Design	Aim of study	Diagnosis	Subjects	Outcome	Factors investigated	Univariate Results (crude estimates, significant differences or associations)	Multivariate Results (adjusted estimates and 95% CI)	Association with SAW
Grotle et al. 2004 [48] Norway	Cross-sectional	To assess the relationship of fear-avoidance beliefs and distress to disability and work loss in acute and chronic low back pain	Low back pain	N = 233 Male 46% Working 20% Participants recruited from primary health care and specialist back clinic	Work loss, defined as patients who were on sick leave, rehabilitation or receiving disability pension due to LBP	Age Gender Fingertip-floor distance high Fear-avoidance beliefs Emotional distress		NS NS OR 1.04 [1.01-1.07] OR 1.12 [1.07-1.17] OR 3.69 [1.25-10.9]	- - -
Kuijer et al. 2005 [49] Netherlands	Cross-sectional	To explore which variables are related to work status in patients with chronic low back pain	Low back pain	N = 92 Male 60% Working 31% Participants following multidisciplinaryrehabilitation	Work status Working: performed job without restrictions. Non-working: any restrictions as reduced hours, slower pace, less heavy work, not regular job, completely off work.	Low self-reported physical health Low self-reported mental health Physical fitness Self reported limitations in ADL Low educational level Depressive symptoms Psycho-neuroticism Gender Pain intensity Performance of work related activities Marital status Age Duration of complaints Recurrences Fear of movement Self-efficacy Self-esteem Pain cognition Coping Catastrophizing	t-test: p<0.005 t-test: p<0.005 X2: p<0.005 t-test: p<0.005 X2: p<0.005 t-test: p<0.005 t-test: p<0.005 X2: p=0.03 NS NS NS NS NS NS NS NS NS NS NS NS	OR 0.91 OR 0.93 OR 0.08	- - -

Sardá et al. 2009 [50] Brazil	Cross-sectional	To examine the contribution of demographic, pain and psychological factors to disability and work status in chronic pain patients	Chronic musculo-skeletal pain	N = 622 (311 Australia; 311 Brazil) Male 82% Working 59% Participants attending pain clinics	Disability and work status. Work status, defined as being at work or on sick leave / being unemployed due to pain.	Pain site (two or more) Aus Age ≥45 years Bra Age ≥44 years Aus Level of education ≤11 years Bra Level of education ≤12 years Aus Physical disability score ≥17 Bra Physical disability score ≥16 Aus Self-efficacy score ≤25 Bra Pain acceptance score ≤51 Bra Depression score ≥16 Aus Catastrophizing score ≥3.3 Aus	OR 2.35 [1.24-4.47] OR 0.39 [0.2-0.74] OR 0.38 [0.2-0.7] OR 3.49 [1.81-6.74] OR 1.94 [1.06-3.56] OR 2.75 [1.27-5.97] NS OR 2.52 [1.06-6.0] NS OR 2.53 [1.24-5.17] NS	- - - - - - - -

NS = not significant
OR = odds ratio
+ = positive associated with staying at work
- = negative associated with staying at work
ADL = activities of daily living
Bra = Brazilian sample
Aus = Australian sample

Table 1b: Characteristics of included qualitative studies

Author Year [Ref no.] Country	Study Design	Aim of study	Diagnosis	Subjects	Outcome	Determinants for SAW identified	Association with SAW
Liedberg and Henriksson 2002 [32] Sweden	Qualitative	To examine which factors influence the decision to remain in a work role for women with fibromyalgia	Fibromyalgia	N = 39 Male 0% Working 49% Participants following rehabilitation	Work disability defined as Working or Nonworking. The Working group included women working full-time or part-time. The Nonworking group included women who had left the labor market due to fibromyalgia and those who were on 100% long-term sickness benefits or sickness pension	Being highly motivated to work	+
						Being a perfectionist	+
						Having endurance	+
						Increased workload	-
						Adjustment of work	+
						Decreasing working hours	+
						Financial support from spouses	-
						Commuting	-
						Varied work posture	+
						Change of work task	+
						Retraining for another job	+
						Social support at work	+
						Support from supervisor	+
						Put in one day rest during the week	+
						Flextime working hours	+
						Deciding own work schedule	+
						Neglect leisure activities	+
						Neglect housework	+
						Taking rest	+
						Giving priority to work	+
						High age	-
						Health problems	-
Löfgren et al. 2006 [37] Sweden	Qualitative	To explore, and obtain increased knowledge, of the strategies used by working women with fibromyalgia regarding control of pain, fatigue and other symptoms	Fibromyalgia	N = 12 Male 0% Working 100% Participants were recruited 6-8 years after rehabilitation	Coping strategies to keep on working with their symptoms	Striving for a bodily balance in life	+
						Relaxation	+
						Positive thinking	+
						Setting limits by prioritizing	+
						Adapting life to one's limitations	+
						Using pain as a guide	+
						Improve ergonomics	+
						Change work tasks during day	+
						Flexible working hours	+
						Plan everything in life with regard to work	+
						Resting to manage the next working day/week	+
						Support from working colleagues	+

+ = facilitator for staying at work

- = barrier for staying at work

Table 2a: Risk-of-bias analysis of included quantitative studies

	Criteria of quality assessment						
1st Author	A Selection bias	B Performance bias	C Attrition bias	D Detection bias	E Valid measurements	F Appropriate statistics	Risk of bias
Feuerstein and Theberge, 1991	1	1	1	1	?	1	1
Linton and Buer, 1995	1	1	1	1	1	1	1
Grotle et al., 2004	1	1	1	1	1	1	1
Kuijer et al., 2005	1	1	2	1	3	1	3
Sarda et al., 2009	1	1	2	1	3	1	3

Table 2b: Risk-of-bias analysis of included qualitative studies

	Criteria of quality assessment					
1st Author	G Credibility	H Transferability	I Dependability	J Confirmability	K Appropriate sampling	Quality
Liedberg and Henriksson, 2002	1	1	1	?	1	1
öfgren et al., 2006	1	1	1	1	1	1

1 = low risk of bias detected
2 = moderate risk of bias detected
3 = high risk of bias detected
? = unclear

Risk-of-bias analysis of qualitative studies

The quality of the 2 included qualitative studies was rated as high (Table 2b). There was only one disagreement in the quality assessment: the confirmability of 1 study[32] was unclear, but was considered unlikely to seriously alter the results.

Grading the evidence of factors promoting staying at work

Table 3 outlines the graded level of evidence for factors associated with SAW[45,46], framed according to the ICF components. The design of the studies prescribed the initial level of evidence: the observational studies started with little evidence. Qualitative studies were not graded. After the assessment of risk of bias and consistency, the level of evidence was downgraded or upgraded. In rating consistency, the direction of association and the size and significance of association were assessed. No indirect evidence was noted, which meant that we found no reason to downgrade the evidence for indirectness. The highest level of evidence found for SAW factors was low-level evidence.

Table 3: Level of evidence of factors associated with staying at work

Group (ICF domain)	Factors investigated	No. of articles (CSS – QS)	SAW associated	High quality	Low quality	Not SAW associated	High quality	Low quality	Consistency	Level of evidence
Health status	Better physical health	3 (2-1)	2	1 QS	1 CSS	1	1 CSS		-	Low
	Better mental health	2 (2-0)	1		1 CSS	1	1 CSS		-	Very low
	Worse perceived overall health	1 (1-0)	1	1 CSS						Low
	Better social health	1 (1-0)				1	1 CSS			Low
Body function and structures	High pain intensity	2 (2-0)	1	1 CSS		1		1 CSS	-	Low
	Longer duration of pain	2 (2-0)				2	1 CSS	1 CSS	+	Low
	Higher no. of pain locations	1 (1-0)	1		1 CSS					Low
	Having endurance	1 (0-1)	1	1 QS						
	More pain recurrences	1 (1-0)				1		1 CSS		Low
	Higher Physical fitness	1 (1-0)	1		1CSS					Low
	Higher functional capacity	1 (1-0)				1		1 CSS		Low
	Higher depressive symptoms	3 (3-0)	2	1 CSS	1CSS	1	1 CSS		-	Low
	Diagnosis low back pain	1 (1-0)	1	1 CSS						Low
	Higher fingertip-floor distance	1 (1-0)	1	1 CSS						Low
	Being an optimist (positive thinking)	1 (0-1)	1	1 QS						
	High pain cognition	1 (1-0)				1		1 CSS		Low
	Higher emotional distress	3 (3-0)	3	3 CSS					+	Low
Activities	Higher self-reported limitations in ADL	1 (1-0)	1		1 CSS					Low
	Higher perceived physical disability	2 (2-0)	2	1 CSS	1 CSS				+	Low
	Higher perceived psychosocial disability	1 (1-0)	1	1 CSS						Low
	Commuting [a]	1 (0-1)	1	1 QS						
	Varied work posture	1 (0-1)	1	1 QS						
	Taking rest to manage next day working	2 (0-2)	2	2 QS						
	Neglect housework	1 (0-1)	1	1 QS						
	Neglect leisure activities	1 (0-1)	1	1 QS						
	Relaxation	1 (0-1)	1	1 QS						
	Using pain as a guide	1 (0-1)	1	1 QS						
	Striving for bodily balanced life	1 (0-1)	1	1 QS						
	Adapting life to one's limitations	1 (0-1)	1	1 QS						
	Setting limits by prioritizing	1 (0-1)	1	1 QS						
Participation	Giving priority to work	1 (0-1)	1	1 QS						
	Planning everything in life with regard to work	1 (0-1)	1	1 QS						

Personal factors	Older age	6 (5-1)	2	1 QS	1CSS	4	3 CSS	1 CSS	-	Low
	Female gender	3 (3-0)	1		1 CSS	2	2 CSS		-	Low
	Lower educational level	3 (3-0)	2		2 CSS	1	1 CSS		-	Low
	Higher pain acceptance	1 (1-0)				1		1 CSS		Low
	Diverting attention	1 (1-0)				1	1 CSS			Low
	Reinterpretation [b]	1 (1-0)				1	1 CSS			Low
	Self-statements [c]	1 (1-0)				1	1 CSS			Low
	Ignoring [d]	1 (1-0)	1	1 CSS						Low
	Praying/hoping	1 (1-0)				1	1 CSS			Low
	Increased behavioral activity	1 (1-0)				1	1 CSS			Low
	Pain behaviors	1 (1-0)				1	1 CSS			Low
	Control [e]	1 (1-0)				1	1 CSS			Low
	Coping	2 (2-0)	1	1 CSS		1		1 CSS	-	Very low
	Higher pain catastrophizing [f]	3 (3-0)				3	1 CSS	2 CSS	+	Low
	Higher fear of movement	1 (1-0)				1		1 CSS		Low
	Higher self-efficacy	3 (2-1)	1		1 CSS	2	1 QS	1 CSS	-	Very low
	Higher self-esteem	2 (2-0)				2	1 CSS	1 CSS	+	Low
	Higher anxiety	1 (1-0)				1	1 CSS			Low
	Insurance coverage	1 (1-0)	1	1 CSS						Low
	Higher psycho-neuroticism	1 (1-0)	1		1 CSS					Low
	Being a perfectionist	1 (0-1)	1	1 QS						
	Time stability [g]	1 (1-0)				1	1 CSS			Low
	Seeing pain as a mystery	1 (1-0)				1	1 CSS			Low
	Self-blame	1 (1-0)	1	1 CSS						Low
	Pain and Impairment relationship	1 (1-0)	1	1 CSS						Low
	Marital status	2 (2-0)				2	2 CSS		+	Low
Personal work related factors	Higher involvement	1 (1-0)				1	1 CSS			Low
	Deciding own work schedule	1 (0-1)	1	1 QS						
	Higher fear avoidance beliefs	1 (1-0)	1	1 CSS						Low
	Perceived work load high	1 (1-0)				1	1 CSS			Low
	Being highly motivated to work	1 (0-1)				1	1 QS			
	Retraining for other job	1 (0-1)	1	1 QS						
	Higher perceived peer cohesion	1 (1-0)	1	1 CSS						Low

Group (ICF domain)	Factors investigated	No. of articles (CSS – QS)	SAW associated	High quality	Low quality	Not SAW associated	High quality	Low quality	Consistency	Level of evidence
Personal work related factors	High perceived supervisor support	2 (1-1)	2	1 CSS 1QS						Low
	High perceived support colleagues	1 (0-1)	1	1 QS						
	Higher perceived autonomy	1 (1-0)	1	1 CSS						Low
	Higher perceived work pressure	2 (1-1)	2	1 CSS 1 QS						Low
	Higher perceived supervisor control	1 (1-0)	1	1 CSS						Low
	Higher perceived task orientation	1 (1-0)				1	1 CSS			Low
	Higher perceived pain clarity [h]	1 (1-0)				1	1 CSS			Low
	Higher perceived innovative work	1 (1-0)				1	1 CSS			Low
	Higher perceived physical comfort	1 (1-0)				1	1 CSS			Low
Environmental factors	Spouses disability pension	1 (0-1)	1	1 QS						
Environmental work related factors	Change of work tasks	1 (0-1)	1	1 QS						
	Less working hours	1 (0-1)	1	1 QS						
	Change work tasks during day	1 (0-1)	1	1 QS						
	Improve ergonomics	1 (0-1)	1	1 QS						
	Adjustments of work	1 (0-1)	1	1 QS						
	Higher social support work	2 (1-1)	1	1 QS		1	1 CSS			Low
	Higher work load	1 (0-1)	1	1 QS						
	Flexible working hours	2 (0-2)	2	2 QS						

CSS = Cross-sectional study; QS = Qualitative study
ICF = International Classification of Functioning, Disability and Health
SAW = Staying at work
+ = high consistency; - = low consistency
High = Further research is very unlikely to change our confidence in the estimate
Moderate = Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate
Low = Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate
Very low = Any estimate of effect is very uncertain
a commuting = travelling from home to work
b reinterpretation = subscale of the Coping Strategies Questionnaire; type of coping strategy in which a new interpretation of the problem is sought
c self-statements = subscale of the Coping Strategies Questionnaire
d ignoring = subscale of the Coping Strategies Questionnaire
e control = subscale of the Coping Strategies Questionnaire; control over life (a measure of how well coping strategies work)
f catastrophizing = 'over appraisal' of the negative aspects/consequences of pain
g time stability = subscale of the Pain Beliefs & Perceptions Inventory; time stability is referring to the stability of the pain over time
h pain clarity = subscale of the Pain Beliefs & Perceptions Inventory; the higher the Pain clarity, the lower pain is seen as a mystery

Synthesis of quantitative studies

No meta-analysis could be performed because the included studies were clinically diverse and used different instruments to measure SAW factors. Most SAW factors in the 5 quantitative studies were determined by existing constructs from questionnaires or measurements which identified the characteristics (age, gender, duration of pain, education, distress, self-esteem, depression, catastrophizing, coping style, etc.) of workers who stayed at work with CMP. These characteristics were largely covered by the ICF components Body functions and structures, Personal factors, and Personal work-related factors, shown in Figure 2.[38,51]
Perceived physical disability and emotional distress were factors consistently associated with SAW. Duration of pain, catastrophizing, self esteem, and marital status were consistently not associated. The findings were inconsistent with respect to better physical health, female gender, mental health, pain intensity, depressive symptoms, older age, educational level, coping, and self-efficacy. The evidence for educational level as a SAW factor was inconsistent (Table 3). However, 2 of the 3 studies reporting on educational level[49,50] presented high estimates (OR 0.08 and 3.49), both indicating that lower educational level is a barrier for SAW.

Synthesis of qualitative studies

Most determinants provided by the 2 qualitative studies linked to the Activities and Environmental work-related factors ICF components (Table 3). Workers who stay at work despite CMP indicate that their success was based on adjustments made by themselves or by workplace interventions. To enable work the following day, adjustments were made in prioritizing daily activities, such as doing less or no housework or leisure activities, or more relaxation.[32,37] Workplace interventions were decreased working hours, varied work postures, variable work tasks, flexible working hours, or improved ergonomics. Many of these workplace interventions could be achieved by effective communication with supervisors and support from colleagues and/or supervisors.

Synthesis of results

All the ICF components were covered by the identified SAW factors (Table 3). The factors described in the quantitative studies were different from the factors noted in the qualitative studies. The 5 quantitative studies described certain characteristics of the successful worker, whereas the qualitative studies revealed ‘change’ as a SAW factor: a change in personal behaviour, the behaviour of others, or a change in the workplace or work conditions. When the level of evidence was considered, the ICF components Health state, Participation, Environmental factors, Environmental work-related factors and Personal work-related factors remained empty (Figure 2).

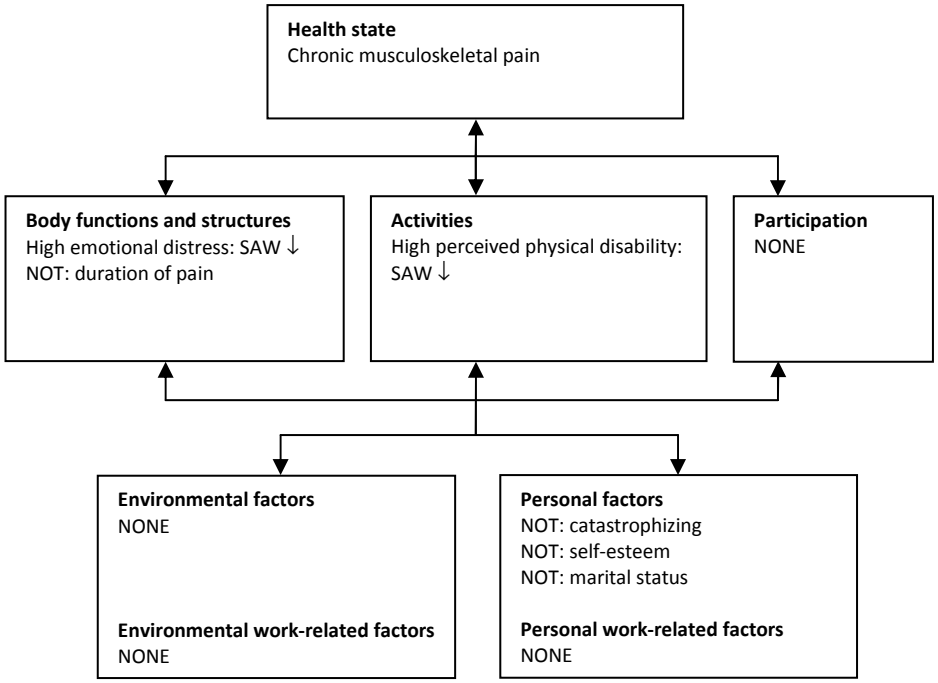

Figure 2: Summary of evidence from quantitative studies classified according to International Classification of Functioning, Disability and Health (World Health Organization, 2001).[38]
NOT = consistently no association was found between this item and SAW
NONE = no information was found within this component of the ICF model
SAW ↑ = factors positive associated with staying at work
SAW ↓ = factors negative associated with staying at work

Discussion

Strength of the evidence

This systematic review focused on factors that promote or hinder SAW in workers with CMP. Our results indicate that a variety of factors are relevant to staying at work: overall a total of 83 factors were identified. Consistent evidence of promoting SAW was found for emotional distress and perceived physical disability. Duration of pain, catastrophizing, self esteem and marital status were consistently not associated with SAW. Because only 7 studies were identified, and these were all observational or qualitative, the level of evidence found for factors associated with SAW ranged from low to very low. Although the quality of the included studies was generally high, this did not contribute to a higher level of evidence. In an uncontrolled environment such as the workplace, it is challenging to conduct prognostic studies or RCTs. In a review aimed at identifying RCTs by comparing sick leave due to musculoskeletal disorders with no sick leave, it was concluded that over

99% of all studies of sick leave were observational.[52] The amount of literature about SAW factors is limited. The reason for the scarcity of studies on SAW is not clear. People who stay at work with CMP often do not seek help from healthcare services, which decreases their accessibility for research. Moreover, people who stay at work do not immediately stand out as interesting study subjects, because common sense would suggest that they are experiencing no problems. As we know, the evidence for SAW determinants is limited, and this review should give direction to further research to fill the current gap in our knowledge.

Applicability of evidence

Low emotional distress was identified in our review as a promoting factor for SAW. Other studies provided evidence that emotional distress is a predictor for RTW following treatment[53-55], and a modifiable risk factor for work disability.[20,56,57] Furthermore, our review provides low-level evidence that perceived physical disability is associated with SAW. Other studies found that low perceived physical disability predicted RTW.[20,58,59] Reducing emotional distress and perceived physical disability could be important targets in helping people to stay at work.

Catastrophizing has been identified as a determinant for RTW and disability.[24,60-63] By contrast, pain catastrophizing was consistently not associated with SAW in our review. A plausible explanation for this seemingly contradictory observation is currently unavailable.

In our review quantitative and qualitative research supplemented each other in identifying SAW factors. The 5 quantitative studies particularly investigated personal and personal work-related characteristics of the successful worker, while the 2 qualitative studies found behavioural and other change and environmental factors to be important determinants: organizing adjustment latitude, workplace interventions, support from supervisor, motivation to work, and self-management skills to manage sustained work participation (Table 1b). It appears that quantitative studies inquire into themes different from those the workers themselves consider to be important. This is reflected in the mainly personal themes identified in the quantitative studies, in contrast to the mainly environmental themes identified in the qualitative studies. This is in line with recent studies of RTW, which stressed that in addition to personal factors, environmental factors particularly determine whether people return to work or not.[62,64,65] Although qualitative studies are descriptive, the results may nevertheless be of value because they could indicate blind spots in quantitative research and should give direction for future research.

Strengths and limitations of the review

Only 7 studies were eligible for inclusion in this systematic review for various reasons. Firstly, in many studies with mixed pain duration samples it was not possible to isolate the results for those subjects with chronic pain. By strict inclusion on the chronic pain criterion, studies with potential information about SAW were excluded. Secondly, in our review we defined SAW as sustained work participation despite CMP for at least 12 months, without present sick leave. Two studies were excluded because the defined working group was sick listed considerably and therefore did not satisfy this criterion.[27,66] We also included studies with negative work-related outcome measures, such as work loss or incapacity.[48,50] Although inclusion of such studies may be regarded as improper study selection, we nevertheless regarded such studies eligible for inclusion, because these studies consisted of SAW control groups that did meet the inclusion criteria. Thirdly, the focus was on CMP in our review. All studies reporting on SAW in people with specific pain conditions, such as cancer pain, arthritis or clearly diagnosed back pain disorders were excluded. As a consequence, potentially interesting information on SAW was omitted. Most of the 7 included studies did not differentiate between sick leave recorded by personnel departments and self-report. From the literature it is known that self-reported sick leave data is less reliable than company recorded data.[67] Although presenteeism was one of the search terms in this review, all studies reporting on presenteeism in CMP were excluded because the subjects in these studies had significant sick leave and therefore did not satisfy the inclusion criteria for this review. Literature on presenteeism does indicate that production loss caused by presenteeism could exceed production loss caused by absenteeism.[5,27,68] It is possible that people who stay at work have low work productivity: SAW does not automatically mean work participation with sustained productive capacity. None of the studies included in this review controlled for effects of presenteeism.

Part-time employment could be considered as a factor that promotes SAW because it could provide more recovery time, which could play a major role in promoting capacity for work the following day. Because full-time or part-time employment was not considered separately in any of the included studies, we were not able to identify part-time employment as a success factor for staying at work. The results of the included studies could be biased by not distinguishing between full- and part time work. It is theoretically possible that people who stay at work were located in the part-time work subgroup. Decreased working hours was identified as a determinant for SAW[32], but part-time work itself does not guarantee more recovery time. The extra time gained could be spent on leisure activities, childcare or housework. In most of the studies included in this review, the findings were based on samples of people consuming healthcare. Only 1 study presented data for a non-clinical group.[31] The generalizability of conclusions to non-clinical populations is therefore limited.

Relevance

The results of our review show that little evidence is available for SAW. Many studies focused on sickness absence, RTW, incapacity or disability benefits claims for CMP reasons, but the people with CMP who stay at work are underrepresented in the literature. We may be able to learn something from this successful group by learning the determinants which support working with CMP, and finding tools for the prevention of incapacity. The focus of many researchers, clinicians and policymakers is on those people with CMP who are no longer able to successfully participate in work. That is perhaps to the detriment of those people with CMP who manage to work despite pain. Specific attention to the people who stay at work despite CMP will contribute to broadening our views on chronic pain and work. If we want to stimulate healthy behaviour, we need to know what healthy behaviour is. This shift in paradigm, focusing on successful, coping behaviour rather than on pain behaviour, could lead to new perspectives. A new focus on rehabilitation, occupational and insurance medicine will assist clinicians to identify successful ways of coping with CMP to stay at work. The effectiveness of vocational rehabilitation programmes could be increased if more SAW determinants are identified. Eventually, this could improve the quality of life and sustained work participation of many people living with CMP.

Definition and terminology for SAW

The terminology used for people who stay at work despite pain was different across the studies, illustrating that the literature is ambiguous about work participation with chronic pain. The definition of SAW in our review was arbitrary, and considered SAW with CMP as a healthy coping behaviour which will help to maintain workers' quality of life. In our review SAW was used differently than sickness presenteeism, which refers to the phenomenon where workers go to work despite health problems that should prompt them to rest and take sick leave.[69] The term presenteeism is usually used to describe a non-desirable behaviour, which could be harmful.[70-72] The use of the term SAW has one disadvantage: like RTW programmes aimed at helping people to return to work, SAW programmes also exist, allowing workers to stay at work on a part-time basis while still receiving partial disability benefits.[73] In these programmes workers receive disability benefits, work fewer hours, do different work at a slower pace, have lower attendance requirements or are allowed to follow courses to find more suitable jobs. This is not SAW as defined in our review, and could lead to confusion. Consensus about terminology is important. Expert meetings or a Delphi study could help create agreement about SAW terminology.

Conclusions and implications for practice and future research

In this review, we were unable to identify high-level evidence about SAW determinants for workers with chronic pain conditions. However, a limited number of low-level evidence determinants were identified. It is likely that future research will reveal additional determinants with better evidence, which will increase our understanding of SAW. There is an urgent need for high quality prognostic studies that investigate SAW determinants. Such prognostic studies should strictly define successful work participation, targeting workers who actually stay at work despite pain, without present sick leave. It is recommended that future research focuses not only on clinical groups, but also on non-clinical groups. In addition, the role of presenteeism in these groups is an important issue to be studied.

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Declaration of interest

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Implications for Rehabilitation

- When modifiable factors that promote staying at work can be identified, interventions can be developed to support the ability of workers with chronic nonspecific musculoskeletal pain to stay at work.
- Consistent evidence of promoting staying at work was found for low emotional distress and perceived physical disability, while duration of pain, catastrophizing, self-esteem and marital status were consistently not associated.
- Future interventions aimed at promoting staying at work should consider reducing perceived physical disability and emotional distress.

Appendix 1: detailed search strategy of the literature

Search history PubMed:
#1 Mesh terms related to work
"Work"[Mesh: NoExp] OR "Occupations"[Mesh] OR "Absenteeism"[Mesh] OR "Employment"[Mesh] OR "Sick Leave"[Mesh] OR "Occupational Health"[Mesh]

#2 Free text words related to work
"sickness absence"[tiab] OR "work status"[tiab] OR "occupational status"[tiab] OR "work ability"[tiab] OR "work disability"[tiab] OR "work attendance"[tiab] OR "work performance"[tiab] OR "occupationally active"[tiab] OR "job retention"[tiab] OR "work capacity"[tiab] OR presenteeism[tiab] OR "job status"[tiab] OR "stay at work"[tiab] OR "occupational ability"[tiab] OR "vocational status"[tiab] OR "vocational rehabilitation"[tiab] OR "employment status[tiab]" OR "return to work"[tiab] OR "Work participation"[tiab] OR "Occupation"[tiab] OR "Absenteeism"[tiab] OR "Employment"[tiab] OR "Sick Leave"[tiab] OR "Occupational Health"[tiab]

#3 Mesh terms related to pain
("Pain"[Mesh] AND "Chronic disease" [Mesh]) OR "Back Pain"[Mesh] OR "Neck Pain"[Mesh] OR "Shoulder Pain"[Mesh] OR "Pelvic Pain"[Mesh] OR "Fibromyalgia"[Mesh] OR "Whiplash Injuries"[Mesh] OR "Tendinopathy"[Mesh:NoExp] OR "Musculoskeletal Diseases"[Mesh:NoExp] OR "Myofascial Pain Syndromes"[Mesh] OR "Joint Instability"[Mesh] OR "Cumulative Trauma Disorders"[Mesh:NoExp]

#4 Free text words related to pain
"Back Pain"[tiab] OR "Neck Pain"[tiab] OR "Shoulder Pain"[tiab] OR "Pelvic Pain"[tiab] OR Fibromyalgia[tiab] OR Whiplash[tiab] OR Tendinopathy[tiab] OR "Musculoskeletal pain"[tiab] OR "Myofascial Pain"[tiab] OR "Joint Instability"[tiab] OR "Cumulative Trauma Disorder"[tiab] OR "repetitive strain injury"[tiab] OR (complaints[tiab] AND (arm[tiab] OR neck[tiab] OR shoulder[tiab])) OR "chronic pain"[tiab] OR "widespread pain"[tiab] OR "work related pain"[tiab]

#5 #1 OR #2
#6 #3 OR #4
#7 #5 AND #6
#8 #5 AND #6 Limits: editorial, letter, practice guideline, case reports, guideline
#9 #7 NOT #8 Limits: Adult: 19-44 years, Middle Aged: 45-64 years

Search history Embase:
#1 Emtree terms and free text words related to work
('work'/de OR 'occupation'/de OR 'absenteeism'/exp OR 'employment'/exp OR 'medical leave'/

exp OR 'occupational health'/de OR 'sickness absence':ab,ti OR 'work status':ab,ti OR 'occupational status':ab,ti OR 'work ability':ab,ti OR 'work disability':ab,ti OR 'work attendance':ab,ti OR 'work performance':ab,ti OR 'occupationally active':ab,ti OR 'job retention':ab,ti OR 'work capacity':ab,ti OR presenteeism:ab,ti OR 'job status':ab,ti OR 'vocational status':ab,ti OR 'vocational rehabilitation':ab,ti OR 'employment status':ab,ti OR occupation:ab,ti OR absenteeism:ab,ti OR employment:ab,ti OR 'sick leave':ab,ti OR 'occupational health':ab,ti OR 'occupational ability':ab,ti OR 'stay at work':ab,ti OR 'return to work':ab,ti OR 'work participation':ab,ti)

#2 Emtree terms and free text words related to pain
('pain'/de AND 'chronic disease'/exp OR 'backache'/exp OR 'shoulder pain'/exp OR 'neck pain'/exp OR 'pelvis pain syndrome'/exp OR 'fibromyalgia'/exp OR 'whiplash injury'/exp OR 'tendinitis'/de OR 'musculoskeletal disease'/de OR 'myofascial pain'/exp OR 'joint instability'/exp OR 'cumulative trauma disorder'/de OR fibromyalgia:ab,ti OR 'back pain':ab,ti OR 'neck pain':ab,ti OR 'shoulder pain':ab,ti OR 'pelvic pain':ab,ti OR whiplash:ab,ti OR tendinopathy:ab,ti OR 'myofascial pain':ab,ti OR 'joint instability':ab,ti OR 'cumulative trauma disorder':ab,ti OR 'repetitive strain injury':ab,ti OR (complaints:ab,ti AND (arm:ab,ti OR neck:ab,ti OR shoulder:ab,ti)) OR 'chronic pain':ab,ti OR 'widespread pain':ab,ti OR 'musculoskeletal pain':ab,ti OR 'work related pain':ab,ti)
#3 #1 AND #2
#4 #3 AND [adult]/limits
#5 #4 NOT ([editorial]/lim OR [letter]/lim OR 'case report'/exp)

Search history CINAHL:
#1 CINAHL heading terms and free text words related to work
(MH "Work") or (MH "Occupations and Professions") or (MH "Employment+") or (MH "Absenteeism") or (MH "Sick Leave") or (MH "Occupational Health") OR TI ("sickness absence" OR "work status" OR "occupational status" OR "work ability" OR "work disability" OR "work attendance" OR "work performance" OR "occupationally active" OR "job retention" OR "work capacity" OR presenteeism OR "job status" OR "vocational status" OR "vocational rehabilitation" OR "employment status" OR occupation OR absenteeism OR employment OR "sick leave" OR "occupational health" OR "occupational ability" OR "stay at work" OR "return to work" OR "work participation") or AB ("sickness absence" OR "work status" OR "occupational status" OR "work ability" OR "work disability" OR "work attendance" OR "work performance" OR "occupationally active" OR "job retention" OR "work capacity" OR presenteeism OR "job status" OR "vocational status" OR "vocational rehabilitation" OR "employment status" OR occupation OR absenteeism OR employment OR "sick leave" OR "occupational health" OR "occupational ability" OR "stay at work" OR "return to work" OR "work participation")

#2 CINAHL heading terms and free text words related to pain
(MH "Chronic Pain") or (MH "Back Pain") or (MH "Neck Pain") or (MH "Shoulder Pain") or (MH "Pelvic Pain") or (MH "Fibromyalgia") or (MH "Musculoskeletal Diseases") or (MH "Whiplash Injuries") or (MH "Tendinopathy") or (MH "Myofascial Pain Syndromes") or (MH "Joint Instability") or (MH "Cumulative Trauma Disorders") or TI (fibromyalgia OR "back pain" OR "neck pain" OR "shoulder pain" OR "pelvic pain" OR whiplash OR tendinopathy OR "myofascial pain" OR "joint instability" OR "cumulative trauma disorder" OR "repetitive strain injury" OR (complaints AND (arm OR neck OR shoulder)) OR "chronic pain" OR "widespread pain" OR "musculoskeletal pain" OR "work related pain") or AB (fibromyalgia OR "back pain" OR "neck pain" OR "shoulder pain" OR "pelvic pain" OR whiplash OR tendinopathy OR "myofascial pain" OR "joint instability" OR "cumulative trauma disorder" OR "repetitive strain injury" OR (complaints AND (arm OR neck OR shoulder)) OR "chronic pain" OR "widespread pain" OR "musculoskeletal pain" OR "work related pain")

#3 #1 AND #2
#4 #3 AND Age Groups: Adult, 19-44 years, Middle Age, 45-64 years
#5 #4 NOT Publication Type: Case Study, Editorial, Letter

Search history PsycINFO:
#1 Descriptor terms and free text words related to work
(DE "Employment Status" or DE "Employability" or DE "Employee Absenteeism") OR TI (("sickness absence" OR "work status" OR "occupational status" OR "work ability" OR "work disability" OR "work attendance" OR "work performance" OR "occupationally active" OR "job retention" OR "work capacity" OR presenteeism OR "job status" OR "vocational status" OR "vocational rehabilitation" OR "employment status" OR occupation OR absenteeism OR employment OR "sick leave" OR "occupational health" OR "occupational ability" OR "stay at work" OR "return to work" OR "work participation") or AB ("sickness absence" OR "work status" OR "occupational status" OR "work ability" OR "work disability" OR "work attendance" OR "work performance" OR "occupationally active" OR "job retention" OR "work capacity" OR presenteeism OR "job status" OR "vocational status" OR "vocational rehabilitation" OR "employment status" OR occupation OR absenteeism OR employment OR "sick leave" OR "occupational health" OR "occupational ability" OR "stay at work" OR "return to work" OR "work participation"))
#2 Descriptor terms and free text words related to pain
(DE "Chronic Pain" or DE "Back Pain" or DE "Myofascial Pain" or DE "Fibromyalgia" or DE "Musculoskeletal Disorders" or DE "Whiplash" OR DE "Pain") OR TI (fibromyalgia OR "back pain" OR "neck pain" OR "shoulder pain" OR "pelvic pain" OR whiplash OR tendinopathy OR "myofascial pain" OR "joint instability" OR "cumulative trauma disorder" OR "repetitive strain injury" OR (complaints AND (arm OR neck OR shoulder)) OR "chronic pain" OR "widespread pain" OR "musculoskeletal pain" OR "work related pain") or AB (fibromyalgia OR "back pain" OR "neck pain" OR "shoulder pain" OR

“pelvic pain” OR whiplash OR tendinopathy OR “myofascial pain” OR “joint instability” OR “cumulative trauma disorder” OR “repetitive strain injury” OR (complaints AND (arm OR neck OR shoulder)) OR “chronic pain” OR “widespread pain” OR “musculoskeletal pain” OR “work related pain”)

#3 #1 AND #2

#4 #3 AND Age Groups: Young Adulthood (18-29 yrs), Thirties (30-39 yrs), Middle Age (40-64 yrs)

#5 #4 NOT Methodology: CLINICAL CASE STUDY; Document Type: Comment/Reply, Editorial, Letter; Exclude Dissertations

Search history Cochrane Library:

#1 MeSH descriptor Back Pain explode all trees

#2 MeSH descriptor Neck Pain explode all trees

#3 MeSH descriptor Shoulder Pain explode all trees

#4 MeSH descriptor Pelvic Pain explode all trees

#5 MeSH descriptor Fibromyalgia explode all trees

#6 MeSH descriptor Tendinopathy explode all trees

#7 MeSH descriptor Musculoskeletal Diseases, this term only

#8 MeSH descriptor Myofascial Pain Syndromes explode all trees

#9 MeSH descriptor Joint Instability explode all trees

#10 MeSH descriptor Cumulative Trauma Disorders explode all trees

#11 MeSH descriptor Work, this term only

#12 MeSH descriptor Occupations explode all trees

#13 MeSH descriptor Absenteeism explode all trees

#14 MeSH descriptor Employment explode all trees

#15 MeSH descriptor Sick Leave explode all trees

#16 MeSH descriptor Occupational Health explode all trees

#17 MeSH descriptor Chronic Disease explode all trees

#18 MeSH descriptor Pain explode all trees

#19 (#17 AND #18)

#20 “sickness absence” OR “work status” OR “occupational status” OR “work ability” OR “work disability” OR “work attendance” OR “work performance” OR “occupationally active” OR “job retention” OR “work capacity” OR presenteeism OR “job status” OR “stay at work” OR “occupational ability” OR “vocational status” OR “vocational rehabilitation” OR “employment status” OR “return to work” OR “Work participation” OR “Occupation” OR “Absenteeism” OR “Employment” OR “Sick Leave” OR “Occupational Health” :ti,ab,kw

#21 “Back Pain” OR “Neck Pain” OR “Shoulder Pain” OR “Pelvic Pain” OR Fibromyalgia OR Whiplash OR Tendinopathy OR “Musculoskeletal pain” OR “Myofascial Pain” OR “Joint

Instability" OR "Cumulative Trauma Disorder" OR "repetitive strain injury" OR (complaints AND (arm OR neck OR shoulder)) OR "chronic pain" OR "widespread pain" OR "work related pain" :ti,ab,kw

#22 (#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #19 OR #21)

#23 (#11OR #12 OR #13 OR #14 OR #15 OR #16 OR #20)

#24 (#22 AND #23)

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3

Staying at work with chronic nonspecific musculoskeletal pain: a qualitative study of workers' experiences

BMC Musculoskeletal disorders 2011; 12:126

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Abstract

Background: Many people with chronic nonspecific musculoskeletal pain (CMP) have decreased work ability. The majority, however, stays at work despite their pain. Knowledge about workers who stay at work despite chronic pain is limited, narrowing our views on work participation. The aim of this study was to explore why people with CMP stay at work despite pain (motivators) and how they manage to maintain working (success factors).

Methods: A semi-structured interview was conducted among 21 subjects who stay at work despite CMP. Participants were included through purposeful sampling. Interviews were audio-recorded, transcribed verbatim, and imported into computer software Atlas.ti. Data was analyzed by means of thematic analysis. The interviews consisted of open questions such as: “Why are you working with pain?” or “How do you manage working while having pain?”

Results: A total of 16 motivators and 52 success factors emerged in the interviews. Motivators were categorized into four themes: work as value, work as therapy, work as income generator, and work as responsibility. Success factors were categorized into five themes: personal characteristics, adjustment latitude, coping with pain, use of healthcare services, and pain beliefs.

Conclusions: Personal characteristics, well-developed self-management skills, and motivation to work may be considered to be important success factors and prerequisites for staying at work, resulting in behaviors promoting staying at work such as: raising adjustment latitude, changing pain-coping strategies, organizing modifications and conditions at work, finding access to healthcare services, and asking for support. Motivators and success factors for staying at work may be used for interventions in rehabilitation and occupational medicine, to prevent absenteeism, or to promote a sustainable return to work. This qualitative study has evoked new hypotheses about staying at work; quantitative studies on staying at work are needed to obtain further evidence.

Background

Chronic nonspecific musculoskeletal pain (CMP) is a prominent public-health problem in most welfare states. The influence of CMP on the degree of employee absenteeism and disability allowances is high.[1-3] However, the majority (60-70%) of workers with CMP stays at work despite pain and without sick leave.[3-6] This is not unique for CMP, for in cases of chronic disorders such as rheumatoid arthritis, diabetes mellitus, or COPD and asthma, most people also stay at work.[7,8] Understanding workers who stay at work despite pain is limited. Qualitative research on staying at work (SAW) has focused primarily on successful working strategies for women with fibromyalgia.[9,10] However, a qualitative study of SAW in working men and women with CMP is not yet available.

Up until now the subjects of absenteeism, work disability, and return to work (RTW) have dominated health and work research, in view of the large expenditure of funds by both society and employers, and, in addition, the personal problems of the employees who are on sick leave. Nevertheless, in spite of decades of extensive research focusing on absenteeism and RTW, no drastic changes in absenteeism and work participation levels have been identified. Disregarding in the literature the amount of people who stay at work might have limited our view on work participation. Knowledge of workers staying at work despite pain may be found useful for research and for the clinical practice of (vocational) rehabilitation, strategies for sustainable RTW, and occupational and insurance medicine. Effectiveness of vocational rehabilitation programs could be improved as soon as the success factors for SAW become clear. We may be able to learn from the successful workers' perspective, and identify factors that are essential for staying at work. Other authors agree that further exploration into this underreported and unknown group is needed.[11,12]

Taken into account that knowledge on workers staying at work despite their pain is limited, a qualitative research approach was chosen as starting point for exploration into our research question.[13] This design is meant to offer a deeper understanding of perceived success factors for SAW despite CMP. It is relevant to know about the experiences of these workers, why they have decided to continue working with pain and how they have managed to be successful. What advice could their colleagues, who have not been able to stay at work, be given? Have they given up on other domains of participation? Which contributing factors could lead to being successful in working with chronic pain? Therefore, the aim of this study is to explore the motives of people with CMP in terms of why they stay at work despite pain, and the success factors of remaining working.

Methods

Study design

Individual semi-structured interviews were conducted. A qualitative study design was chosen, because it elucidates data from the experiences of the workers themselves, thus opening up the study to authentic themes, independent from prevailing constructs, instruments, or questionnaires. Thematic analysis was used to analyze the data.[14]

Subjects

Semi-structured interviews were conducted among 21 subjects with CMP (9 male, 12 female) who stayed at work despite CMP. These subjects were sampled from participants in the study "Working with Pain" which was conducted from May 2009 to January 2010. Participants in the "Working with Pain" study were recruited through announcements in newspapers and websites of national associations for Whiplash and Fibromyalgia patients. Inclusion criteria of the "Working with Pain" study were: CMP, duration longer than 6 months; age 20 to 60 years; having been employed 20 hours a week or more during 12 months prior to participation in the study; and participants' absence from work ascribed to CMP could not be more than 5% of potential total working hours in the year prior to participation (which is around the average rate of sickness absence in Europe).[15-17] Exclusion criteria were: relevant co-morbidities with severe negative consequences for physical and/or mental functioning (for example severe mental illness), addiction to drugs, pregnancy, and insufficient knowledge of the Dutch language. To diagnose the type of pain and the existence of co-morbidities, all participants received a standard medical examination by a physiatrist. Sick leave was recorded by a standard questionnaire constructed by Rehabilitation Development Centers in the Netherlands.[18]

To answer the review question and fully understand the topic, workers from various settings were interviewed. A purposeful sampling strategy was used to ensure that the sample consisted of a rich mixture of different perspectives according to gender, age, social background, and occupation.[13] The characteristics of the interview participants (n=21) have been outlined in Table 1. Pain intensity was measured using the 11-point numeric rating scale (NRS), ranging from 0 (no pain) to 10 (worst possible pain), requiring participants to rate their current pain intensity and average pain intensity.[19] Validity and utility of the 11-point NRS is sufficient and it is responsive to changes in individuals.[20-22] The Pain Disability Index (PDI) was used to measure the degree of chronic pain interfering with daily life.[23] The PDI is a 7-item inventory, with each item score ranging from 0 (no interference) to 10 (total interference). The total PDI score ranges from 0 to 70. Reliability and validity of the PDI are supported by the literature.[24]

The study was judged and approved by the Medical Ethical Committee of the University Medical Center of Groningen. Anonymity, confidentiality, and the right to withdraw from the study at all times were guaranteed. All participants signed an informed consent form.

The interview

Large numbers of explanatory models and theories have been constructed to understand and explain sick leave and work attendance.[25-32] Each model seems to have shortcomings. For that reason, no explicit theoretical framework was used in the construction of the interview so as to enable participants to speak for themselves without theoretical constraints imposed by the interviewer and also to set no limitations on the interviewer's mindset. We have used open questions in our interview such as, "Why are you working with pain?" and "How do you manage working with your pain?" Topics of relevance were developed at an expert meeting attended by occupational, rehabilitation, and insurance physicians; a healthcare psychologist; an expert on labor; and a patient representative. Topics included were motivators for SAW, success factors for SAW, coping strategies promoting SAW, future expectations regarding work participation, what can be learned from workers who stay at work, as well as consequences of SAW (Additional file 1). These topics were tested in a trial by way of seven interviews, after which the interview guide was altered slightly, and some new topics were added (Additional file 1: Questions 4, 17, 18, 20, and 29). The interview guide guaranteed that no information was overlooked, whereas the semi-structured format also made allowances for spontaneous interaction. After completion of the pilot study, the sampling and interviewing of the participants started.

Data analysis

Interviews lasted 45-90 minutes, and were audio-recorded and transcribed verbatim. The first three interviews were transcribed by the interviewer (HdV), while the rest were done by a secretary. The transcribed text was verified and corrected by the interviewer. Data was analyzed according to the theoretical approach of the method of thematic analysis.[14] Atlas.ti computer software was used for data analysis. To find answers to our research questions, the interview texts were analyzed, guided by the themes "why" and "how." The analyses were completed by the interviewer in close collaboration with the second author (SB). At first, the transcribed interviews were read and open-coded by the first and second author, independently. The research questions "why" and "how" guided the coding process. Agreement was reached on the naming and defining of the preliminary emerged codes. An experienced psychologist was consulted about the coding. After rereading the interviews, codes were renamed, combined, or split, and classified by themes. Peer debriefing, audit trail, and verbatim quotes were used to ensure that participants' personal perceptions were analyzed, and not the personal beliefs of the investigators.[33]

Table 1: Demographic characteristics of 21 interview participants

Variable	mean (sd)	n	%
Age	49 (6.9)		
20-30 years		0	
31-40 years		4	19
41-50 years		4	19
51-60 years		13	62
Gender			
Male		9	43
Female		12	57
Education			
Primary		8	38
Secondary		6	29
Higher		7	33
Profession			
Teacher		4	19
Healthcare		6	29
Sales		2	10
Engineering		3	14
Gardening		3	14
Administration		2	10
Journalist		1	4
Working hours	31 (8.4)		
20 hours		4	19
21-30 hours		5	24
31-40 hours		12	57
Pain location			
(low) Back		9	43
Neck/shoulders		7	33
Fibromyalgia		5	24
Pain intensity NRS [a] now	4.5 (1.9)		
1-4		8	38
5-7		9	43
8-10		4	19
Pain intensity NRS average [b]	5.3 (1.7)		
1-4		2	10
5-7		12	57
8-10		7	33
Pain duration			
1-2 years		3	14
3-5 years		0	0
> 5 years		18	86
Pain Disability Index (PDI)	20.3 (8.2)		
0-10		2	10
11-20		7	33
21-30		10	47
> 30		2	10
Occupational parameter PDI	3.7 (1.5)		
Work			
Paid employment		19	90
Self-employed		2	10
Work absence previous year [c]			
0 days		17	81
1-10 days		4	19

[a] Numeric Rating Scale
[b] Average pain rating during the last 7 days
[c] Work absence due to chronic musculoskeletal pain

Participants' quotes were translated by the first author and a research assistant with Bachelor's degrees in the English language.

Data were analyzed continuously until the point of saturation was reached. The sample was considered saturated when no new themes emerged from the gathered data.[34] The interview was adjusted twice, to increase insight into some of the new topics which arose from previously analyzed data. After interviewing 21 participants, data collection stopped, having reached saturation. Therefore, we concluded that the sample size of 21 was sufficient for an appropriate understanding of the topic and for answering the research questions "how" and "why".

Measures for validity

The first author, who did the interviews, has worked in a rehabilitation clinic for 12 years, and so was familiar with the phenomenon of chronic pain management. This experience made communication with the participants easier. On the other hand, having been a therapist for many years, it seemed more difficult to not act as a therapist, which obviously wouldn't be the appropriate role within the context of interviewing. To avoid this risk, feedback on objectivity was given by an experienced psychologist during three pilot interviews, conducted independently from the study sample. In a further attempt to minimize the risk of observer bias, the interviews were also analyzed by the second author. The background of the second author, who had a great deal of experience in work and health research, was complementary to the knowledge of the first author. This gave us the opportunity to analyze the data from different perspectives.

Results

Several themes emerged after thematic analysis of the transcribed interviews. A total of four themes of motivators (work as value, work as therapy, work as income generator and work as responsibility) and five themes of success factors (personal characteristics, adjustment latitude, coping with pain, use of healthcare services, and pain beliefs) were recorded in the interviews. Within the group of participants the answers turned out to be divergent. Figure 1 outlines the categories of motivators and success factors for SAW that emerged after analyses of the interviews. In addition to motivators and success factors, two other themes in the interviews were: "Consequences of SAW" and "What can be learned from workers who 'stay at work' with pain."

Motivators for staying at work

1. Work as a value

In their work, participants found recognition and approval, self-realization, and self-respect. In a way, work gave meaning to the lives of many people. Participants stated that work provided a goal or mission in their lives.

Job satisfaction was often stated as a strong motivator for SAW. Work gave satisfaction because it was rewarding. Job satisfaction was linked to most other motivators listed in Figure 1. P3: "My work is wonderful; it gives me energy and satisfaction. I like my job and I don't want to lose it; it gives me the strength to continue working." On the other hand, some participants indicated that work was no longer giving them any joy, yet they kept on working. In those cases, other motivators compensated for this, for example, work as a means of ensuring income.

Self-realization. Some participants stated that they feared a stationary situation without their work. P18: "What would I do when the children are at school? I want to develop myself, learn new things, keep my mind active!"

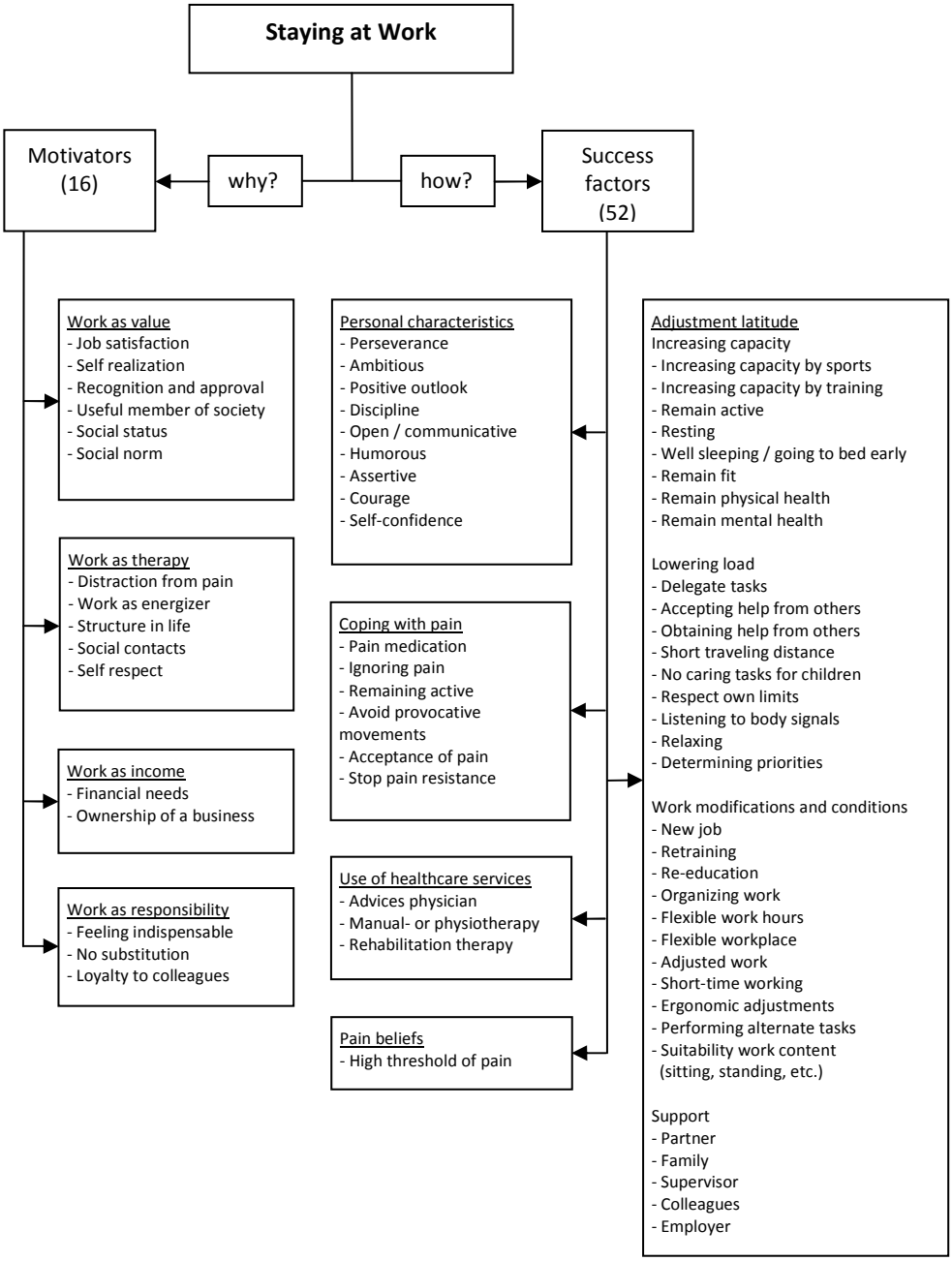
Recognition and approval. At work participants felt valued and approved by others. P12: "In my job I get appreciation for what I do. That's why I work."

Or another example: "My husband is always away on business, so it feels good to be with other people and to share common goals."

Useful member of society. Many participants felt an urgent need to participate in society. They feared losing touch with work and society. P6: "Everyone has to contribute to society, and I want to do my part. It's no use just being at home with my back pain, turning my back on society."

Social status. Having a job was regarded as status, making it evident that one can earn one's own living. P8: "Unemployment leads to social decline, which would be horrifying to me."

Social norm. Some participants try to act in accordance with what is the general belief. P8: "I think work is the norm." P15: "A man has to earn a living for his family; this is how things are meant to be." Fulfilling this ambition secured a feeling of self-respect.



Figuur 1: Thematic content of motivators and success factors for staying at work with chronic pain

2. Work as therapy

Many participants experienced their work as being a place for healing and recovering. They indicated that work increased their mental and physical well-being.

Distraction from pain. Work distracted from the pain. P17: "Working gives me pleasure; often I am in a flow, forgetting the pain completely. At home there is a stimulus-deficit; there is no distraction, which intensifies my pain." And P2: "When I am busy and concentrating on my work, I have no time for pain. Other things become more important than pain." A few participants indicated that the harder they worked, the less pain they experienced. P4: "The harder I work, the less attention I pay to my pain." Some managed to go on acting this way at home too; others felt exhausted and had no choice but to lie down and rest.

Work as an energizer. Many participants felt work to be a source of new energy. P11: "When I work, I have more energy, even at home. I simply feel much better when I am working. One has to realize that work, whether with modifications or not, can act as powerful energizer."

A structure in life. A few participants found that work enabled them to live a life not constantly dominated by pain. P7: "It helps to organize your life and have control over the pain."

Social contacts. Being at work generated social contacts; it may prevent feelings of loneliness. P17: "My work helps me to escape from the daily routine at home. Most of my friends who live nearby are at their work and not available for socializing." Participants linked social contacts to distraction, indicating that contacts distracted them from the pain. P12: "I need some people around to talk with, to share common interests. At home I lack the opportunity to meet other people." Being around colleagues gave new energy.

Self-respect. Some participants mentioned that working brought about self-respect, a reason to be proud. P10: "Being at work again gave me a sense of belonging to society; it increased my self-respect." In this context, increased self-confidence has also been mentioned as a therapeutic aspect of working. P16: "I found out that I can do more than I thought I could, and that working doesn't make things worse."

3. Work as income

Financial needs. For most participants a secure income appeared to be a strong motivator to stay at work with CMP. P13: "I feel the need to stay at work, because I am a breadwinner, and without my income we would have to sell our house." For others, the financial aspect was of less importance.

Being the owner of a business was mentioned as a strong motivator, for the obvious reason that work guaranteed income. P5: "If I didn't have a business of my own, there would be moments of short-time work disability." Employees qualify for workers' compensation/ disability benefits. Owing to the high cost of insurance, self-employed people are seldom covered against illness. Moreover, self-employed participants were convinced that their commitment was keeping them at work.

4. Work as responsibility

Feeling indispensable. A few participants felt they were indispensable at their work. They perceived their presence at work as a necessity, making them determined to work despite pain. Being absent without anyone substituting would mean that the work would not be done. The consequences of this could be very bothering: students would be deprived of education, patients wouldn't get the care they needed, deadlines would not be met, and productivity would drop. Most participants had strong feelings of responsibility and kept on working despite pain.

Loyalty to colleagues. Some participants felt that, by staying away from work themselves, their colleagues would have no other choice but to work harder to make up for them. Loyalty to colleagues appeared to be a significant motivator for SAW.

Success factors for staying at work

Success factors for SAW were categorized into five theme groups: personal characteristics, adjustment latitude, coping with pain, use of healthcare services, and pain beliefs.

1. Personal characteristics

Participants found their own characteristics to be an important success factor in SAW. Many times perseverance was mentioned as a success factor, indicating that SAW was not always easy. A few participants thought of themselves as ambitious, which was indicated as success factor for SAW. P1: "I really have the drive to be successful in my job; the pain is not going to stop me." A positive outlook was seen as an important factor for SAW. P6: "Take your chances, there's always something you can do. I'm inclined to look for opportunities instead of problems. If you can't climb the mountain, then travel around it to reach your goal." And P7: "Sometimes it's hard, but something negative should be turned into positive. Find ways to do what you want to do. Focus your mind on possibilities." Being communicative, assertive, or self-confident helped participants to ask for support, to set their limits, to balance load and capacity, to communicate their needs to the employer, and to initiate work modifications.

2. Adjustment latitude

A large majority of the participants mentioned adjustment latitude as a powerful success factor for SAW. The possibility to balance working hours, workplace, and work pace gave participants the opportunity to organize their own work, and perform work tasks in accordance with their own conditions. P9: "I am in a fortunate position that I can determine my own workplace. Since I have a mobile phone, I am no longer forced to sit at my desk the whole day; I can move around now." Since not every workplace offers a high adjustment latitude, it seems likely that good working conditions contribute to a successful SAW. In

order to create a balance between (work)load and capacity, participants had changed their behavior: they delegated tasks, accepted help from others, they complied with perceived physical and mental limits, organized work, and determined priorities of their own. On the one hand, they increased their capacity by participating in sports and training, remaining active as well as resting more frequently, or improving the quality of their sleep. On the other, their load was lowered by delegating tasks, accepting help from others, shortening the traveling distance to work, delegating child care, respecting their own limits by taking notice of their body signals, relaxing, and lastly, by determining their priorities. Participants organized modifications at work and suitable work conditions to decrease the work load. It appeared that modifications at work enabled workers with CMP to stay at work, and that these modifications were made at different levels: by changing jobs, by retraining to fulfill alternative tasks, and by organizing their work in terms of flexible working hours, more flexible work, adjusted work, short-time working, ergonomic adjustments, or having a more suitable work content. P2: "I have always worked in nursing, but now I am housekeeping for others, which is less demanding." And P9: "In our company there was a vacancy. This gave me the opportunity to find a more suitable job." P10: "If I had had to go back to slaughterhouse work, I would have been on sick leave again very soon." Or P17: "I worked in a nursing home, was always very busy. After work I used to be exhausted. At my new job things go better; when I'm home I have enough energy to do things for myself again."
To some of the participants suitable work content was felt to be of upmost importance for SAW. A job requiring long stretches of standing in an upright position is not fit for a person who has difficulties with standing, while others indicate the opposite. P15: "If I'd have a job that would include a lot of sitting down, I'd have quit a long time ago."
Support from others was often mentioned as a success factor for SAW, for instance, with the spouse or children taking over housework, the extended family helping with the babysitting, and the manager or the employer allowing flexible working hours. P18: "My supervisor is very cooperative: as long as I work my hours and perform well, he doesn't care when or where the work is done." And colleagues relieved the workload. P15: "I've found a balance between what I can do and what not. In case of a strenuous project, I ask my colleagues for help; it has never been a problem for them."

3. Coping with pain

Participants reported a variety of styles in coping with pain: some promoting and others hindering SAW. The effect of pain medication varied. Sometimes medication was considered to be a success factor for SAW. P21: "Without my medication I wouldn't be able to work; it's as simple as that." Pain reduction as a result of medication resulted in better sleep during the night. P4: "If I have a lot of pain, I take medication before sleeping. Next day I feel better." And it was experienced as facilitating a positive outlook. P17: "Don't think it is good

or bad: just use them. Because when the pain is lower, you feel better, and more positive." On the other hand, some participants feared they might ignore pain signals and fail to take a break as a result, or they feared drowsiness, and the consequential disability in working. P1: "I don't want pain medication, because then I no longer feel my limits. I have decided I don't want to live a life on drugs. The pain is there, but it is bearable." These participants showed reluctance towards pain medication. Moreover, in many cases the pain medication did not help soothe the pain at all. Another reason for discontinuing pain medication was the notion of overcoming the pain on their own, taking responsibility, and no longer depending on someone or something else. Ignoring the pain was mentioned by some participants as a strategy to control the pain. Other participants avoided provocative movements, carefully taking notice of the pain and understanding the heightening pain level as a signal to stop overworking themselves. P9: "Listening to body signals and preventing overuse, and thus maintaining the balance, is what's keeping me going." Remaining active was experienced as promoting coping style for SAW by most of the participants, preventing deconditioning. P1: "I'm convinced that the best remedy for the pain is to remain active and to keep moving. It is keeping me fit." Many participants stressed that pain acceptance was a successful strategy to stay at work. P10: "You learn to accept the pain, to endure it, and to live with it." Putting an end to resisting the pain was considered to be in a direct line with pain acceptance. P3: "My girlfriend stays at home until the pain has gone; she can't accept doing things while having pain."

4. Use of healthcare services

Although some participants indicated that they were disappointed in healthcare, others stated that healthcare services helped them to stay at work. Reassuring advice by physicians to keep exercising despite pain, manual therapy or physiotherapy, and rehabilitation therapy all made it easier for participants to stay at work. P12: "Twice a year I visit my physiotherapist for a couple of weeks. Without his help, I believe working would be practically impossible." Or P7: "During rehabilitation I learned to no longer let the pain become the main focus in my life. Doing the things I want to do, despite the pain, that helped me a lot. I even feel less pain."

5. Pain beliefs

Most participants evaluated their threshold of pain as above average, which enabled them to act despite pain. P3: "People with higher thresholds of pain are able to tolerate their pain. They can do more with their pain, I guess." For a plausible explanation of how this higher threshold of pain came about, participants referred to the length of time they had had the pain. P17: "I've had the pain so long now, I'm used to it." A few participants said their threshold of pain diminished as the pain lasted longer. P10: "In the past I never needed painkillers at the dentist's; now I really can't do without. I have become more sensitive to pain."

Consequences of SAW

Participants stated that SAW had both positive and negative consequences. Most motivators for SAW were labeled as positive (Figure 1), and were seen as stimulants for participants to stay at work. But there were perceived negative consequences of staying at work despite pain. Diminished capacity for spare time activities such as sports, gardening, or social events was one. P17: "I go to bed early, to recover from my work and become fit again for tomorrow's work. There are hardly any opportunities for social activities." Or P14: "Gardening is fatal. Afterwards I'm dead beat; I can't even walk." A negative effect on one's private life and decreased quality of work was another. P20: "It is so much harder to concentrate when pain intensity is high." And then there was fatigue. P5: "The first thing I do after work is fall asleep on the sofa." And there was also frustration. P4: "Some colleagues of mine call in sick when they have a cold, which I find very annoying." And, finally, there was an increased level of pain.

What absentee workers can learn from the workers who stay at work with pain

In the interview a standard question was: "What could other workers with CMP, who are on sick leave, learn from you, so that they will be able to continue working?" Most participants were able to answer this question, revealing their personal success factor in the process: "Listen to your body language (what is your back trying to tell you?), take a rest when needed, stay active/keep exercising despite the pain, retrain for a more suitable job, get to work and don't give up, make something that seems negative into something positive, concentrate on possibilities instead of impossibilities, find a new job with less strain, set your own limits and be assertive, have the courage to change, keep yourself involved in society, go out of the pain and leave it behind, don't worry about the pain, learn to accept your pain, don't resist the pain, find a way to self-confidence, re-organize your life and seek help."

Discussion

Why

The first research question in our study, "Why do workers with CMP stay at work despite pain", resulted in four themes of motivation: work as value, therapy, income, and responsibility. Participants who stay at work with pain placed a high value on working. In general, participants in our study felt the need to stay at work, which seemed to encourage them to find ways to be able to stay at work. Feeling the desire to stay at work may be recognized as being an important success factor and a prerequisite for SAW despite pain. Strong motivation helped to strive for aims in life.[27,29] Participants in our study were willing to change in order to reach their goal: staying at work. A strong motivation to stay working set off behaviors such as increasing adjustment latitude, improving pain-coping strategies,

organizing work modifications or better working conditions, accepting healthcare treatment, and seeking support. Contrary to what was investigated in our study, workers who were not able to stay at work may have other motives in life, overpowering the motivation to stay working.[27,29] For example, in a study on the question of deciding whether to work or to call in sick, participants chose calling in sick when they felt their daily lives had been affected in a bad way by their effort to stay working. Some chose to look after the family, instead of SAW.[35] Even so, there is a possibility that many absentees did have the intrinsic motivation to stay at work, but failed to find or put into practice the strategies needed.[27,36] People without the appropriate motivation or personal characteristics for promoting coping are bound to have more difficulties finding or developing strategies promoting RTW or SAW. Unfortunately, it is not at all easy to have a positive and optimistic attitude. It is obvious, however, that many success factors identified in our study can be put into practice by the workers themselves; yet sometimes people need help in finding alternative behaviors in order to stay working. We may be able to learn from the successful workers in our study, who have pointed out the essentials of staying at work. The results of this study could possibly be used to develop programs for sustainable RTW or as a guideline in attendance motivation. Strategies and competency leading to SAW can be trained or taught.

How

The second research question, "How do workers with CMP stay at work", resulted in five themes of success factors: personal characteristics, adjustment latitude, coping with pain, use of healthcare services, and pain beliefs. Linton and Buer have suggested enlisting the help of workers who managed to successfully cope with CMP to "teach" their absentee colleagues. It appeared, however, that these successful workers only had a few suggestions and often were not fully aware of their own coping strategies.[37] In our study we asked: "What can others learn from workers who stay working with pain?" Most participants appeared to self-manage their challenges, take responsibility for themselves, and scored high on self-efficacy, although this did not always mean that they had been acting entirely on their own. Sometimes help had been offered and accepted from others. Participants had taken upon themselves the responsibility to change and had taken chances at the appropriate moment. Participants' personal characteristics had contributed to the power of self-management. However, self-management can also be taught. Acquiring these skills could be an ingredient of RTW programs to achieve sustained work participation. The successful strategies for SAW revealed in our study may be used for guidance.

This self-manager profile presented above resembles the profile of "Adaptive Copers" described by Turk and Rudy, characterized as experiencing low affective distress, high levels of daily activity, and locus of control.[38] The hypothesis that workers who stay at work act as

"Adaptive Copers" needs to be tested using the Multidimensional Pain Inventory.[39] Boot and colleagues have distinguished four profiles of adaptation to functional limitations in workers with asthma and COPD: the eager, the adjusted, the cautious, and the worried.[40] These adaptation profiles provide insight into the different ways workers with CMP are coping with their pain at work. Adjusted workers have managed to adapt well to their limitations by finding the balance between workload and capacity. Eager workers are highly motivated to stay at work; they do not talk about the pain and perform well at work.[40] Participants in our study mostly resembled the Adjusted-worker profile and the Eager-worker profile. In a review of Shaw and colleagues, prominent work disability risk factors were identified, resulting in three high-risk profiles for prolonged work absence and disability: the immobilized, the disemployed, and the overwhelmed.[41] Success factors experienced by workers who stay at work in our study match the opposites of these different profile types for work absence and disability.

The themes of motivation "Work as income" and "Work as responsibility" have also been described in the Illness Flexibility Model by Johansson and Lundberg.[42] In this model, attendance requirements (negative consequences of being absent) experienced by workers were economic loss, accumulating work tasks, or unattended patients or students.[26,36] In addition, the latitude of workers for balancing work and capacity is recognized in the illness flexibility model, defined as adjustment latitude.[42] A high adjustment latitude "provides opportunities to work despite ill health."[36] It has been concluded in the literature that a low level of adjustment latitude at work may mean a risk factor for sickness absence.[43] Other studies show that modifications at work for employees with work disabilities lower the levels of absenteeism.[44,45] Our study supported these findings: participants reported that moderation of work, making it more suitable to their capacity, turned out to be an important factor in SAW. Sometimes, there are obstacles within an organization that hinder a successful implementation of modifications in work.[32] Therefore, working conditions had better not be ignored and should be regarded as success factors for SAW.[46] The skills of successful participants in our study could be a helpful tool in programs preventing absenteeism. The extent of adjustment latitude at work should be taken into account as a possible risk factor.

In our study, it seemed that the lives of participants who "stay at work" despite pain were not dominated by the pain. The pain had not been "conquered," but accepted. This may explain why participants reported only a moderate level of work disability, while the pain intensity had been substantial (Table 1). In present-day pain management programs, pain acceptance is increasingly achieved by paying less attention to the pain by focusing on themes that are really important in life.[47,48] Clinicians could make use of the acceptance and commitment therapy (ACT)[47] in their treatment of workers with chronic pain, to help them

to stay at work. Furthermore, the approach of acceptance may be valuable within an RTW program. Disabled workers may become conscious of work as being an important life value, which perhaps they hadn't realized before. This is supported in a recent study using the context of a work rehabilitation trajectory, by transforming the meaning of pain to facilitate RTW. Many workers were ready to accept the idea that the pain might never disappear and they were willing to learn how to deal with this reality.[49]

Many explanatory models and theories have been created to understand and explain sick leave and work attendance. Sick leave has been linked to motivation[26,27,29,42,50,51], to stress and coping[25,52], to the balance between work demands and capacity[28,31], to adaptation[30], or to a combination of these.[32] All these models explain or predict the behavior of workers. At this moment it is unclear which model is the most appropriate one to explain SAW. It is difficult to fit all self-experienced determinants for SAW retrieved in our study into one of these models, although models which stress the multi-causality of work participation seem to be the most suitable. The model of the International Classification of Functioning, Disability and Health (ICF) could be used as a framework when categorizing the determinants, but it offers no explanation.[53] Our results indicate that a variety of factors are relevant for SAW, which is in accordance with the disability prevention management model of Loisel and colleagues.[32] In finding an explanation for sick leave or SAW, the compensation policy and social security system should be taken into account.[54] Recent studies indicate that in addition to workers' personal factors (workers' characteristics, health, and medical care), environmental factors such as job characteristics, work modifications, involved stakeholders, and the compensation system are of upmost importance for SAW and RTW.[54-56]

Strengths and limitations of the study

Qualitative research has certain pitfalls. To manage these, we have chosen measures offering valid and reliable results and conclusions. Attention was paid to credibility, transferability, dependability and confirmability.[33,57] To increase credibility and transferability of the results, we have created a varied sample. Unfortunately, in our study we had to do without participants between the ages of 20 and 30. Moreover, the majority of participants had experienced pain for more than five years. In the course of these years they may have learned to adapt to the pain and its limitations. As a result, the conclusions may be less suitable for generalization in cases of younger people and cases of people with a shorter history of pain. Since workers aged over 45 years more frequently call in sick, our sample still seems to be representative.[3,58] In the Netherlands the system of social security is a relatively generous one. Nevertheless, compared to working populations in other European countries, the amount of people working despite their pain is very similar: an average of 74% indicated that pain did not interfere with employment.[5] Furthermore, in the Dutch

compensation system no distinction is made between work-related and non-work-related injuries. Therefore, in the analysis of this study no such distinction was made. Whether generalization of these results to countries with less generous social security systems is possible is uncertain: the relative weight of financial incentives may be stronger. The strength of our study is that it offers an overview of many motivators and success factors for SAW as experienced by participants with CMP. Because of the aim of our study, which was to learn from a successful group of workers, we selected workers who worked despite CMP. Apparently, their pain did not lead to strong disability; the score on the occupational parameter of the PDI was on average 3.7 (scale 0-10), indicating an almost moderate level of occupational disability. Therefore, the results of this study cannot simply be generalized to RTW populations. A comparison with workers who were not able to stay at work would have lent more weight to the results.

Recommendations

We recommend using the experiences of our participants who revealed which factors and strategies were essential to them for staying at work with chronic pain. These success factors may offer some guidance in developing intervention programs to prevent absenteeism or to promote sustainable RTW. Research should not focus solely on characteristics of the individual workers but should also take into account contextual factors such as work environment, social security system, social situation, and healthcare system.

Conclusions

Participants in our study experienced many motivators and success factors for SAW. Personal characteristics, well-developed self-management skills, and the drive to work may be seen as important success factors and prerequisites for SAW. Those behaviors promoting SAW were: increasing adjustment latitude, improving coping strategies, organizing work modifications, making use of healthcare services, and asking for support. These behaviors are modifiable and can be influenced by the workers themselves. Therefore, the results of this study may be used to develop preventive interventions to avoid absenteeism. Behavioral changes and competency resulting in SAW can be taught or trained by a clinician. Interventions to help workers to stay at work or return to work should take into account both the individual worker, as well as his social situation and work environment. Working conditions, such as flexible work hours or workplaces with high adjustment latitude, may be helpful for avoiding absenteeism. With a view to future research on work participation in CMP, it is recommended that the experience of those workers who have revealed which factors and strategies were essential for them to stay at working be used.

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Appendix: Semi-structured interview

General introduction

1. Which subjects, related to working with pain, would you like to talk about during the interview?
2. What kind of work do you do?
3. What kind of pain do you have?

Pain-related questions

4. What do you think is the origin of your pain?
5. How does the pain influence your life?
6. How do you cope with the pain?
7. How was pain-coping in your family when you were a child?

Work-related questions

8. What does work mean in your life?
9. What are reasons for you to work?

Work- and pain-related questions

10. Why are you working despite your pain condition?
11. What made you decide to continue working with pain?
12. Did you ever consider stopping working because of the pain?
13. What does it mean for you to be working with pain?
14. What consequences does working with pain have for you?
15. Are there moments you are tempted to call in sick?
16. What keeps you going at such moments?
17. Does the pain influence your productivity?
18. Does the pain influence your performance?
19. What has contributed to your staying at work?
20. Did you have to give up other aspects of life?
21. How do you manage working with pain? (What are your success factors for working with pain?)
22. What qualities do you have for continuing to work with pain?
23. What do you do to prevent absenteeism?
24. What was the best advice that helped you to stay working?
25. Why are you able to work with pain, while some other people are not?
26. How do you judge your future work situation within the next two years?
27. What can other workers with chronic pain, who become sick-listed, learn from you in order to stay working?
28. How did others contribute to your staying at work?
29. What was the role of healthcare services in staying at work?

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4

Workers who stay at work despite chronic nonspecific musculoskeletal pain: do they differ from workers with sick leave?

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Abstract

Purpose: Most workers with chronic nonspecific musculoskeletal pain (CMP) do not take sick leave, nor consult a health care professional or search vocational rehabilitation. Yet, the knowledge of many researchers, clinicians and policy makers is largely based on people with CMP who discontinue work. The aim of this study was to explore characteristics of workers who stay at work despite CMP, and to compare these with sick-listed workers with CMP following vocational rehabilitation.

Methods: The clinical characteristics of workers who stay at work despite CMP (n=119) and sick-listed workers who follow vocational rehabilitation (n=122) were described and the differences between these groups were assessed. Logistic regression analysis was used to assess differences between the groups and to determine which variables predicted group status.

Results: Workers who stayed at work despite CMP reported significantly lower levels of fear avoidance (OR=0.94), pain catastrophizing (OR=0.93), perceived workload (OR=0.93), and higher pain acceptance (OR=1.11), life control (OR=1.62) and pain self-efficacy (OR=1.09) compared to sick-listed workers following rehabilitation, even after controlling for confounders. The groups did not differ on physical activity level, active coping and work satisfaction. Group status was predicted best by pain intensity, duration of pain, pain acceptance, perceived workload, mental health, and psychological distress (area under the receiver operating characteristic curve = 0.91, 95% CI = 0.87-0.95).

Conclusions: A wide range of characteristics of workers who stay at work despite CMP were explored. Relevant differences from sick-listed workers with CMP were observed in all domains of the bio-psycho-social model. Six main predictors were identified that best discriminate between both groups.

Key words: Staying at work; vocational rehabilitation; musculoskeletal disorders; chronic pain; work participation.

Introduction

The reference of many researchers, clinicians and policy makers concerning work and pain is based on people with chronic nonspecific musculoskeletal pain (CMP) who were not longer able to participate in work. However, by far not all workers with CMP become work-disabled[1-3], nor do they consult a health professional[4-6] or search multidisciplinary rehabilitation. Many workers are able to cope with CMP at work and maintain their employment. It is currently unknown on which factors people who stay at work despite CMP (SAW group) differ from people who are on sick leave and referred for rehabilitation (SL-Rehab group).

Most research has focused on sick leave and work disability of people with CMP.[7-9] Several predictors or associations for work disability have been identified, such as fear avoidance[10,11], catastrophizing[12,13], de-conditioning[14,15], pain acceptance[16,17], emotional distress[18,19], life control and self-efficacy.[20,21] Our knowledge about staying at work with CMP, however, is limited. A literature review to identify factors that promote staying at work in workers with CMP revealed only 7 studies.[22] It was concluded that perceived physical disability and emotional distress are associated with staying at work (low level of evidence). Most studies investigating work participation in workers with CMP focused on absent or disabled workers and did not report on the successful counterpart that remained at work. To learn more about this large but relative 'unknown' group, the project 'Working with pain' was conceived. In this project, staying at work was defined as sustained work participation despite CMP, with a maximum of 5% sick leave over a period of 12 months for CMP reasons. Because this group can be considered as the long-term goal of vocational rehabilitation, we expected that lessons can be learned from these successful workers. Specific attention to this SAW group may broaden our views on chronic pain and work participation. Factors associated with sick leave or disability may also explain why some people succeed to stay at work, where others fail.[13,23] The theory of fear avoidance describes how people with CMP develop catastrophizing thoughts and inactivity, then become deconditioned, which explains why they develop chronic pain and ultimately are susceptible for work disability. "Acceptance and Commitment Therapy" postulates that people may achieve better adjustment to CMP by learning to reduce avoidance and other attempts to control pain and choosing to direct their efforts on important life-values such as work.[16] People with high levels of stress may easily get trapped in a vicious circle, in which pain and distress reinforce one another. Relief of emotional distress may help people to stay at work.[19,24] The person's belief of having control over events may determine the behavior to fulfill its goals.[25]; high feelings of control may initiate actions to enhance workability and staying at work. Self-efficacy beliefs determine "how much effort people will expend and how long they will persist in the face of obstacles and aversive experiences".[26-28] Vocational rehabilitation operates at the interface of work

and health care, where a bio-psycho-social approach is required to offer appropriate care. Therefore, a range of variables and corresponding measures were investigated in this study, sufficient to cover most essential domains for work participation: demographic, physical, psychological and work characteristics. It was assumed that if modifiable factors that associate with staying at work are known, it would give new insights for the development of effective vocational rehabilitation programs. Moreover, the knowledge gathered in this study might provide data towards a new reference for clinicians and researchers working in rehabilitation and occupational medicine.

The first aim of this study was to describe physical, psychological and work characteristics of workers in a SAW group. The second aim was to compare these characteristics with a SL-Rehab group and healthy working controls. Our hypotheses regarding the SAW and SL-Rehab group were that compared to the SL-Rehab group, workers in the SAW group report: higher levels of daily activity (hypothesis 1; H1); lower levels of fear avoidance beliefs about physical activity (H2) and pain catastrophizing (H3); higher pain acceptance (H4); lower psychological distress (H5); better life control (H6) and self-efficacy (H7); better active coping (H8); lower perceived physical workload (H9) and higher work satisfaction (H10). Ultimately, the third aim was to examine on which variables the two groups can be distinguished the best.

Methods

Design

In a cross-sectional design the characteristics of workers with CMP in a SAW group and SL-Rehab group were measured in order to compare both groups.

Subjects

Eligible participants of the SAW group were recruited from May 2009 to December 2010 by announcements in newspapers, and websites of national patient associations of whiplash and fibromyalgia. It was made clear that they participated in scientific research and that no treatment or advice would be provided. A compensation of €50 and traveling compensation was offered for participation. Inclusion criteria were: diagnosed as CMP (pain in back, neck, shoulder, extremities or disorders such as widespread pain, fibromyalgia and whiplash) without known underlying specific medical cause (e.g. infection, neoplasm, metastasis, osteoporosis, rheumatoid arthritis, fracture, neurological disorders, and serious spinal pathology); duration of pain was longer than 6 months; age 20 to 60 years; paid work for 20 hours or more during the 12 months before participation in the study. Exclusion criteria in this study were the following: relevant co-morbidities with severe negative consequences

for physical and/or mental functioning (for example severe psychiatric disease or addiction to drugs), pregnancy, and insufficient knowledge of the Dutch language. Participants must have sustained work participation despite CMP, operationally defined as a maximum of 5% sick leave ascribed to CMP over a period of 12 months (which is around the average rate of sickness absence in The Netherlands).[29,30] Participants did not seek help in a Rehabilitation Center in the year prior to participation.

Workers in the SL-Rehab group were consecutively included from July 2009 to March 2011. The SL-Rehab group was referred for vocational rehabilitation, a multidisciplinary approach that is provided to individuals of working age with health-related impairments, limitations, or restrictions with work functioning and whose primary aim is to optimize work participation.[31] Inclusion and exclusion criteria for the SL-Rehab group were the same as for the SAW group, except for absence at work caused by the pain in the SL-Rehab group was higher than 5% in the year prior to participation.

Sample size was determined by the amount of independent variables we intended to include into a logistic model. A minimum of 10 subjects per independent variable has been recommended.[32] Because we estimated to use 20 predicting variables in the model, a total sample size of at least 200 was needed.

In literature, norm scores or reference data of healthy controls were available for most of the used measures in our study. These reference data were obtained from working healthy controls, aged between 20 and 60 years.

Procedures

To diagnose the type of pain and the existence of co-morbidities, all participants from both groups received medical examination performed by a physiatrist. All participants completed questionnaires assessing demographic data and physical, psychological and work characteristics. The SL-Rehab group completed the work related questionnaires in relation to their most recent job experiences. Measures were taken prior to the rehabilitation program. Most of the questionnaires are used in usual care of patients in rehabilitation. The study was approved by the Medical Ethical Committee of the University Medical Center Groningen. All participants signed informed consent.

Measures

Demographic characteristics

Demographic characteristics were gathered by a questionnaire constructed by Rehabilitation Development Centers in the Netherlands.[33]

Physical characteristics

Pain intensity: Current pain intensity was measured by the 11-point Numeric Rating Scale (NRS), ranging from 0 (no pain) to 10 (worst imaginable pain). Validity and utility of the NRS is sufficient.[34,35]

Disability: The Pain Disability Index (PDI) was used to measure the degree to which chronic pain interferes with daily activities (self perceived disability). The PDI is a 7-item inventory, each item score ranging from 0 (no interference) to 10 (total interference). The reliability and validity of the PDI is sufficient.[36,37] Higher scores reflect higher interference of pain with daily activities. Reference data were obtained from a German population.[38]

Health: The Dutch version of the RAND 36-item Health survey (RAND-36) was used to measure physical health.[39] The subscales physical functioning, role limitations arising from physical health problems, pain, and general health perception were merged into the Physical Component Summary.[40] Scores range from 0-100, and higher scores reflect better perceived physical health. The Dutch version of the RAND 36-items is a reliable, valid and sensitive instrument.[39] Reference data were obtained from a Dutch population[39] and from a Dutch reference sample of healthy workers.[41]

Activity level: The Baecke Physical Activity Questionnaire (BPAQ; 16 items) was used to assess the total daily physical activity level of participants, reflected by 3 subscales work, sports and (non-sport) leisure time. Higher scores reflect higher perceived activity level. The BPAQ is presented as a valid and reliable instrument.[42,43] Reference data were obtained from a Dutch reference sample of healthy workers.[41]

Psychological characteristics

Mental health: The RAND-36 was used to measure mental health. The subscales social functioning, role limitations caused by emotional problems, mental health, and vitality were merged into the Mental Component Summary.[40] Scores range from 0-100, and higher scores reflect higher perceived mental health.

The Symptom Checklist-90-Revised (SCL-90-R; 90 items) was used to measure psychosocial distress. The total score, the Global Severity Index (GSI), is reflected by the sum of all sub scores as a global measure of psychological distress. Higher scores reflect higher perceived psychological distress. Reliability and validity of the SCL-90-R are good.[44,45] Reference data were obtained from a Dutch population.[45]

Acceptance: Pain acceptance was assessed using the Chronic Pain Acceptance Questionnaire (CPAQ; 20 items)[46,47], consisting of two subscales: Activity Engagement (participation in daily activities while acknowledging the presence of pain) and Pain Willingness (the degree to which pain is allowed in experience without efforts to avoid or control it). Higher scores reflect higher perceived acceptance of pain. Validity and reliability of the CPAQ are reasonable.[48-50] Reference data were not available.

Avoidance: Fear avoidance beliefs about physical activity and (re)injury was measured with the Dutch version of the Tampa Scale of Kinesiophobia (TSK; 17 items).[51,52] Higher scores reflect higher perceived fear of physical activity. Reliability and validity of the Dutch version are good.[52,53] Reference data of a healthy working group were not available.

Self-efficacy: Pain self-efficacy was measured by the Dutch version of the Pain Self Efficacy Questionnaire (PSEQ; 10 items). Each item is rated by selecting a number on a 7-point scale, scores ranging from 0 ("not at all confident") to 6 ("completely confident"). Higher scores reflect stronger self-efficacy beliefs. Self-efficacy beliefs for people experiencing chronic pain incorporate not just the expectation that a person could perform a particular behavior or task, but also their confidence in being able to do it despite their pain.[54] The PSEQ has strong psychometric properties and high reliability and validity.[28]

Catastrophizing: Pain catastrophizing was measured by the Dutch version of the Pain Catastrophizing Scale (PCS; 13 items).[55,56] Higher scores reflect stronger experienced thoughts and feelings of participants while they are in pain. The PCS showed to be valid and highly reliable.[56,57,58] Reference data were obtained from a Dutch community sample without pain.[59]

Coping reactions were measured by the Utrecht's Coping List (UCL; 47 items), distinguished by the following subscales: active coping, palliative reaction, avoidance, social support, passive coping, expression of emotions and coping self statements. Higher scores reflect higher levels of coping reactions. The UCL is validated for patients with chronic pain.[60] Reliability and validity are moderate to good.[61] Reference data were obtained from a Dutch population.[61]

Interference of pain in daily life: The Dutch version of the West-Haven Yale Multidimensional Pain Inventory (MPI-DV; 21 items) was used to assess the subjects' level of life control (incorporating the ability to solve problems and feelings of personal mastery and competence); mood (including ratings of depressed mood, irritability and tension); support received from spouse; and responses of significant others to their pain behavior (punishing, solicitous, and distracting responses). Higher scores reflect stronger feelings of life control, better mood, higher perceived support and more responses of significant others. The reliability and validity of the MPI are good.[62,63]

Work characteristics

Vocational sector, perceived workability, sick leave during previous 12 months, and expectation to fulfill future work were assessed with the Work Ability Index (WAI). The reliability and validity of the WAI are acceptable.[64,65]

Presenteeism was assessed with the World Health Organization's Health and Work Performance Questionnaire (HPQ). Presenteeism was conceptualized as a measure of actual performance in relation to possible performance, scored as percent of performance

on a 0-10 response scale, where 0 represents a total lack of performance and 10 no lack of performance during time of the job. The HPQ is a reliable and valid measure.[66,67]
Work pace, emotional workload, relation with colleagues or supervisor, work satisfaction, and need for recovery were assessed by the Dutch questionnaire on the Perception and Evaluation of Work (Dutch abbreviation: VBBA).[68] Subscale scores range between 0 and 100; higher scores indicate more unfavorable situations. The reliability and unidimensionality of all scales of the VBBA were considered satisfactory.[68] Reference data were obtained from a Dutch reference sample of healthy workers.[41]
The work physical demand category was assessed by the researcher according to the Dictionary of Occupational Titles (DOT). Within the DOT, occupations are classified into 5 categories of physical workload, based on intensity and duration of lifting or carrying needed for the job: sedentary, light, medium, heavy, very heavy.[69]
Self reported physical work load was assessed with the Dutch Musculoskeletal Questionnaire (Dutch abbreviation: VBA; 21 items).[70] Exposure to carrying, lifting, bending, reaching, turning, use of forces, repetitive tasks, and prolonged (inconvenient) postures is measured, reflected in a sum score ranging from 21 to 84. Higher scores reflect a higher physical workload. Reference data were obtained from a Dutch reference sample of healthy workers.[41]

Statistical analysis

All statistical analyses were performed using SPSS for Windows, version 18.0.3. Missing data in questionnaires were addressed by adding the calculated average of a scale or questionnaire, conform questionnaire recommendations. To create a "profile" of the SAW group, the two groups were first compared on the basis of demographic, physical, psychological and work characteristics. Group differences between the SAW group and SL-Rehab group were analyzed by independent samples T-tests (continuous measure and normally distributed), or Mann-Whitney U tests and Chi-square tests (data not distributed normally). Cohen's d effect sizes (ES) were calculated to assess the clinical relevance of differences. ES was defined as the difference between two mean scores expressed in standard deviation (sd) units: $(x1-x2)/\sigma_{pooled}$, where $\sigma_{pooled} = \sqrt{(sd1^2+sd2^2/2)}$. When comparing group averages, an ES <0.2 was considered as trivial, from 0.2 to 0.49 as small, from 0.5 to 0.79 as medium, and ≥0.8 as large.[71] We considered an ES ≥0.5 as clinically relevant.[71,72]
To test the hypotheses, logistic regression analyses were performed to analyze the contribution of the variables to the dependent variable group status, while controlling for potential confounding variables such as age[73], gender[74], educational level[75,76], diagnose group, duration of pain, pain intensity[77,78], and DOT category.[69] Because of the large number of 10 variables, the Bonferroni correction could have been applied to reduce the chance on type-I error, resulting in a p-value of 0.005 (0.05/10 variables), which would have reduced the number of variables significantly associated with group status. However, to reduce the chance on type-II errors, we decided not to use the Bonferroni correction.

Stepwise backwards logistic regression was used to assess which of the variables best predicted group status. Based on previous research and theory we selected candidate predictors for group status and entered these in the model. We used a preselected significance value p<0.10 as a criterion for removal from the backwards stepwise analysis to reduce the chance of type-II errors.[79] The Hosmer and Lemeshow test was used to assess how well the chosen model fits the data. To evaluate the ability of the model to discriminate between workers in the SAW and SL-Rehab group, the area under the receiver operating characteristic curve (AUC) was calculated. An AUC of 0.50 indicates no, 0.70-0.80 acceptable, and >0.80 excellent discrimination.[79]

Results

A total of 119 participants were included in the SAW group and 122 in the SL-Rehab group; total sample size was 241. Seven potential participants in the SAW group were not included in the study because of heart disease (2), high blood pressure (2), neurological disorder (1), radiculopathy (1) and co-morbidity (1). Various potential participants registered for the study, but were not allowed to participate because of age > 60 years (20), specific medical cause such as rheumatoid arthritis (48), unpaid job (11), employment less than 20 hours (14), or more than 5% sick leave (15).

Description of SAW and SL-Rehab group

Demographic, physical, psychological and work characteristics of both groups are presented in Table 1. In Figure 1 the average scores of the SAW group and SL-Rehab group are presented, supplemented with norm scores from healthy controls. To allow presentation of all variables simultaneously, all scores were transformed to a score ranging from 0-100, where higher scores represent a more favorable situation. Transformed scores were only used for Figure 1 and not in the statistical analyses. In the demographic characteristics category, compared to the SL-Rehab group, people in the SAW group had higher age and educational level, longer duration of pain and lower use of pain medication. Major differences between both groups were observed on physical characteristics, such as perceived pain and disability, physical functioning and physical role limitations. Moreover, workers in the SL-Rehab group perceive more pain, mental and social limitations, and score detrimental on most psychological measures. Both groups scored similar on work characteristics such as work pace, emotional load at work, relation with colleagues and supervisor, work satisfaction and need for recovery, but workers in the SAW group reported lower physical activity at work and perceived lower physical workload, which was consistent with the higher percentage of subjects working in a higher DOT-category in the SL-Rehab group. The largest differences with the healthy controls were found in the physical characteristics category; scores in the psychological and work categories are generally similar with the SAW group.

Table 1: Description of demographic, physical, psychological and work characteristics of the SAW and SL-Rehab group

Instrument	Unit or scale	SAW (n=119) Mean (sd)	SL-Rehab (n=122) Mean (sd)	n	Effect size	*p*-value
Demographic characteristics						
Age	years	51 (44 – 54)	39 (32 – 48)	122		0.001 [r]
Gender male	%	40.3	46.0	122		0.380 [q]
Married / co-habitation	%	90	72	122		0.001 [q]
Educational level	%			106		0.001 [q]
Low		11	30			
Medium		56	49			
High		33	21			
Diagnosis region	%			122		0.006 [q]
Back		53	66			
Neck/shoulders		13	18			
Fibromyalgia		23	7			
Other [a]		11	9			
Duration of pain	%			96		0.001[q]
1-2 years		8.4	34.4			
2-5 years		10.9	17.8			
>5 years		80.7	47.8			
Pain medication (yes)	%	39.5	85.1	73		0.001 [q]
Frequency use pain medication	%			51		0.001 [q]
≤ 3 / month		65	10			
1-6 / week		21	13			
≥ 1 / day		14	77			
Physical characteristics						
NRS current pain [b]	0-10	4.6 (2.1)	6.1 (1.9)	114	0.8	0.001
NRS worst pain	0-10	6.9 (1.8)	8.0 (1.4)	88	0.7	0.001
PDI [c]	0-70	19.9 (11.1)	39.2 (11.2)	92	1.7	0.001
RAND 36 [d]						
Physical functioning	0-100	72.8 (17.9)	48.0 (19.8)		1.3	0.001
Role limitations (physical)	0-100	50 (0 – 100)	0 (0 – 0)	93	1.2	0.001 [r]
Pain	0-100	55.4 (15.5)	36.6 (17.0)	93	1.2	0.001
General health perception	0-100	62.9 (17.7)	58.2 (18.9)	93	0.3	0.072
Health changes	0-100	46.6 (18.7)	32.8 (24.8)	93	0.6	0.001
Physical Component Summary	0-100	59.8 (17.0)	38.5 (12.7)	93	1.4	0.001
BPAQ [e]						
Work	1-5	2.7 (0.6)	3.2 (0.6)	116	0.8	0.001
Sport	1-5	2.6 (0.8)	2.3 (0.6)	118	0.4	0.004
Leisure time	1-5	3.1 (0.6)	3.0 (0.6)	118	0.2	0.108
Total activity level	3-15	8.4 (1.2)	8.5 (1.1)	116	0.1	0.625

Psychological characteristics						
RAND 36 [d]						
Social functioning	0-100	78.7 (18.8)	56.2 (24.3)	93	1.0	0.001
Role limitations (emotional)	0-100	100 (100 – 100)	67 (0 – 100)	93	0.8	0.001 [r]
Mental health	0-100	75.4 (16.4)	63.6 (16.2)	93	0.7	0.001
Vitality	0-100	58.1 (18.3)	43.9 (16.9)	93	0.8	0.001
Mental Component Summary	0-100	74.1 (17.0)	54.6 (20.2)	93	1.0	0.001
SCL90-R [f]						
Anxiety	10-50	12 (10 – 14)	14 (12 – 17)	108	0.5	0.001 [r]
Phobic anxiety	7-35	7 (7 – 8)	7 (7 – 9)	108	0.4	0.050 [r]
Depression	16-80	20 (17 – 25)	26 (21 – 35)	108	0.6	0.001 [r]
Somatization	12-60	20.9 (5.7)	25.5 (6.3)	108	0.8	0.001
Obsessive-Compulsive	9-45	14.8 (4.3)	20.8 (11.3)	108	0.7	0.001
Interpersonal sensitivity	18-90	22 (19 – 28)	24 (20 – 31)	108	0.2	0.189 [r]
Hostility	6-30	7 (6 – 7)	8 (7 – 9)	108	0.6	0.001 [r]
Sleep disturbance	3-15	5 (4 – 7)	7 (5 – 11)	108	0.5	0.001 [r]
Psychoticism	9-45	10 (9 – 12)	12 (10 – 14)	108	0.4	0.003 [r]
Global severity index	90-450	118 (105 – 141)	142 (123 – 177)	108	0.7	0.001 [r]
CPAQ [g]						
Activity engagement	0-66	43.5 (7.2)	34.6 (9.6)	118	1.0	0.001
Pain willingness	0-54	28.7 (7.5)	21.4 (7.1)	118	1.0	0.001
Total score	0-120	72.2 (11.7)	56.4 (13.1)	118	1.3	0.001
TSK [h]	17-68	33.0 (7.2)	37.2 (8.1)	107	0.5	0.001
PSEQ self efficacy [i]	0-60	46.9 (8.5)	35.5 (12.0)	121	1.1	0.001
PCS [j]	0-52	10.5 (8.6)	21.6 (10.4)	77	1.2	0.001
Rumination	0-16	4.7 (3.6)	8.2 (3.9)	77	0.9	0.001
Magnification	0-12	1.2 (1.6)	3.1 (2.4)	77	0.9	0.001
Helplessness	0-24	4.5 (4.1)	10.1 (4.8)	77	1.3	0.001
UCL [k]						
Active coping	7-28	19.3 (3.4)	17.7 (3.4)	109	0.5	0.001
Palliative reaction	8-32	17.7 (3.4)	17.6 (3.7)	109	0.0	0.768
Avoidance	8-32	16.2 (3.4)	15.8 (3.2)	109	0.1	0.305
Social support	6-24	13.1 (3.6)	12.8 (3.4)	109	0.1	0.508
Passive coping	7-28	10.9 (3.0)	12.0 (3.1)	109	0.4	0.012
Expression of emotions	3-12	5.7 (1.5)	5.3 (1.6)	109	0.3	0.049
Coping self statements	5-20	12.6 (2.7)	11.9 (2.6)	109	0.3	0.042
MPI [l]						
Life control	0-6	5.0 (4.7 – 5.7)	4.0 (3.0 – 5.0)	119	0.9	0.001 [r]
Mood	0-6	4.7 (3.7 – 5.3)	3.7 (2.7 – 5.0)	120	0.6	0.001 [r]
Support	0-6	4.0 (3.0 – 4.9)	5.0 (4.0 – 5.3)	100	0.6	0.001 [r]
Punishing responses	0-6	1.0 (0.3 – 1.7)	1.3 (0.3 – 2.7)	100	0.3	0.029 [r]
Solicitous responses	0-6	2.3 (1.1)	2.8 (1.0)	100	0.5	0.001
Distracting responses	0-6	2.4 (1.4)	2.9 (1.2)	99	0.4	0.012

Instrument	Unit or scale	SAW (n=119) Mean (sd)	SL-Rehab (n=122) Mean (sd)	n	Effect size	*p*-value
Work characteristics						
Expected to work last week	Hours	31.5 (7.8)	35.0 (11.1)	122	0.4	0.007
Actually worked last week	Hours	32.5 (10.4)	11.3 (13.8)	113	1.7	0.001
HPQ presenteeism [m]	0-100	76.9 (11.1)	46.7 (29.5)	89	1.4	0.001
HPQ relative presenteeism	0.25-2	1.1 (0.3)	0.75 (0.4)	85	1.0	0.001
Employment	%			114		0.260 [q]
Part-time		49.6	42.2			
Full-time		50.4	57.8			
Sick leave	%			122		0.001 [q]
<5%		100	0			
5-20%		0	16.5			
21-50%		0	20			
>50%		0	63.5			
Vocational sector	%			115		
Industry		8	13			
Construction		1	8			
Trade		9	18			
Transport		4	5			
Commercial services		9	7			
Education		13	7			
Health care		34	25			
Public administration		13	7			
Agriculture		4	4			
Other		5	6			
Work demands						
Physical demand category work				122		0.007 [q]
DOT category 1 [n]	%	35	20			
DOT category 2	%	35	33			
DOT category 3	%	24	29			
DOT category 4	%	6	18			
VBBA [o]						
Work pace	0-100	41.3 (13.9)	45.8 (15.2)	111	0.3	0.023
Emotional load	0-100	31.9 (15.1)	25.8 (15.1)	111	0.4	0.003
Relation with colleagues	0-100	0 (0 – 11)	0 (0 – 11)	109	0.0	0.560 [r]
Relation with supervisor	0-100	0 (0 – 11)	0 (0 – 11)	106	0.1	0.710 [r]
Work satisfaction	0-100	0 (0 – 11)	0 (0 – 22)	110	0.3	0.024 [r]
Need for recovery	0-100	45 (18 – 73)	64 (18 – 82)	109	0.3	0.020 [r]
VBA [p]	21-84	43.1 (10.4)	52.5 (12.3)	112	0.8	0.001

[a] Pain of extremity, cervical-brachial syndrome, generalized pain, [b] Numeric Rating Scale (0 = no pain, 10 = worst possible pain), [c] Pain Disability Index, [d] RAND 36-item Health Survey, [e] Baecke Physical Activity Questionnaire, [f] Symptom Checklist 90-R, [g] Chronic Pain Acceptance Questionnaire, [h] Tampa Scale for Kinesiophobia, [i] Pain Self Efficacy Questionnaire, [j] Pain Catastrophizing Scale, [k] Utrecht's Coping List, [l] Multidimensional Pain Inventory, [m] Health and Work Performance Questionnaire, [n] Dictionary of Occupational Titles; 1 = sedentary; 2 = light; 3 = medium; 4 = heavy/very heavy work, [o] Questionnaire on the Perception and Evaluation of Work, [p] Dutch Musculoskeletal Questionnaire, [q] Chi-squared test (χ^2-test), [r] Mann-Whitney U test, outlined in the table with median and (25–75%, interquartile range)

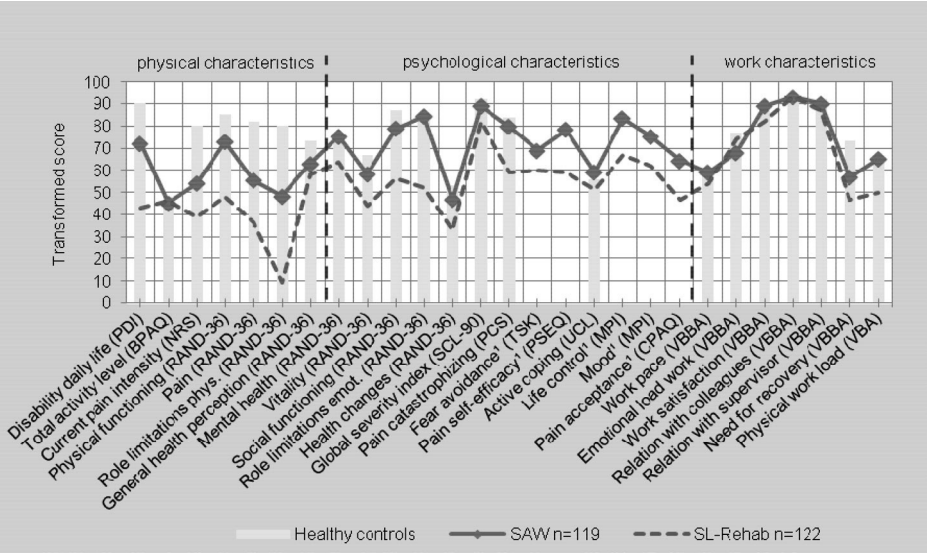

Figure 1: A comparison of the SAW group, SL-Rehab group, and healthy working controls. The y-axis represents transformed scores on a standardized 0-100 scale, in which higher scores represent more favorable situations. The x-axis shows all variables. No norm scores of healthy controls were retrieved for variables indicated with[1].

Hypotheses tested

In Table 2 the results of the hypothesis testing are presented. In six variables a significant association with group status was observed: fear avoidance beliefs about physical activity (OR 0.94, p=0.028), pain catastrophizing (OR 0.93, p=0.005), pain acceptance (OR 1.11, p=0.001), pain self-efficacy (OR 1.09, p=0.001), life control (OR 1.62, p=0.012), and perceived physical workload (OR 0.93, p=0.003), even after adjusting for potential confounders. Psychological distress was almost significantly associated with group status. No association with group status was observed for activity level, active coping and work satisfaction.

Discriminating between SAW and SL-Rehab group

In Table 3 the results of the backwards stepwise logistic regression analysis are presented. Within this regression model, group status was best discriminated by pain intensity, duration of pain, pain acceptance, perceived workload, mental health, and psychological distress. The Hosmer and Lemeshow test supported our model (χ^2=6.80, p=0.56). The model showed excellent ability to discriminate between the SAW and SL-Rehab group (AUC=0.91, 95% CI=0.87–0.95). If the value of the pain intensity scale raises one unit (scale 0-10), the odds of a person to be in the SAW group decrease 1.8 times. When pain duration is longer than 5 years, the odds to be in the SAW group increase 6.4 times. A higher score of one unit on

pain acceptance (scale 0-120), mental health (scale 0-100) or psychological distress (scale 90-450) increased the odds to stay at work (OR 1.08, 1.07 and 1.02), while a higher score of one unit on perceived workload (scale 21-84) reduced the odds to stay at work (OR 1.10).

Table 2: Hypotheses (H) tested by logistic regression, adjusted for potential confounders, with group status as dependent variable.

Instrument	Hypothesis	n	B	*p*-value	Exp(B)	95% CI Exp(B)
Physical characteristics						
H1: Activity level [a]	SAW > SL-Rehab	193	-0.10	0.597	0.91	[0.64 – 1.30]
Psychological characteristics						
H2: Fear avoidance [b]	SAW < SL-Rehab	190	-0.06	0.028*	0.94	[0.90 – 0.99]
H3: Pain catastrophizing [c]	SAW < SL-Rehab	165	-0.07	0.005*	0.93	[0.88 – 0.98]
H4: Pain acceptance [d]	SAW > SL-Rehab	196	0.10	0.001*	1.11	[1.06 – 1.16]
H5: Psychological distress[e]	SAW < SL-Rehab	190	-0.01	0.082	0.99	[0.98 – 1.00]
H7: Pain self efficacy [f]	SAW > SL-Rehab	198	0.09	0.001*	1.09	[1.05 – 1.14]
H6: Life control [g]	SAW > SL-Rehab	196	0.48	0.012*	1.62	[1.11 – 2.36]
H8: Active coping [h]	SAW > SL-Rehab	191	0.04	0.490	1.04	[0.92 – 1.18]
Work characteristics						
H9: Work satisfaction [i]	SAW > SL-Rehab	190	-0.00	0.639	1.00	[0.98 – 1.01]
H10: Physical workload [j]	SAW < SL-Rehab	192	-0.07	0.003*	0.93	[0.89 – 0.98]

Exp(B) > 1 indicated a higher chance to be in the SAW group; * significant difference, p<0.05; [a] Baecke Physical Activity Questionnaire; [b] Tampa Scale for Kinesiophobia; [c] Pain Catastrophizing Scale; [d] Chronic Pain Acceptance Questionnaire; [e] Symptom Checklist R-90; [f] Pain Self Efficacy Questionnaire; [g] Multidimensional Pain Inventory; [h] Utrecht's Coping List; [i] Questionnaire on the Perception and Evaluation of Work; [j] Dutch Musculoskeletal Questionnaire

Table 3: Results of the logistic regression analysis, with group status as dependent variable.

Predictor	B	SE	*p*-value	Exp(B)	95% CI Exp(B)
Physical characteristics					
Pain intensity (1 point higher)	-0.61	0.17	0.001	0.55	[0.39 – 0.76]
Pain duration (>5 years)	1.86	0.68	0.006	6.40	[1.70 – 24.00]
Psychological characteristics					
Pain acceptance (1 point higher)	0.08	0.02	0.002	1.08	[1.03 – 1.14]
Mental health (1 point higher)	0.07	0.02	0.001	1.07	[1.03 – 1.12]
Psychological distress (1 point higher)	0.02	0.01	0.036	1.02	[1.00 – 1.04]
Work characteristics					
Perceived workload (1 point higher)	-0.10	0.03	0.002	0.91	[0.85 – 0.97]

Exp(B) > 1 indicated a higher chance to be in the SAW group
χ^2=82.9 (degrees of freedom=6, n=151), p<0.001

Discussion

Main findings

The aim of this study was to describe and compare the differences of a SAW group and a SL-Rehab group on physical, psychological and work characteristics. An extended profile of this relative unknown SAW group was presented (Table 1) and a crude comparison with the SL-Rehab group and healthy controls was made (Table 1, Figure 1). Based on theoretical grounds we hypothesized to identify several differences between the SAW and SL-Rehab group. Significant differences were found for fear avoidance, pain catastrophizing, pain acceptance, pain self-efficacy beliefs, life control and perceived physical workload. The SAW and SL-Rehab group scored similar on activity level, active coping and work satisfaction. Both groups were best discriminated by pain intensity, pain duration, pain acceptance, mental health, psychological distress and perceived workload.

Contrary to the present study, in a systematic review on factors promoting staying at work in workers with CMP, pain catastrophizing was consistently not associated with staying at work.[22] Although different questionnaires were used to measure pain catastrophizing, a plausible explanation for this contradictory observation is unavailable. Pain acceptance has been observed to be associated with better work status.[16] The higher level of pain acceptance experienced by workers in the SAW group means that they participated more in daily activities while acknowledging the presence of pain, and were better able to allow pain in experiences without efforts to avoid or control it. This was not conflicting with the detected higher feelings of life control in our SAW group: paradoxically, when pain control becomes less important, the feeling to have control over life increases. Some people believe that once their pain is solved, they regain the ability to fulfill their work demands. Because these people "rely on the healthcare system and still seek for a medical solution for their pain", they have decreased power of life control.[80]

Workers in the SAW group reported significantly higher pain self-efficacy beliefs compared to sick-listed workers in the SL-Rehab group. Having high self-efficacy beliefs can be considered as a prerequisite for behavior promoting staying at work, such as: raising adjustment latitude, changing pain-coping strategies, organizing modifications and conditions at work, finding access to healthcare services, and asking for support.[21,81] Many patients with CMP have resistance to behavioral changes or a lack of self-management skills to make that change. Vocational rehabilitation to promote staying at work in people with CMP should consider to target pain self-efficacy.

A systematic review on factors promoting staying at work in people with CMP concluded that low perceived physical disability and low emotional distress were associated with staying at work.[22] This was confirmed in the present study, where large differences were observed on these variables between the groups. Because we selected two groups based on work status and rehabilitation status, it was not surprising that the groups differed on perceived disability. It was also expected that the groups would differ on activity level, however no difference was observed. The considerable difference on perceived disability between the two groups, while having the same activity level, is remarkable. Even compared with healthy working controls the activity level of workers with CMP, whether sick listed or not, did not differ. This result does not support the assumption of activating to promote returning to work, or activating sports at work for remaining at work, which is often postulated in literature.[82,83] Simply activating patients with CMP in rehabilitation programs to promote sustained work participation or return to work may be reconsidered, because the working mechanism is unknown, and it may be only effective for subgroups.[84] Coping strategy was not associated with group status. In an interview study on staying at work, participants judged their coping style as an important success factor to stay at work. It appeared that opposite coping strategies (e.g. medication use can be viewed both as an active and a passive coping strategy) could lead to the similar results.[81]

People in the SAW group were on average almost 10 years older. This might be the consequence of the selection process; participation into the study was probably more attractive for older people. In addition, the “healthy worker” effect may have resulted in younger workers admitted for rehabilitation, reducing the age in the SL-Rehab group. Older workers, who often had longer duration of pain, may have had more time to re-organize their lives and probably better learned to accept the pain. In another study was observed that older persons were less likely to be out off work due to pain[16] and a few studies observed that age was not associated with staying at work.[85-87]

Work factors are frequently associated with sick-leave and work disability.[13,88,89] In our study physical factors at work, such as perceived physical workload, were stronger associated with staying at work than psycho-social factors, which is consistent with other research.[90] Workers with strenuous jobs may sooner experience problems to stay at work with CMP. Vocational rehabilitation should improve the functional capacity of these workers, or investigate possibilities for workplace adjustments.

Discriminating between SAW and SL-Rehab group

In the stepwise logistic regression model, being in the SAW group was best predicted by lower pain intensity, longer duration of pain, better pain acceptance, lower perceived physical

workload, better mental health, and more psychological distress. Contrary to expectations based on the univariate analyses, higher psychological distress was (minimally) associated with being in the SAW group. In all the three domains of physical-, psychological- and work characteristics were variables that contributed to distinguish both groups, suggesting that factors from multiple domains are important for sustained work participation. Future research concerning disability prevention may target these variables that may be promising for sustained work participation. Pain related variables were strongly associated with group status, suggesting that pain intensity matters in sustained work participation. The SAW group reported on average 1.5 points less pain compared to the SL-Rehab group, which was a significant difference, but not clinically relevant.[35,91,92] In our study pain intensity was one of the variables that explained group membership. We do not know whether pain reduction would be effective to improve workability. Some studies concluded that disability level rises gradually with pain intensity.[78,93-95] In other studies pain intensity was not observed as a significant predictor for work ability.[16,20,85] Whether pain reduction should be a target in multidisciplinary rehabilitation for CMP to improve workability is under debate. Nevertheless, workers in the SAW group have shown that sustained work participation with CMP is indeed possible.

Strengths and limitations of the study

The current study is the first that provides a profile of workers with CMP who succeed to stay at work despite pain, which complemented our view on work participation in CMP and may contribute to a better understanding of work participation in non-clinical samples. People who stay at work are less accessible for research, yet we managed to include 119 participants. When group size is large, differences between groups turn out to be significant very soon, sometimes even when differences are negligible. We expressed the magnitude of the differences in ES to elevate the robustness of the results. All participants in our study were physically examined and medical data were available, so diagnoses were not solely based on self-report.

A few limitations in our study need careful attention. Participants in the SAW group responded to a call in a newspaper in which they were invited to take part in the study. In this design selection bias is inevitable and diminishes the external validity of the results. Higher educated or older workers may have been more prone to participate into the study and workers with high decision latitude had better opportunity to leave their job for a few hours and participate into the study. In our analysis we adjusted for educational level and other potential confounding variables. In this explorative study, data of the SAW and SL-Rehab group was collected at one point in time. Because of the cross-sectional data collection, no causal inferences could be made. Secondly, workers who managed to stay at work may have become sick-listed after participating into our study, thus violate the SAW condition

we defined. We included workers without sick-leave during the past 12 months due to CMP. Most participants had positive expectations to remain at work the next two years, 20% was unsure and 1% did not expect to work after two years. Therefore, we considered it was not likely that many workers in the SAW group became sick-listed soon after participation into our study. We investigated workers with CMP, which was not defined as a uniform diagnosis group, and therefore might influence interpretation of data. We made this choice because in daily practice clinicians are confronted with patients who present a diversity of diagnoses with often more than one pain site.[5,96,97] In testing our hypotheses we controlled for diagnose group, which did not alter the results.

This study was conducted in The Netherlands. In other societies or cultures, with different compensation systems for work disability, determinants for sustained work participation may be different.[98] Our study was explorative and may be used to direct future research and clinical developments in vocational rehabilitation and sustained work participation of workers with CMP. Clinicians may use the characteristics of the SAW and SL-Rehab group to estimate the relevance of "deviant" scores of their patients. Longitudinal studies on SAW are needed to further increase our knowledge about staying at work with CMP.

Conclusions

A wide range of bio-psycho-social characteristics of workers who stay at work despite CMP were explored. People who stay at work despite pain have clinically relevant different scores compared to sick-listed workers with CMP referred for multidisciplinary rehabilitation on fear avoidance beliefs about physical activity, pain catastrophizing, pain acceptance, pain self-efficacy, life control and perceived physical workload. Group status was not associated with activity level, coping strategy and work satisfaction. The SAW and SL-Rehab group could be discriminated the best by pain intensity, duration of pain, pain acceptance, perceived physical workload, mental health, and psychological distress. Further research on these topics is needed to raise our understanding of staying at work despite CMP and to investigate the usefulness for sustained work participation.

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5

Do workers with chronic nonspecific musculoskeletal pain, with and without sick leave, have lower functional capacity compared with healthy workers?

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Abstract

Objectives: (1) To analyze whether Functional Capacity (FC) of sick listed workers with chronic nonspecific musculoskeletal pain (CMP) referred for rehabilitation (SL-Rehab group) and workers with CMP who stay at work (SAW group) differs from the FC of healthy workers (HW group). (2) To analyze if FC of workers with CMP is insufficient to meet work demands, and to assess factors associated with insufficient FC.

Design: A 3-group cross-sectional comparison.

Setting: Rehabilitation center.

Participants: Workers (n=942) were included (SL-Rehab group: n=122, SAW group: n=119 and HW group: n=701).

Interventions: All subjects performed a short Functional Capacity Evaluation (FCE) and completed questionnaires assessing demographics, personal, and work characteristics.

Main Outcome Measure: FCE performances. Participants' FC was insufficient to meet their work demands when their FC was lower than the 5th percentile of the HW groups FC.

Results: Both SL-Rehab and SAW groups had significantly lower FC compared with the HW group, 15% to 71% demonstrated insufficient FC. Insufficient FC was associated with group status (SL-Rehab group: odds ratio [OR] = 6.5; SAW group: OR=7.2), having physically high demanding work (OR= 35.1), being a woman (OR=35.7), higher age (OR=1.2), and lower effort level during FCE (OR=1.9). Among subjects with CMP, kinesiophobia, physical health, and perceived disability were associated with having an insufficient FC for work.

Conclusions: Workers in the SL-Rehab group have lower FC than their working counterparts. Many workers in both groups with CMP demonstrated insufficient FC. Not the pain itself, but personal and work-related factors are related to insufficient FC.

Keywords: Chronic pain; Rehabilitation.

Introduction

In rehabilitation and occupational medicine, chronic nonspecific musculoskeletal pain (CMP) is among the most prevalent[1,2] and expensive health conditions.[3] Populations from various social and cultural backgrounds show prevalence ranging from 13% to 47%.[2] In low back pain and fibromyalgia, the majority of costs are related to indirect costs (loss in productivity), mainly because of temporary or permanent work disability.[3-5] While many workers with CMP discontinue work, many others stay at work despite their pain. This raises a question about the origin of work disability in workers with CMP, specifically about differences between these groups. Within the biopsychosocial model, the differences in work (dis)ability may be explained by differences in biological, psychological, and social factors. A leading explanation is the deconditioning paradigm, which postulates that the patient's functional capacity (FC) is decreased as a result of inactivity because of catastrophizing, kinesiophobia, and avoidance of activity.[6,7] Cognitive behavioral therapies, such as graded exposure, have been developed to reduce avoidance behavior. This approach has been one of the underlying rationales for the widespread application of (work) reconditioning programs for patients with CMP.

Deconditioning suggests a decrease of capacity over time. For example, a workers' FC decreases during the duration of being in pain. Evidence underlying the deconditioning paradigm, however, is inconclusive.[8] One of the reasons is that it is still challenging to objectively assess activity levels and patterns,[8,9] although it was recently concluded from a meta-analysis that higher self-reported disability was weakly associated with lower activity levels in patients with chronic low back pain.[10] Evidence of deconditioning because of reduced aerobic capacity[7,11] and muscle atrophy[12] is also limited, and conflicting. Although decreased surface area of the *m. psoas* and *m. multifidi* in patients with back pain were observed,[12] studies aimed at objectifying deconditioning by measurement of physical activities of daily living could not objectify decreased levels in patients with chronic low back pain.[7] Evidence of being deconditioned for functional tasks, such as lifting and postural tolerances, is unavailable. Regardless of its longitudinal course, however, from the perspective of the worker's ability to perform work, FC should be interpreted in relation to work load. Even if deconditioning would occur, a patient's FC can still be sufficient to perform the minimal required workload. If this were the case, then alternative reasons should be considered to explain work disability.

In management of CMP, multidisciplinary rehabilitation programs that focus on restoration of functioning and return to work are recommended over interventions that focus on pain reduction, such as medications, transcutaneous electrical nerve stimulation, or nerve root blocks.[13] While evidence is present that rehabilitation is effective in management of

CMP,[14] the underlying biological, psychological, and social mechanisms that explain these effects are insufficiently investigated. When relations between pain, FC and work disability become clear, rehabilitation clinicians may improve the effectiveness of their interventions. Relevant subgroups may be distinguished and individualized treatments may be developed. To establish such, we need to analyze if the FC of workers is related to work demands. In addition, it should be investigated whether workers with a lower FC than work demands are able to perform their work. It is unknown, however, whether the relationships between FC and pain-related variables differ between sick listed and working individuals with CMP.

The aim of the current study was to analyze the FC of sick listed workers with CMP referred for rehabilitation (SL-Rehab group) and workers with CMP who stay at work (SAW group), and to compare their FC with healthy workers (HW group). The following research questions were investigated: (1) Do workers in an SL-Rehab group have lower FC compared with workers in an SAW group and an HW group? (2) Is the FC of workers in SL-Rehab and SAW groups sufficient to meet their work demands? (3) Which factors are associated with insufficient FC to meet work demands?

Methods

Design

A cross-sectional study design was used. FC was tested in a standardized environment with a Functional Capacity Evaluation (FCE). Three groups were compared based on their FC. The first group consisted of sick listed subjects with CMP who were admitted to a multidisciplinary pain rehabilitation program (SL-Rehab group). The second group included subjects with CMP who stayed at work despite CMP (SAW group). The third group consisted of healthy working subjects (HW Group).

Study samples

The SL-Rehab group consisted of patients referred for a multidisciplinary outpatient pain rehabilitation program in the Center for Rehabilitation of the University Medical Center Groningen, the Netherlands. Inclusion criteria were: diagnosed by a physiatrist as CMP (pain in back, neck, shoulder, extremities, or disorders such as widespread pain, fibromyalgia or whiplash) without known underlying specific medical cause (eg, infection, neoplasm, metastasis, osteoporosis, rheumatoid arthritis, fracture, neurological disorders, and serious spinal pathology); age 20 to 60 years; and currently sick listed from paid work (paid work for at least 20 hours per week during the 12 months before participation in the study). Age was limited to between 20 and 60 years because between these ages, a stable working situation normally can be developed. Before 20 and after 60 years, working hours often are diminished

and people mostly have partial, adapted, or temporary work participation. Exclusion criteria were: relevant comorbidities with severe negative consequences for physical and/or mental functioning (eg, severe psychiatric disease), addiction to drugs, pregnancy, and insufficient knowledge of the Dutch language.

Participants of the SAW group were recruited in the context of the 'Working with Pain' research project from May 2009 to December 2010 by announcements in newspapers and websites of national patient associations of low back pain, whiplash, and fibromyalgia in the Netherlands.[15] Participants in the SAW group were less than 5% sick listed and did not seek help in a pain rehabilitation program in the year prior to participation. All other inclusion and exclusion criteria were equal to the SL-Rehab group.

The HW group consisted of healthy workers without pain and was derived from a previous study.[16] The HW group was between 20 and 60 years of age and was working 20 hours or more in a wide range of professions.

Procedures

Data were collected from January 2006 to December 2010. FCEs were administered to all participants. Self-report measures were administered prior to the FCE. Data from the SL-Rehab group were derived from usual care prior to the start of rehabilitation. Subjects received a €15 coupon for their cooperation, and travel expenses were compensated. Subjects from all 3 groups provided written informed consent. Data from the SAW and HW groups were derived from specific projects for which approval was received by the Medical Ethical Committee of the University Medical Center Groningen, the Netherlands. All subjects were stratified by work load according to the Dictionary of Occupational Titles (DOT).[17] Prior to the FCE, the Physical Activity Readiness Questionnaire was used to screen for risks for performing physical exercise.[18] Workers with 1 or more answers indicating a risk (yes) were excluded.

Primary Measures

Functional Capacity Evaluation. A standardized 1.5 hour, 12 item FCE was performed. Six tests were used for the current study. These tests were lifting low, lifting high, overhead work, static bending, dynamic bending and energetic capacity. All tests were reliable[19-21] and merely derived from the Workwell protocol.[22] The Bruce protocol was used to measure energetic capacity.[23] After an introduction to general FCE procedures, subjects were verbally instructed on how to perform each individual test. Subjects in the HW group were individually evaluated by 15 physical therapy students who had completed 2-day FCE-training provided by a licensed WorkWell trainer. The SAW and SL-Rehab groups were tested by licensed physical therapists. A more comprehensive description of these 6 tests can be found elsewhere.[16] To analyze if FC was insufficient to perform work, individuals'

test results were compared with the 5th percentile of normative values of HW group in the corresponding physical demands category.[16] Participants were classified into 4 categories of physical demands, based on intensity and duration of lifting or carrying needed for the job. These categories were sedentary, light, medium, and heavy/very heavy.[17] Insufficient FC was considered in those subjects who performed lower than 5% of the normative values of the tests lifting low or lifting high. These tests were chosen because they have the highest predictive value for fitness for work.[24]

Secondary measures

Health status. Self-reported health was measured with the Rand 36-Item Health Survey. The Rand 36-Item Health Survey is a generic health questionnaire covering 9 domains of self-reported health. For the analyses, the subscales physical functioning, role-physical, bodily pain and general health were merged into the physical component summary, and the subscales vitality, social functioning, role-emotional and mental health were merged into the mental component summary.[25] Scores range from 0 to 100, and higher scores reflect better perceived health perception. The Dutch version of the RAND 36-Item Health Survey is a reliable, valid, and sensitive instrument.[26]

Physical activity level. Self-reported habitual physical activity in sports, leisure time, and work was assessed with the Baecke Physical Activity Questionnaire.[27] The total score can range from 3 to 15 and subscales range from 1 to 5, with higher scores indicating higher levels of habitual physical activity. Reliability and validity of the Baecke Physical Activity Questionnaire is adequate.[27]

Subjects with CMP (SL-Rehab and SAW groups) filled out questionnaires to measure pain intensity, pain self-efficacy, and disability.

Pain intensity was measured with an 11-point numeric rating scale (NRS) for pain ranging from 0 (no pain) to 10 (worst pain imaginable).[28] Reliability and validity of the pain NRS is sufficient.[29]

Pain self-efficacy was measured by the 10-item, Dutch version of the Pain Self-Efficacy Questionnaire (PSEQ). Higher scores reflect stronger pain self-efficacy beliefs.[30] Reliability and validity of the PSEQ is good.[30]

Pain-related disability was measured with the Pain Disability Index (PDI). The PDI is a 7-item questionnaire used to investigate the magnitude of perceived disability in different situations such as work, leisure time, activities of daily living, and sports. The questionnaire is constructed on 7 NRSs (each 0-10) and can be considered an interval scale in which a total score of 0 means no disability and 70 means maximum disability.[31,32]

Statistical analysis

Descriptive statistics were provided for all 3 groups. In case of missing values, cases were excluded pairwise for descriptive analyses and univariate analyses. Listwise exclusion occurred for multivariate analyses. Depending on datadistribution, *t* tests or Mann-Whitney *U* tests were performed to test differences between groups. To answer the first question (Do sick listed workers referred for rehabilitation have lower FC compared with workers who stay at work despite pain and compared with healthy workers?), one-way analyses of variance (ANOVAs) were calculated for each of the 6 tests. Because significant differences exist between sex in lifting low and lifting high, men and women were calculated separately.[16] Normality was tested with a Kolgomorov-Smirnov test and by plotting the data. If data were not normally distributed, Kruskal-Wallis tests were performed instead of ANOVAs. To test for equality of variances, Levene tests were calculated. When variances were not equal, a Brown-Forsyth test was calculated instead of ANOVAs. Post hoc Tukey tests were performed to determine which means differed significantly.

To study FC related to work demands, patients of the SL-Rehab and SAW groups were stratified into work demands categories as provided by the DOT.[17] To answer which factors were associated with having insufficient FC for work, a logistic regression analysis (method Enter) was performed using insufficient FC for work (yes/no) as the dependent variable. Two models were calculated. In model 1, a 3-group comparison was made between SL-Rehab and SAW groups compared with the HW group, in which sex (women=0, men=1), age (y), height (cm), weight (kg), DOT category, and group status were entered as predictor variables. In model 2, the SL-Rehab group was compared with the SAW group with additional predictor variables including pain intensity, pain self-efficacy, kinesiophobia, self-reported activity, disability, and self-reported health. DOT categories and group status (SL-Rehab and SAW groups) were entered as categorical variables in the regression equation. B values, odds ratios (ORs), and 95% confidence intervals (CIs) of ORs were calculated. The *P* value of <.05 was considered significant.

Results

In this study, a total number of 942 subjects (553 men and 389 women) were included. The SL-Rehab group consisted of 122 subjects (58 male; 64 female). The SAW group included 119 subjects (48 men; 71 women) and in the HW group, 701 subjects (447 men, 254 women) were included. In Table 1, descriptive statistics are provided. Pain-related variables in the HW group were absent, because these workers reported no pain scores.

Table 1: Baseline data of 3 groups of workers: SL-Rehab, SAW and HW groups

Descriptive characteristics	Unit or scale	SL-Rehab group N=122	SAW group N=119	HW group N=701
Gender male	%	47.5	40.3	63.8
Age	mean (sd)	39.6 (10.1)	48.3 (7.8)	41.4 (10.3)
Sedentary work load	%	19.5	34.4	17
Light work load	%	33.1	35.3	32.7
Medium work load	%	29.7	24.4	43.4
(very) heavy work load	%	17.8	5.9	6.9
Pain intensity	0-10; mean (sd)	6.1 (1.9)	4.6 (2.1)	NA
Pain self-efficacy	0-60; mean (sd)	35.4 (11.8)	46.9 (8.5)	NA
Rand-36 PCS	0-100; mean (sd)	37.8 (12.5)	59.8 (17.9)	89.1 (9.3)
Rand-36 MCS	0-100; mean (sd)	54.1 (20.0)	74.1 (17.0)	80.5 (12.1)
Physical activity work	1-5; mean (sd)	3.2 (0.6)	2.7 (0.6)	2.9 (0.7)
Physical activity sports	1-5; mean (sd)	2.3 (0.6)	2.6 (0.8)	2.7 (0.8)
Physical activity leisure	1-5; mean (sd)	3.0 (0.6)	3.1 (0.6)	3.1 (0.7)
Physical activity total	3-15; mean (sd)	8.5 (1.1)	8.4 (1.2)	8.7 (1.3)
Observed effort lifting low males	0-10	6.1 (2.0)	8.2 (1.7)	8.2 (1.6)
Observed effort lifting low females	0-10	5.4 (2.3)	8.3 (1.8)	8.0 (1.9)

Abbreviations: MCS, mental component summary; NA, not applicable; PCS, physical component summary; Rand-36, Rand 36-Item Health Survey.

Do workers in the SL-Rehab group have lower FC compared with workers in the SAW and HW groups?

In Table 2, the differences between groups on FC are presented. In general, FC of the SL-Rehab group was the lowest. In all tests, except for energetic capacity, both groups with CMP scored significantly lower than healthy workers. On lifting low, overhead work, and static bending, the SL-Rehab group scored significantly lower than the SAW group, while differences in lifting high, energetic capacity, and dynamic bending were nonsignificant.

Table 2: Differences in functional capacity between 3 groups of workers: SL-Rehab, SAW and HW groups

			Post hoc Tuckey test Mean score (sd)		
	F (p)	df	SL-Rehab	SAW	HW
Lifting Low (kg)					
Males	70.4 (0.00)	2	27.0 (14.1) ‡,§	34.7 (12.4) ‖	48.0 (12.6)
Females	57.9 (0.00)	2	15.0 (7.2) ‡,§	20.7 (6.4) ‖	26.7 (8.2)
Lifting High (kg)					
Males	25.5 (0.00)	2	14.5 (5.3) §	17.2 (4.2) ‖	21.1 (5.2)
Females *	15.5 (0.00)	2	9.2 (3.7) §	9.9 (2.3) ‖	11.8 (3.4)
Energetic capacity (METS)	18.2 (0.00)	2	9.4 (2.0)	9.1 (1.6) ‖	10.3 (1.9)
			Post hoc Mann-Whitney U test		
	χ^2 (p)		Median (IQR)		
Overhead work (sec) †	15.6 (0.00)	1	108 (72-174) ‡,§	157 (113-226) ‖	240 (181-312)
Static Bend (sec) †	19.8 (0.00)	1	148 (97-212) ‡,§	221 (150-287) ‖	287 (194-419)
Dynamic Bend (sec) †	3.1 (0.08)	1	48 (44-54) §	51 (46-58) ‖	45 (41-49)

NOTE. 1 MET is 3.5L O2 min-1 kg-1
Abbreviations: IQR, interquartile range; METS, metabolic equivalent.
* Brown-Forsythe test.
† Kruskal-Wallis test.
‡ SL-Rehab group significantly different from SAW group.
§ SL-Rehab group significantly different from HW group.
‖ SAW group significantly different from HW group.

Is the FC of workers in the SL-Rehab and SAW groups insufficient to meet their work demands?

Table 3 presents the percentage of workers with CMP whose FC is sufficient to meet work demands (higher than the 5th percentile of FC of the HW group).

The percentage of subjects in the SL-Rehab group meeting the 5th percentile is the lowest. For higher workload (higher DOT categories), this means that the SL-Rehab group is in many cases not able to meet the work load. Depending on work load and sex, 15% to 71% demonstrated insufficient FC to meet work demands. For all other tests, besides lifting low, lifting high, and carrying, most workers' FC exceeded the work load.

Table 3: Percentage of workers with CMP whose test results are higher than their work demands (≥P5)

	% SL-Rehab group ≥P5 Healthy Workers				% SAW group ≥P5 Healthy Workers			
Work load category	Sedentary	Light	Medium	Heavy	Sedentary	Light	Medium	Heavy
Lifting low males (%)	NA	85	80	40	100	87	100	NA
Lifting low females (%)	64	29	47	NA	82	60	71	NA
Energetic capacity (METS)*	100	100	100	100	97	97	96	NA
Static overhead work (s)	NA	54	77	NA	83	85	84	NA
Static forward bend (s)	77	68	75	13	93	90	93	NA
Dynamic bending 20x (s)	85	85	84	71	72	68	82	NA

Abbreviations: METS, metabolic equivalent; NA, not applicable because of insufficient group size (n<10); P5, score representing 5th percentile score of corresponding DOT class.
* 1 MET is 3.5L O_2 min^{-1} kg^{-1}

Which factors are associated with sufficient FC to perform work?

Results of 2 logistic regression models are presented in Table 4. In model 1, the SL-Rehab and SAW groups were compared with the healthy controls. A total of 799 subjects were included in the analysis, 143 cases were excluded because of missing values. Total explained variance of sufficient FC in model 1 was 54% (Nagelkerke R^2). Both CMP group scores were highly significant, meaning that having CMP was negatively associated with sufficient FC. The mean odds of a person with CMP having insufficient FC are 6.5 (95% CI, 2.7 – 15.4) in the SL- Rehab group and 7.2 (95% CI, 3.4 – 15.5) in the SAW group. Being a woman, having higher age, lower effort level, and higher work load were also significantly associated with insufficient FC. The second model included comparisons of the SL-Rehab group with the SAW group. A total of 138 subjects were included in the analysis; 103 cases were excluded because of missing values. Total explained variance of insufficient FC in model 2 was 67% (Nagelkerke R^2). Being a woman, having higher age, lower effort level, lower activity level, and heavy physical work load were associated with insufficient FC. Group status was not significantly associated with having insufficient FC to perform work (OR = 1.2; 95% CI, 0.2 – 9.2).

Table 4: Logistic regression analysis of sufficient FC to meet workload (≥P5)

	Model 1			Model 2		
Predictor variables	B	OR	95% CI of OR	B	OR	95% CI of OR
Constant	1.4	4.2	NA	-8.7	0.0	NA
SL-Rehab	1.9	6.5*	2.7 – 15.4	-0.2	1.2	0.2 – 9.2
SAW	2.0	7.2*	3.4 – 15.5	NA	NA	NA
Gender	-3.6	35.7*	11.9– 100.0	-5.0	143*	13.2 – 1000
Age	0.03	1.0	0.9 – 1.0	0.18	1.2*	1.1 – 1.3
Observed effort	-0.7	1.9*	1.6 – 2.3	-1.1	3.0*	1.8 – 5.1
Baecke	-0.1	1.1	0.9 – 1.5	0.1	1.1	0.6 – 1.9
Light work load	1.0	2.7†	1.1 -6.4	1.4	4.0	0.8 – 19.6
Medium work load	1.1	3.0†	1.1 – 7.7	0.1	1.1	0.2 – 6.4
Heavy work load	3.6	35.1*	7.6 – 162.5	3.9	50.6*	3.1 – 828.6
Kinesiophobia	NA	NA	NA	0.1	1.1†	1.0 – 1.2
Rand-36 mental	NA	NA	NA	-0.04	1.0	1.0-1.1
Rand-36 physical	NA	NA	NA	0.06	1.1†	1.0 – 1.1
Pain	NA	NA	NA	-0.1	1.1	0.8 – 1.5
Disability (PDI)	NA	NA	NA	0.1	1.1†	1.0 – 1.2
Self Efficacy (PSEQ)	NA	NA	NA	0.0	1.1	1.1 – 1.2

NOTE: Model 1 is a 3-group comparison of the SL-Rehab group and SAW group compared with the HW group (n=799); Model 2 is a 2-group comparison of SL-Rehab group compared to the SAW group (n=138), Abbreviations: NA, not applicable; P5, score representing 5th percentile score of corresponding DOT class; Rand-36, Rand 36-Item Health Survey.
* $P<.01$; † $P\leq.05$

Discussion

The main objective of this study was to investigate if subjects with CMP who are sick listed and subjects with CMP who stay at work had lower FC compared with healthy workers, and to study the role of work participation in workers who stay at work with CMP and sick listed workers. Based on the results, it can be concluded that both groups with CMP had lower FC than healthy workers, and that the FC of the SL-Rehab group was lower than the SAW and HW groups. In the SAW group, most workers' FC was sufficient, regardless of their type of workload. For subjects in the SL-Rehab group, FC in most cases was sufficient for sedentary work demands, but insufficient for higher work demands, especially for lifting and carrying.

For energetic capacity, no relevant differences appear between the 3 groups. This is not in accordance with research in which energetic capacity was observed to be lower in patients with chronic low back pain compared with healthy controls.[33] Even so, it remains unknown if a lower score on FCE is truly reduced by deconditioning or if other factors may be associated with the lower FC of the SL-Rehab group compared with the SAW and HW group. Besides deconditioning, a range of other explanations can be postulated to explain differences in the FC between these groups. The first explanation is that patients with CMP stop the tests because of pain experience, fear of pain, or taking into account possible consequences of performing heavy tasks, rather than because of limiting FC. Pain intensity, however, is unlikely to be the modifying factor for observing low effort, because the SAW group suffers from pain as well. Pain intensity was not associated with insufficient FC. Personal (kinesiophobia, perceived physical health and disability, sex, and age) and work-related factors (work load) were associated with insufficient FC (see Table 4). A second explanation may be that patients see the FCE as a prerequisite for inclusion in the rehabilitation program. In the patient's perception, a higher performance may reflect little limitation. Patients may therefore (un) consciously perform different in different contexts. In Table 1, it can be observed that the SL-Rehab group scored remarkably lower on observed effort during the test. Observed effort also was a significant contributor in model 2 (see Table 4). The origin of reduced effort may be because of patient or FCE evaluator variations. The evaluator may respond differently to the patients with higher painrelated behavior compared with healthy subjects, which in turn may limit the performance of patients.[34] Additionally, previous research observed that beliefs and attitudes of clinicians play a significant role on advising patients about CMP.[35] In this study, these possible explanations could not be determined, and it is recommended to further explore the role of these interaction effects on functioning in future research.

For women and physically high demanding work, high ORs were associated with insufficient FC (see Table 4). The reason for this result is because the 5% normative value for sufficient FC was constructed regardless of sex, but women score significantly lower on material handling tests than men. This also explains the high ORs for high work load. It must be stated, however, that limited value to the scores of the ORs can be given concerning the sex and workload factors, because the 95% CIs were very broad. In particular, in model 2, sex (OR=143; 95% CI, 12.2-1000) and heavy work load (OR=50.6; 95% CI, 3.1-828.6) had very broad 95% intervals.

Whether patients in this study were deconditioned remains unclear, but this may be more theoretically than clinically relevant. In this study, we focused on the FC of workers related to work demands. It was demonstrated that patients with CMP have lower FC when they are off work. It was observed that insufficient FC was not significantly associated with group

status, indicating that workers in the SL-Rehab and SAW groups were both equally equipped to perform work. That was not in accordance with the different work status of both groups. Factors other than group status explained the variance in (in)sufficient FC (age, sex, observed effort, kinesiophobia, perceived physical health). The results are important for clinicians and therapists working in vocational and rehabilitation. Patients who have sufficient FC but who are absent from work may be limited by more than physical factors. Physical training in patients with insufficient FC for work may be a part of rehabilitation programs, but not strictly, because nonphysical factors were also significant predictors for lower FC.

Study limitations

There are some critical notes to the choices that were made in this study. First, it appeared impossible to state if lower FC in CMP groups was the result of deconditioning, because this assumes a process which occurs over a certain time period. A cross-sectional design is not suitable for measuring changes over time, and only a current state of the patient can be observed. In the study by Bousema et al.,[36] deconditioning was prospectively measured and deconditioning was observed in patients with chronic pain. In the Bousema study[36], however, it remained unclear whether the deconditioning could be considered relevant, because capacity was not related to work load or functioning. Even if significant deconditioning has occurred over time, FC could still be sufficient to meet the work load. In the present study, therefore, the minimal FC, which is assumed to be sufficient (>5th percentile of the HW group),[16] was used as a criterion for insufficient FC. From this point of view, it was hypothesized that subjects who score above this criterion, indeed have sufficient capacity (highly sensitive), but for those subjects who score below this criterion, it is still unknown if capacity is sufficient (lower specificity). It can be argued, however, that FC will become a threat if one performs below the 5th percentile criterion. The data of the present study confirm that 2 groups can be identified based on different predictors. Future prospective research to deconditioning in relationship to work load may further investigate this challenging postulation. Second, FC was based on FCE results in relationship to work load. FC could be defined as a broader concept than only a physical one: besides physical components, psychological and social factors are known to influence functioning. The magnitude of this influence is ambiguous and should be a further object of study. Third, inclusion of subjects in the groups was nonstratified, and randomization was not possible. This led to different group characteristics with respect to age, sex, and workload. In Table 2, results were stratified based on sex, because it is known that lifting capacity differs between men and women.[16] In Table 4, corrections were applied in a multivariate design to overcome these distribution differences. Finally, the validity of DOT is questionable. Validity of the DOT has never been scientifically tested, nor has it been based on quantitative work-related task analyses, and instead it is based on consensus meetings of experts.[37]

Conclusions

Sick listed workers with CMP referred for rehabilitation have lower FC than workers with CMP who stay at work. Compared with healthy workers, both groups with CMP have lower FC. CMP is strongly associated with insufficient FC to meet work demands. In many cases, workers among both groups demonstrate insufficient FC to meet work demands. Not the pain itself, but personal and work-related factors are related to insufficient FC.

List of abbreviations:

FC: Functional Capacity
FCE: Functional Capacity Evaluation
CMP: Chronic Nonspecific Musculoskeletal Pain
SAW: Staying At Work despite chronic musculoskeletal pain
SL-Rehab: Sick listed and referred for rehabilitation
HW: Healthy Workers
OR: Odds Ratio
CI: Confidence Interval
DOT: Dictionary of Occupational Titles
MCS: Mental Component Summary of Rand-36
PCS: Physical Component Summary of Rand-36
BPAQ: Baecke Physical Activity Questionnaire
NRS: Numeric Rating Scale
PSEQ: Pain Self-Efficacy Questionnaire
PDI: Pain Disability Index

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6

Different level, but a similar day pattern of physical activity in workers and sick-listed people with chronic nonspecific musculoskeletal pain

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Abstract

Objective: To investigate whether physical activity (PA) levels and day patterns of sick-listed workers with chronic nonspecific musculoskeletal pain (CMP) admitted for multidisciplinary rehabilitation are different from those of workers with CMP.

Design: Cross-sectional.

Setting: Outpatient rehabilitation center and general community.

Participants: A convenience sample of sick-listed patients with CMP (n=27) referred for multidisciplinary pain rehabilitation, and a volunteer sample of workers with CMP (n=107; 5% sick leave in year before participation).

Intervention: Participants wore an accelerometer for 5 to 7 consecutive days.

Main Outcome Measure: PA, expressed as activity counts. All analyses were corrected for confounders.

Results: PA levels of workers with CMP were higher than those of sick-listed patients (P=.01). After correction for confounders, work status explained 3.5% of the variance observed in activity counts (F_{change}=5.27, P=.024). In the mornings, group status significantly contributed to the variance in mean activity counts (F_{change}=5.32, P=.02). In afternoons (F_{change}=3.29, P=.07) and evenings (F_{change}=2.41, P=.12), the effect of group status on PA level was nonsignificant. No significant interaction was observed between time and group status (Wilks' λ=.92, $F_{14,104}$=.66, P=.80).

Conclusions: Workers with CMP have a higher PA level compared with sick-listed patients. The PA day pattern did not differ significantly between the 2 groups.

Key Words: Chronic pain; Human activities; Rehabilitation; Rehabilitation, vocational; Work.

Introduction

People with Chronic Low Back Pain (CLBP) often have lower physical activity (PA) levels compared with healthy controls.[1,2] Much less is known about PA day patterns, both in patients with chronic nonspecific musculoskeletal pain (CMP) and healthy controls. Multiple definitions of PA levels and patterns have been proposed, none of which has been established as the criterion standard. In this study, PA level refers to the amount of PA during a time period, and PA pattern refers to differences in PA across sections of a day. Compared with healthy controls, patients with CLBP showed lower PA levels in the evening.[3,4] Authors have suggested that this pattern is deviating from 'normal' and may have been the result of increasing pain intensity during the day.[4] However, in that patient group, only 28% of the patients (n=29) were working, compared with 90% of the controls (n=20). Work status sub-analyses revealed nonsignificant differences in PA between both groups. We are observing on the one hand an absence of robust knowledge on daily PA levels and patterns of people with CMP, while on the other hand even without this robust knowledge, a widespread therapeutic use of the construct of PA patterns in daily clinical pain rehabilitation. The current study was performed to analyze the PA level and pattern in workers and sick-listed patients, all having CMP.

Methods

Participants

The data of sick-listed patients were derived from a dataset containing a convenience sample of 27 patients with CMP who were admitted to outpatient multidisciplinary pain rehabilitation in the Netherlands. Data were gathered before and independent of the program. Inclusion criteria were as follows: more than 3 months CMP (1 or more regions) without known medical cause; age 18 to 65 years; paid work more than 20 h/wk; and sick-listed currently and for more than 5% during the previous year. Exclusion criteria were as follows: comorbidities that could influence physical or mental functioning, or both; and insufficient knowledge of the Dutch language. The inclusion period was from 2007 through 2008. All patients signed informed consent. The data of workers with CMP were derived from a dataset of the 'Working with pain' study[5] containing 107 volunteers with CMP who did not participate in a rehabilitation program in the year before participation. Recruitment happened via announcements in local newspapers and on websites of national patient associations. Inclusion criteria were the same as those used in the sick-listed group, with 2 exceptions: no current sick-listing and total sick-listing attributable to CMP of less than 5% during the previous year. The inclusion period was from 2009 through 2010. The cutoff of 5% was chosen because it reflected the average amount of sick leave in the Netherlands. The

study was approved by the local ethics committee, and all participants provided informed consent.

Instruments

Daily PA was measured with a triaxial RT3 accelerometer.[a] The RT3 accelerometer is sensitive to movements across the vertical (x), anteroposterior (y), and mediolateral (z) axes. It measures the mean acceleration (in m/s^2) for the 3 planes according to 1-minute intervals, and the data are stored as a number of activity counts. An average vector magnitude (VM) can be calculated according to the following formula: $VM = \sqrt{(x^2 + y^2+z^2)}$. The validity and interinstrument reliability were sufficient.[6-8]

Pain intensity was assessed using the visual analog scale (sick-listed group) or a numeric rating scale (working group). The visual analog scale and numeric rating scale can be used interchangeably.[9] Pain-related fear was assessed by the Tampa Scale for Kinesiophobia. Psychosocial distress was assessed with the Symptom Checklist-90-Revised.

Procedures

Participants wore the accelerometer around the waist for 5 to 7 consecutive days during waking hours, except while showering and bathing. At least 2 were nonworking days. Participants filled in a diary to compare with the accelerometer data. Days were classified into working or leisure days.[4] A measurement day was assessed using the hours of the day, of which at least 70% of the data were present. The day of a participant was included in the analysis if at least 80% of the measurement day consisted of nonmissing activity counts.[10] Days were divided into morning, 8:00 am to 11:59 am; afternoon, 12:00 am to 5:59 pm; and evening, 6:00 pm to 10:59 pm.[4]

Main analyses

A hierarchical multiple regression analysis was performed to test differences in PA levels between the groups, controlling for the following confounders: age, sex, physical work load (*Dictionary of Occupational Titles* category: sedentary, light, moderate, [very] heavy[11]), diagnosis, pain intensity and psychological distress. In case of missing values, cases were excluded pairwise. Line graphs were created to obtain insight into the PA day patterns. A repeated-measures analysis of variance was conducted to assess the relation between group status and PA across the hours, controlling for the same confounders.

Results

Table 1 shows the demographics and clinical characteristics of the groups. Workers' mean PA level over the day (in activity counts) was 31% higher than the sick-listed patients (day sections: morning 32%, afternoon 31%, and evening 28%). In the regression analysis, the total variance explained by the model as a whole was 22.0% ($F_{11,117}$=3.0, *P*=0.002). Group status significantly contributed to the variance in activity counts during the day (F_{change}=5.27, *P*=0.024), suggesting a higher overall PA level for workers with CMP. Group status explained 3.5% of the variance observed in activity counts.

Table 1: Demographics and clinical characteristics of the study samples

		Sick-listed patients		Working people		
		n	Mean (SD)	n	Mean (SD)	P
Gender (male/ female)		12/15	-	43/64	-	0.43‡
Marital status (single/relationship)		5/22	-	10/97	-	0.16‡
Age (years)		27	38.7 (9.6)	107	48.1 (8.0)	0.001§
Diagnosis region						0.02‡
Back		12		54		
Neck/shoulders		10		16		
Fibromyalgia		1		24		
Other *		4		13		
Sick leave past year						
<5%		0		107		
5-20%		1		0		
21-50%		6		0		
>50%		19		0		
Working during study		0		107		
Physical demand category work						0.65‡
DOT category 1 †		7		39		
DOT category 2		9		36		
DOT category 3		6		26		
DOT category 4		4		6		
Pain intensity (0-10)		23	5.7 (2.1)	107	4.5 (2.1)	0.01§
TSK Total score (17-68)		27	35.3 (8.7)	107	32.9 (7.2)	0.14§
SCL-90-R Total score (90-450)		27	154.3 (48.1)	107	127.1 (31.3)	0.001‖
Counts per day (mean)		27	189,237 (73630)	107	247,614 (107626)	0.01‖
Counts per hour (mean)	Morning	27	12,845 (5612)	107	16,979 (10186)	0.07‖
	Afternoon	27	15,581 (6802)	107	20,456 (10003)	0.02‖
	Evening	27	8,873 (4011)	107	11,393 (5465)	0.03‖

Abbreviations: DOT, Dictionary of Occupational Titles; SCL-90-R, Symptom Checklist-90-Revised; TSK, Tampa Scale for Kinesiophobia.
* Pain of extremity, cervical-brachial syndrome, generalized pain.
† DOT categories: 1, sedentary; 2, light; 3, medium; 4, heavy/very heavy work.
‡ χ^2 test.
§ Independent-samples t test.
‖ Mann-Whitney U test.

Figure 1 shows the PA day patterns. In the mornings, group status significantly contributed to the variance in mean activity counts (F_{change}=5.32, *P*=0.02). In afternoons (F_{change}=3.29, *P*=0.07) and evenings (F_{change}=2.41, *P*=0.12), the effect of group status on PA level was nonsignificant. No significant interaction was observed between time and group status (Wilks' λ=0.92, $F_{14,104}$=0.66, *P*=0.80, partial eta squared =0.08), indicating that the change in PA level over time is not different between the 2 groups.

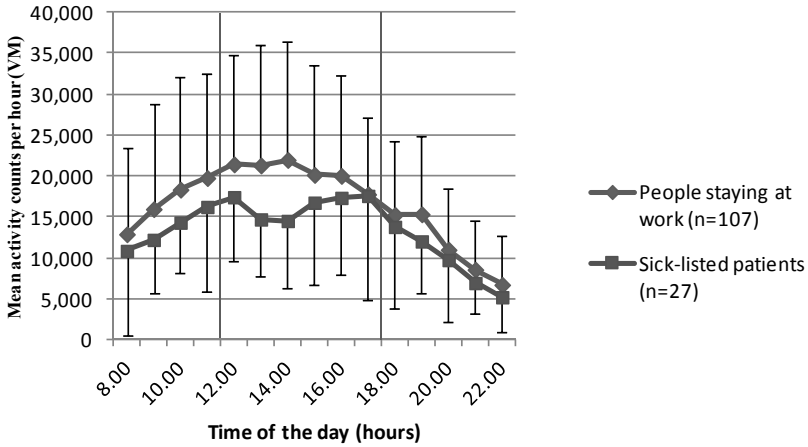

Figure 1: Physical activity patterns during the day.

Discussion

Others have reported differences in PA day pattern between pain rehabilitation patients who stayed at work and those who were sick-listed.[4] This might be explained by the smaller sample size of 13 sick-listed and 8 working patients with CLBP in the other study, contrary to 27 sick-listed patients and 107 working people with CMP in the current study. Our study samples consisted of CMP, which included CLBP and other chronic pain syndromes, but subanalyses revealed that differences in diagnoses did not significantly explain variance in PA. A more striking difference between the 2 studies can be found in the inclusion criteria. In the current study, only the sick-listed group participated in pain rehabilitation, as opposed to both groups in the study of van Weering et al.[4]

A decreasing PA in the evening was observed in both groups, which is similar to findings of studies on healthy controls.[12,13] The clinical implication of our findings contradict with van Weering et al.[4], who suggested that patients with CLBP would be less disabled after restoration of the PA day pattern. It may be normal for most individuals, including those

with CMP, to be less physically active in the evenings. The implicit theoretical assumption that a constant PA day pattern would be preferable and a means to restore disability and (work) participation is not supported by this study. The clinical implication of this is that interventions aimed to maintain a steady PA day pattern may be questioned.
With regard to PA level, work may be a way to keep PA levels in people with CMP as normal as possible. Remaining at work creates the impetus to remain active, which is not obvious when one is at home. On the other hand, it remains unclear whether the workers worked because they were able to maintain a higher PA level, or had a higher PA level because they worked. Additionally, this study demonstrated that although group status was associated with PA level, the explained variance was small after controlling for confounders. Currently, the evidence to activate patients with CMP to raise overall PA levels as a 'condicio sine qua non' to improve work participation is conflicting.[14,15] One of the reasons for this may be that studies have lumped patients into 1 group and disregarded subgroups of patients with high or low PA levels. The latter may theoretically benefit from an activating approach.

Study limitations

The subgroup of sick-listed patients was rather small (n=27), although larger than in other studies. The cross-sectional nature of this study does not allow causal implications. Future studies should investigate whether elevation of PA will promote return to work in people who are sick-listed, and/or whether sustaining PA levels will prevent absenteeism in workers with CMP. Because the total variance explained by the regression model was 22.0%, it is clear that not all potential variables were included in this study. Additionally, full datasets were not available for all variables, limiting the power of this study.

Conclusion

The results of this study showed that workers with CMP have a higher PA level compared with sick-listed patients. The PA day pattern, however, did not differ significantly between the 2 groups.

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Self-reported work ability and work performance in workers with chronic nonspecific musculoskeletal pain

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Abstract

Purpose: To assess self-reported work ability and work performance of workers who stay at work despite chronic nonspecific musculoskeletal pain (CMP), and to explore which variables were associated with these outcomes.

Methods: In a cross-sectional study we assessed work ability (Work Ability Index, single item scale 0-10) and work performance (Health and Work Performance Questionnaire, scale 0-10) among 119 workers who continued work while having CMP. Scores of work ability and work performance were categorized into excellent (10), good (9), moderate (8) and poor (0-7). Hierarchical multiple regression and logistic regression analysis was used to analyze the relation of socio-demographic, pain-related, personal- and work-related variables with work ability and work performance.

Results: Mean work ability and work performance were 7.1 and 7.7 (poor to moderate). Hierarchical multiple regression analysis revealed that higher work ability scores were associated with lower age, better general health perception, and higher pain self-efficacy beliefs (R^2=42%). Higher work performance was associated with lower age, higher pain self-efficacy beliefs, lower physical work demand category and part-time work (R^2=37%). Logistic regression analysis revealed that work ability ≥8 was significantly explained by age (OR=0.90), general health perception (OR=1.04) and pain self-efficacy (OR=1.15). Work performance ≥8 was explained by pain self-efficacy (OR=1.11).

Conclusions: Many workers with CMP who stay at work report poor to moderate work ability and work performance. Our findings suggest that a subgroup of workers with CMP can stay at work with high work ability and performance, especially when they have high beliefs of pain self-efficacy. Our results further show that not the pain itself, but personal and work-related factors relate to work ability and work performance.

Key words: Work ability; Work performance; Chronic pain; Musculoskeletal disorders; Staying at work

Introduction

Chronic nonspecific musculoskeletal pain (CMP) accounts for large costs to society.[1,2] Many workers with CMP report decreased work ability or work performance, which impairs their work productivity[3,4] and may lead to long-term sickness absence and work disability. However, although many workers with CMP discontinue work, most workers are able to cope with CMP and still attend work while having pain.[5,6] It is under debate whether remaining at work with chronic pain is wise: it may adversely affect health[7] and the question is whether these workers remain productive. Therefore, it is of importance to focus research not only on highly disabled or sick-listed groups, but also on its successful counterpart[8] and to learn which factors are associated with work ability and work performance in workers who stay at work with CMP.

To investigate the workers' ability to participate in work, the concept of work ability has been introduced. It is defined as the degree to which a worker, given his health, is physically and mentally able to cope with the demands at work.[9] High associations between work ability and productivity loss due to absenteeism have been observed.[10,11] Likewise, two recent studies on work productivity showed that having pain is associated with higher levels of reduced work performance.[4,12] Reduced work performance accounts largely for indirect costs due to productivity loss.[13,14] When work productivity is affected by reduced performance due to a health problem, it is often referred to as presenteeism. In recent years, it has been demonstrated that societal costs related to CMP are not only related to absenteeism, but to presenteeism as well.[14,15] The costs related to presenteeism might even exceed the costs of absenteeism.[16-18]

In earlier research, different variables were observed to be associated with self-reported work ability or work performance in people with chronic pain conditions: age[10], gender[19], pain intensity[4,20], general health perception[10,21], fear avoidance[22], pain self-efficacy[23,24], work demands[25,26], number of working hours[26,27], control over work tasks[28], and work satisfaction.[27] So far, knowledge of work ability and work performance focusing on people who stay at work despite CMP remains scarce. In the present study we connected to the existing knowledge on work ability and work performance, and focused on workers who stay at work despite CMP. Although this group of workers may be successful in terms of low absenteeism, their levels of work ability and work performance remain unclear. Moreover, knowledge about which variables are associated with high work ability and work performance despite CMP might help us to tailor vocational rehabilitation programs that prevent unneeded work disability and maintain work performance.

The aim of this study was twofold: to assess levels of self-reported work ability and work performance in people who stay at work with CMP, and to explore which socio-demographic, pain related, personal and work-related variables were associated with work ability and work performance.

Methods

Subjects

Participants in the "Working with pain" study were recruited from May 2009 to December 2010 by announcements in newspapers, complemented with a call on the websites of national patient associations of low back pain, whiplash and fibromyalgia. It was made clear that they participated in scientific research and that no treatment or advice would be provided. A compensation of €50 and traveling compensation was offered for participation. Inclusion criteria of the "Working with pain" study were: CMP (pain in back, neck, shoulder, extremities or disorders such as widespread pain, fibromyalgia and whiplash) without known underlying specific medical cause (e.g. infection, neoplasm, metastasis, osteoporosis, rheumatoid arthritis, fracture, neurological disorders, and serious spinal pathology); duration longer than 6 months; age 20 to 60 years; having been employed 20 hours a week or more during 12 months prior to participation in the study. Participants' absence from work ascribed to CMP could not be more than 5% of potential total working hours in the 12 months prior to participation. The 5% was chosen because it is around the average rate of sickness absence in The Netherlands and Europe.[29,30] Exclusion criteria in this study were the following: hypertension or cardiovascular diseases, co-morbidities with severe negative consequences for physical and/or mental functioning (e.g. severe psychiatric disease or addiction to drugs), pregnancy, and insufficient knowledge of the Dutch language.

Sample size was determined by the amount of independent variables we intended to include into a logistic model. A minimum of 10 subjects per independent variable has been recommended.[31] Because we estimated to use 10 predicting variables in the model, a total sample size of at least 100 was needed.

Procedure

To diagnose the type of pain and the existence of co-morbidities, all participants were medically examined by a physiatrist. All participants completed questionnaires assessing socio-demographic characteristics, work characteristics (work ability, work performance, relation with colleagues, relation with supervisor, work satisfaction, control over work tasks), pain related characteristics (pain region, pain intensity, pain disability), and personal characteristics (general health perception, fear avoidance beliefs, pain self-efficacy). In earlier research, these variables were observed to be associated with work ability or work performance[4,10,19,21,22,26,27] The study was approved by the Medical Ethical Committee of the University Medical Center of Groningen. Anonymity, confidentiality, and the right to withdraw from the study at all times were guaranteed. All participants gave informed consent.

Main measures

Work ability was assessed with a single item of the Work Ability Index (WAI). Current work ability compared to lifetime best was scored on a 0-10 response scale, where 0 represents "completely unable to work" and 10 "work ability at its best". A very strong association between this single WAI-item and the complete WAI was found.[32] The scores are categorized into excellent (score 10), good (score 9), moderate (score 8) and poor (score 0-7).[33,34] It was concluded that the single-item question could be used as a simple indicator for assessing self-reported work ability.[32]

Work performance was assessed with the World Health Organization's Health and Work Performance Questionnaire (HPQ). The HPQ is a reliable and valid self-rated work performance measure, scored as percentage of performance on a 0-10 response scale, where 0 represents a total lack of performance and 10 no lack of performance during time of the job in the past four weeks.[35,36] The scores were categorized into excellent (score 10), good (score 9), moderate (score 8) and poor (score 0-7), adapted from Kessler et al.[35]

Independent variables and covariates

Socio-demographic characteristics were recorded by a questionnaire constructed by Rehabilitation Development Centers in the Netherlands.[37]

Pain-related characteristics: Diagnosis region, duration of pain and use of pain medication were recorded by a questionnaire constructed by Rehabilitation Development Centers in the Netherlands.[37] Pain intensity was measured using the 11-point numeric rating scale (NRS), ranging from 0 (no pain) to 10 (worst possible pain), requiring participants to rate their current pain intensity and average pain intensity.[38] Validity and utility of the 11-point NRS is sufficient and it is responsive to changes in individuals.[39,40]

The Pain Disability Index (PDI) was used to measure the degree to which chronic pain interferes with daily activities (self-perceived disability).[41,42] The PDI is a 7-item inventory, with each item being scored from 0 (no interference) to 10 (total interference). Higher scores reflect higher interference of pain with daily activities. The reliability and validity of the PDI is sufficient.[41,42]

Personal characteristics: The Dutch version of the RAND 36-item Health survey (RAND-36) was used to measure general health perception.[43] Scores range from 0-100, and higher scores reflect better perceived general health perception. The Dutch version of the RAND 36-items is a reliable, valid and sensitive instrument.[43] Fear avoidance beliefs about physical activity and (re)injury was measured with the Dutch version of the Tampa Scale of Kinesiophobia (TSK; 17 items).[44,45] Higher scores reflect higher perceived fear of physical activity. Reliability and validity of the Dutch version are good.[44,46] Pain self-efficacy was measured by the Dutch version of the Pain Self Efficacy Questionnaire (PSEQ; 10 items).[47] Each item is rated by selecting a number on a 7-point scale, scores ranging from 0 ("not at all confident") to 6

("completely confident"). Higher scores reflect stronger self-efficacy beliefs. Self-efficacy beliefs for people experiencing chronic pain incorporate not just the expectation that a person could perform a particular behavior or task, but also their confidence in being able to do it despite their pain.[48] The PSEQ has strong psychometric properties and high reliability and validity.[48]

Work characteristics: Sick leave during the previous 12 months, full-time or part-time employment, and own prognosis to fulfill work two years from now were assessed by the WAI. The reliability and validity of the WAI are acceptable.[9,49] Control over work tasks, social support at work, and work satisfaction were assessed by the Dutch questionnaire on the Perception and Evaluation of Work (Dutch abbreviation: VBBA).[50] Subscale scores range between 0 and 100; higher scores indicate more unfavorable situations. The reliability and unidimensionality of all scales of the VBBA were considered satisfactory.[50]

The physical work demand category was assessed according to the Dictionary of Occupational Titles (DOT). Within the DOT, occupations are classified into 5 categories of physical workload, based on intensity and duration of lifting or carrying needed for the job: sedentary, light, medium, heavy/very heavy.[51] The 5th DOT-category hardly exists in the Netherlands, because the Dutch laws on worker safety advise a maximum lifting weight of 23 kg. Therefore, in the present study the DOT-categories "heavy" and "very heavy" were combined into one. Validity of the DOT has not been scientifically tested nor has it been based on quantitative work-related task analyses, but rather on concensus meetings of experts.[52,53]

Statistical analysis

All statistical analyses were performed using SPSS for Windows, version 18.0.3.[54] To answer what levels of work ability and performance were observed in workers with CMP, average scores with standard deviations, medians with interquartile range, and percentiles were provided. To answer which variables were associated with work ability and work performance, a hierarchical multiple regression analysis was used, with work ability and work performance as dependent variable. Candidate predictor variables were entered stepwise into the regression model: age (yrs), gender (female=0, male =1), pain intensity[20], general health perception[10,21], fear avoidance[22], pain self-efficacy[23,55], DOT-category (1-4)[26], employment (part-time=0, full-time=1), control over work tasks[28], and work satisfaction.[27] DOT-categories were entered as dummy variables in the regression equation. Beta values with 95% confidence interval, standardized β and p-values for all variables were calculated. For each step in the model, explained variance (R^2 and R^2-change) were calculated.

Logistic regression was applied to assess which of the independent variables were associated with high work ability and high work performance in workers with CMP. Therefore, work ability and work performance were transformed into dichotomous variables: scores on the

single WAI item “current work ability compared to lifetime best” <8 were considered as low work ability, and scores ≥8 were considered as high work ability[32,34]; scores on the HPQ-work-performance scale <8 were considered as low work performance, and scores ≥8 were considered as high work performance[19,27,35] In all analyses a p-value <0.05 was considered significant. Listwise deletion was used to discard the cases with missing values from the regression analysis.

Results

A total of 119 subjects was included in the “Working with pain” study. Detailed descriptive data of the participants are presented in Table 1. All potential participants were examined for eligibility: 7 were not included in the study because of heart disease, high blood pressure, neurological disorder, radiculopathy and co-morbidity. Various potential participants registered for the study, but were not confirmed eligible because of age >60 years, specific medical cause such as rheumatoid arthritis, unpaid job, employment less than 20 hours, or more than 5% sick leave.

Levels of work ability and work performance

The mean work ability level was 7.1 (sd.1.6), 43% reported a work ability ≥8 (Table 1). The mean work performance level was 7.7 (sd.1.1). Work performance was rated ≥8 by 70% of the subjects. Only 3% of these workers reported the maximum score, which represents a top work performance. Eighty-one percent of the workers rated their work performance equal or better compared to their co-workers.

Table 1: Description of the study population, workers who stay at work with CMP (n=119)

Variables		Range		Median [IQR]
Socio-demographic characteristics				
Age (years), mean (sd)			48.3 (7.8)	51 [44-55]
Gender male (%)			40	
Married / co-habitation (%)			90	
Educational level (%)	Low		11	
	Medium		56	
	High		33	
Pain-related characteristics				
Pain region (%)	Low back		53	
	Neck/shoulders		13	
	Fibromyalgia		23	
	Other [a]		11	
Duration of pain (%)	1-2 years		8	
	2-5 years		11	
	>5 years		81	
Pain medication (yes) (%)			40	
NRS current pain [b], mean (sd)		0-10	4.6 (2.1)	5 [3-6]
NRS worst pain, mean (sd)		0-10	6.9 (1.8)	7 [6-8]
PDI [c], mean (sd)		0-70	19.9 (11.1)	19 [12-28]
Personal characteristics				
RAND 36 General health perception [d], mean (sd)		0-100	62.9 (17.7)	65 [50-75]
Fear avoidance beliefs TSK [e], mean (sd)		17-68	33.0 (7.2)	32 [28-39]
Pain self-efficacy beliefs PSEQ [f], mean (sd)		0-60	46.9 (8.5)	49 [42-53]
Work characteristics				
Expected to work last week (hours), mean (sd)			31.5 (7.8)	
Actually worked last week (hours), mean (sd)			32.5 (10.4)	
Employment full-time (%)			50.4	
Physical demand category work [g] (%)				
DOT 1 sedentary			35	
DOT 2 light			35	
DOT 3 moderate			24	
DOT 4 (very) heavy			6	
Relation with colleagues [h], mean (sd)		0-100	7.1 (11.9)	0 [0-11]
Relation with supervisor [h], mean (sd)		0-100	10.0 (20.0)	0 [0-11]
Work satisfaction [h], mean (sd)		0-100	11.1 (18.8)	0 [0-11]
Control over work tasks [h], mean (sd)		0-100	25.4 (26.5)	18 [0-36]
Main outcome measures				
Work ability single item (WAI) [i], mean (sd)		0-10	7.1 (1.6)	7 [6-8]
poor (0-7), %			57	
moderate (8), %			25	
good (9), %			10	
excellent (10), %			8	

Work ability related to the demands of job, mean (sd)	2-10	7.6 (1.0)	8 [7-8]
Estimated work impairment due to CMP, mean (sd)	1-6	3.9 (1.2)	4 [3-5]
Sick leave during the past 12 months, mean (sd) [j]	1-5	4.6 (0.5)	5 [4-5]
Personal prognosis of work ability about 2 years, mean (sd)	1, 4 or 7	6.2 (1.4)	7 [4-7]
Work performance (HPQ) [k], mean (sd)	0-10	7.7 (1.1)	8 [7-8]
poor (0-7), %		30	
moderate (8), %		50	
good (9), %		17	
excellent (10), %		3	
Relative presenteeism , mean (sd)	0.25-2	1.1 (0.3)	1 [1-1]

[a] Pain of extremity, cervical-brachial syndrome, generalized pain, [b] Numeric Rating Scale (0=no pain, 10=worst possible pain), [c] Pain Disability Index, [d] RAND 36-item Health Survey, [e] Tampa Scale for Kinesiophobia, [f] Pain Self Efficacy Questionnaire, [g] Dictionary of Occupational Titles, [h] Subscale of Questionnaire on the Perception and Evaluation of Work (in Dutch: VBBA), [i] Work Ability Index, [j] Subscale of the WAI: 1= ≥ 100 days sick leave; 4=1-10 day sick leave; 5= no sick leave during the past 12 months, [k] Health and Work Performance Questionnaire

Associations with work ability and work performance

In Table 2 the results of the linear regression analysis are presented, with work ability and work performance as dependent variables. The total variance of work ability explained by the model was 42%, $F_{(12,104)}$=6.34, p=0.001. Younger age, better perceived general health and higher beliefs of pain self-efficacy were associated with higher work ability in workers who stayed at work with CMP. Work ability was not associated with pain intensity, fear avoidance beliefs, physical work demand category, full-time work, control over work tasks and work satisfaction. The total variance of work performance explained by the model was 37%, $F_{(12,103)}$=4.97, p=0.001. Younger age, higher beliefs of pain self-efficacy, lower physical work demand category and having a part-time job were associated with a higher work performance. Work performance was not associated with pain intensity, general health perception, fear avoidance beliefs, control over work tasks and work satisfaction.

Logistic regression revealed that high work ability was explained by age (OR=0.90; 95% CI: 0.84-0.97; p=0.007), general health perception (OR=1.04; 95% CI: 1.00-1.07; p=0.036) and pain self-efficacy (OR=1.15; 95% CI:1.05-1.25; p=0.002). High work performance was only associated with pain self-efficacy beliefs (OR 1.11; 95% CI 1.04-1.19; p=0.003). This means that with every year older, the odds of having high work ability decrease 1.11 times (10 years older decreases the odds 2.84 times). With every unit higher on the RAND-36 general health perception subscale (range 0-100), the odds of having high work ability increase 1.04 times. With every unit higher on the PSEQ (range 0-60), the odds of having high work ability increase 1.15 times (10 points higher increase the odds 4.05 times) , and the odds of reporting high work performance increase 1.11 times (10 points higher increase the odds 2.84 times). All other independent variables were not associated with high work ability and work performance.

Table 2: Hierarchical multiple regression analysis with work ability and work performance as dependent variables

Model	Work ability				Work performance			
	R^2	Change in R^2	Standardized ß	p-value	R^2	Change in R^2	Standardized ß	p-value
1	0.029				0.034			
Age			-0.140	0.136			-0.144	0.125
Gender			-0.083	0.374			-0.099	0.293
2	0.110	0.080			0.063	0.028		
Age			-0.156	0.085			0.153	0.102
Gender			-0.101	0.263			-0.111	0.234
Pain intensity			-0.285	**0.002**			-0.169	0.069
3	0.358	0.248			0.214	0.152		
Age			-0.168	**0.033**			-0.165	0.059
Gender			-0.084	0.299			-0.111	0.218
Pain intensity			-0.045	0.601			-0.005	0.954
General health perception			0.231	**0.012**			0.026	0.795
Fear avoidance beliefs			-0.034	0.687			0.053	0.572
Pain self-efficacy beliefs			0.388	**0.000**			0.424	**0.000**
4	0.423	0.065			0.367	0.152		
Age			-0.183	**0.020**			-0.185	**0.026**
Gender			-0.150	0.147			0.112	0.301
Pain intensity			-0.006	0.941			-0.015	0.872
General health perception			0.217	**0.023**			-0.049	0.624
Fear avoidance beliefs			0.013	0.873			0.097	0.277
Pain self-efficacy beliefs			0.423	**0.000**			0.458	**0.000**
Light physical work			-0.099	0.267			-0.213	**0.024**
Moderate physical work			-0.052	0.555			0.015	0.866
(Very) heavy physical work			-0.142	0.100			-0.287	**0.002**
Full-time vs. part-time work			0.117	0.231			-0.215	**0.038**
Control over work tasks			-0.125	0.158			0.110	0.238
Work satisfaction			-0.099	0.241			-0.164	0.067

Bold numbers indicate a p-value <0.05

Discussion

The aim of this study was to assess self-reported work ability and work performance of workers who stay at work despite CMP, and to explore associated variables. Most workers with CMP report poor to moderate work ability and moderate work performance. Younger age, better perceived general health and higher beliefs of pain self-efficacy were associated with higher work ability. Younger age, higher beliefs of pain self-efficacy, lower physical work demand category and having a part-time job were associated with higher work performance.

The observed rates of work ability in our study were lower compared to another study investigating people with CMP.[20] In that study, the sample was younger (mean age 42, versus 48 years in the present study), which is a plausible explanation for the higher observed work ability. In comparison, healthy workers rated their current work ability on average at 88%[56] and 79%[57], which was, after being transformed to a 0-10 scale, 1.7 and 0.8 point higher than the work ability reported in our study. The rates of work performance observed in our study were in accordance with the results of Bernaards et al.[58], who also used the HPQ in workers with neck and upper limb symptoms, and others.[4,12] Contrary to the latter findings, in our study no association was observed between pain severity and work performance. The reason for this might be that, contrary to others, we included personal variables into the regression analysis, which might have moderated the effect of pain. The mean work performance of a healthy reference group was 8.6 ± 1.2[59], which is on average 0.9 point higher compared to the workers with CMP. Our results suggest that staying at work with CMP is, on average, associated with reduced performance. Compared to absent workers due to CMP, workers who stay at work with CMP reported much higher work ability and work performance (WAI single item: 7.1 versus 3.8; HPQ: 7.7 versus 4.7).[60]

Reduced work performance is also seen in populations without a chronic health condition.[4,59] Therefore, reduced work performance is not necessarily attributed to a chronic health condition. When presenteeism is assessed, a comparison with a healthy non-pain reference group is recommended: considering work performance of 100% as the norm may lead to underestimation of the work performance of workers with CMP or other health problems. Workers with CMP have indicated that when they experience that their work performance or quality of work would decrease beyond acceptable levels, they would decide to call in for sick leave.[61,62] This concern of being able to meet the job demands may explain the relatively low declined work performance of these workers with CMP: they continue work until they experience that job demands are no longer met.

Although presenteeism is described as an important factor for productivity loss, in some studies it has been observed that workers with a chronic health condition generally perform well while being at work.[27] Continuing work with CMP can even be beneficial and entail a therapeutic effect.[62] Even so, working with pain is considered by some as a non-desirable behavior which even could be harmful.[7,63] Reduced work performance due to health problems such as CMP is not desirable, but the alternative of work absence may be even worse, reflected by declining return-to-work perspectives as the length of work absence increases.[64,65] Presenteeism "should not necessarily be interpreted as a negative thing, either for the individual or the company".[22] Staying at work with pain may be regarded as a healthy coping behavior, which will help to maintain the workers' longstanding participation in work and quality of life.[6]

Beliefs of pain self-efficacy were strongly associated with work ability and work performance. Pain self-efficacy reflects "how much effort people will expend and how long they will persist in the face of obstacles and aversive experiences".[48] High self-efficacy beliefs may facilitate behavior which improves work ability and work performance. At the workplace, beliefs of pain self-efficacy seem to have a moderating effect on work ability and work performance. Workers with high beliefs of pain self-efficacy seem to be able to maintain work ability and work performance the best. In vocational rehabilitation, beliefs of pain self-efficacy might be an important treatment mediator, by which increased work ability and/or work performance can be achieved. Further research is needed to confirm this.

Older workers with CMP are at risk of having reduced work ability and performance, which has also been observed in other studies.[11,59,66,67] To maintain work ability and performance in the workforce, extra attention to this group is needed. Pain intensity and fear avoidance beliefs were not related to either work ability or work performance; our study provided evidence to not recommend the use of these variables to maintain work productivity of workers with CMP. Contrary to other findings[27], but in accordance with another study[68], in our study full-time work was negatively associated with work performance. Possibly, in part-time employment, workers can better compensate for reduced capability. Evidence on the effect of part-time versus full-time employment is not robust. In accordance with our study, others have also observed reduced work ability[20] and work performance in workers performing heavy work.[25,28] In cases of heavy workload, work performance may be increased by adjustment of work demands or making job accommodations. Control over work tasks was not significantly associated with work ability or work performance, in accordance with others.[27] However, in other studies, job control had a moderating effect on reduced work ability[28], or was associated with work performance.[26,69] Evidence concerning the relation of work control and work performance is conflicting and needs further attention.

Because the term presenteeism assumes a priori loss of productivity, for employers it may be less attractive to employ people with CMP. However, the present study suggests that remaining at work with CMP does not cause productivity loss in all cases. This might be explained by the term "extensionism", which has been introduced to describe the phenomenon of working extended hours beyond those expected by the employer, to compensate for reduced productivity.[70] Reduced work performance can be compensated by working extended hours (negative absenteeism). This was confirmed in our study, where actual worked hours exceeded the expected worked hours.

There are some limitations and considerations to this study. Firstly, participants responded to a call in a newspaper. In this design selection bias is inevitable and diminishes the external validity of the results. Secondly, because of the cross-sectional data collection, no causal inferences could be made. Thirdly, comparison of work ability measured on a 0-10 scale

with reference values of the WAI was performed after transformation of average WAI-scores into a percentage.[56,57] Therefore, the reference values are an indication and should be interpreted with caution. Fourthly, the construction of the single WAI question "what is your current work ability compared to lifetime best" implies that older workers are more likely to have had higher work ability in their life, because they might have had an onset of the condition at an age older than the younger workers. This might have resulted in an underestimation of work ability of older workers compared to younger workers. However, across many studies on work ability (using the complete WAI), older age was related to lower work ability too.[11,67] Although the mean reported work performance in our study was lower compared to reference values of healthy controls, 81% of the workers rated their work performance as equal or better compared to their co-workers. When work performance in our study was determined on comparison with workers in similar jobs, it would have exceeded reference values of healthy controls. This illustrates that it matters which instrument is used to measure work performance. Estimates of reduced productivity at work vary considerable according to the instrument chosen.[71,72]

Clinical implications

In our study we selected a group of workers with CMP who remained at work without sick leave. Therefore, the generizability of the results to workers with CMP on partly sick leave may be limited. Our results suggest that a subgroup of workers with CMP can stay at work without reduced work ability or work performance, especially when they have high beliefs of pain self-efficacy. In our study it was not possible to make causal inferences, so it is unclear whether these workers have high pain self-efficacy beliefs because they work, or whether they work because of high pain self-efficacy beliefs. It is unclear whether we are able to train self-efficacy with return to work as a result, or whether self-efficacy will be improved from the moment people are placed in work. Longitudinal studies are needed to answer this question. Because work performance in workers with CMP is reduced, intervention programs on CMP at work should focus not only on absenteeism, but on presenteeism as well. Staying at work while suffering from CMP is favorable for sustainable work participation, but is not always obvious to achieve. Our results further show that not the pain itself, but personal and work-related factors relate to work ability and work performance. Work ability may be improved by promoting general health perception and pain self-efficacy beliefs. Work performance may be improved by promoting pain self-efficacy beliefs and part-time employment, and by reducing physical work demands.

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8

General discussion

8.1 Main findings

This thesis focused on workers who continue work with chronic nonspecific musculoskeletal pain (CMP). The aims in this thesis were to describe characteristics of workers who stay at work despite pain, and to explore which determinants are associated with staying at work (SAW). It was expected to learn from the successful workers' perspectives and that essential factors for SAW could be identified. The main research questions posed in the general introduction (chapter 1) are answered below.

In a systematic review on determinants of SAW in people with CMP (chapter 2), low emotional distress and low perceived disability were observed to be consistently associated with SAW, while duration of pain, catastrophizing, self-esteem and marital status were consistently not.[1] Further, it was concluded that scientific knowledge concerning SAW factors is scarce, which emphasized the relevance of the current thesis.

Workers who stay at work appeared to be very motivated to maintain their work. Their drive to work was converted into behavior that enhanced their ability and opportunity to continue work despite CMP. They succeeded to raise the latitude for balancing work and capacity, to improve pain coping strategies, to organize modifications and conditions at work, to find access to healthcare services and to ask for support. Many participants made a transition to other work because of CMP, or arranged a modified job adapted to their own capacity. Many workers with CMP experienced their work as therapeutic, inducing distraction from pain, new energy, structure, social contacts and self-respect, which was beneficial for their health and increased their mental and physical well-being. Several motivators and success factors were described in chapter 3.[2]

A wide range of characteristics of workers with CMP, with and without sick leave, were described and compared (chapter 4). Generally, workers who stay at work with CMP (SAW group) appreciated their quality of life higher compared to sick-listed workers with CMP who were admitted for rehabilitation (SL-Rehab group). On average, workers in the SAW group had higher beliefs of pain self-efficacy and better developed self-management skills. They better mastered self-regulation of their emotions (less emotional role limitations), attention (well-focused and less distracted; better life control; mindful) and planning (set priorities; find a balance between activities and rest; increase adjustment latitude). In addition, they reported favorable cognitions (better pain acceptance, less beliefs of fear avoidance and catastrophizing thoughts). The groups did not differ on self-reported physical activity level, active coping and work satisfaction.[3]

Workers in the SAW group predominantly performed better on a functional capacity evaluation (chapter 5). Workers with CMP, whether they are working or not, have significantly lower functional capacity and had more often insufficient functional capacity to perform work compared to healthy workers.[4]

Workers in the SAW group had a higher objectively assessed physical activity level compared to workers in a SL-Rehab group (chapter 6). The physical activity day-pattern, however, did not differ significantly between the two groups. Sick listed patients with CMP are confronted with loss of work structure, which means that work related activity is lost.[5]
Many workers with CMP who stay at work reported poor to moderate work ability and work performance (chapter 7). Not the pain itself, but personal and work-related factors were related to work ability and work performance. In workers with CMP, higher work ability and work performance was associated with higher pain self-efficacy.[6]
In Figure 1, all factors of workers with CMP which were observed to be associated with SAW are presented.

8.2 Factors associated with staying at work: a synthesis of the thesis

In the systematic review (chapter 2) it was concluded that further research is required to fill the current gap in our knowledge. This emphasizes the relevance of the current thesis, which takes a first step to increase our knowledge on SAW in people with CMP. In this thesis, a wide range of characteristics of workers who stay at work despite CMP was explored. Different factors were observed to be associated with SAW when a working group was contrasted with a sick-listed group referred for rehabilitation.
The findings of the systematic review (chapter 2), the group comparison study (chapter 4), and the studies on functional capacity and activity level (chapter 5 and 6) provided information about SAW associated factors.
In Figure 1, all the factors that were identified from multivariate analyses were presented (chapters 4, 5, and 6), also the factors retrieved from the studies in the systematic review. Factors that were *not* associated with SAW were indicated too. The framework of the ICF is used to demonstrate in which domains the associated factors with SAW are located.[7] Moreover, this framework provides insight in which ICF domains knowledge about determinants for SAW is lacking as well. A few inconsistent findings were observed, which also will be discussed.

Health state:

Mental health was associated with SAW.[3,8] Also the univariate results in chapter 4 showed that the four subscales of the mental health component of the RAND-36 significantly differ between the SAW and SL-Rehab group. Although no causal inferences can be made, mental health appears to be a suitable target to support workers to stay at work.

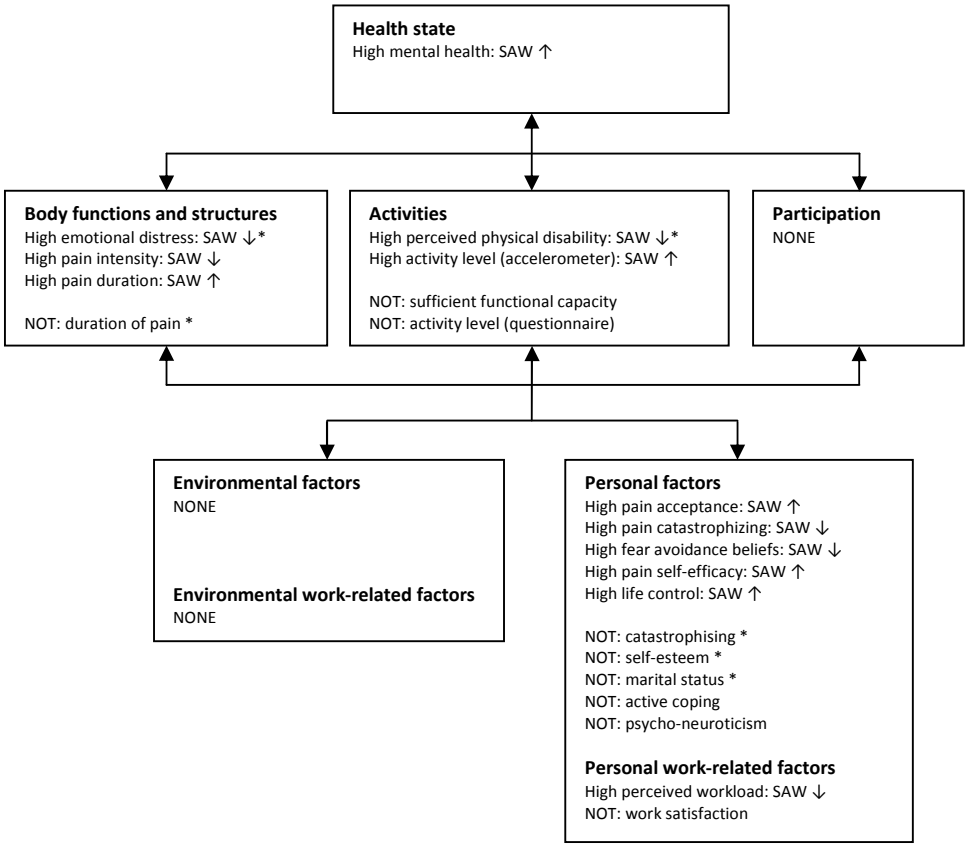

Figure 1: Factors associated with staying at work classified according to the International Classification of Functioning, Disability and Health.[7]
NOT = consistently no association with SAW
NONE = no information was found within this component of the ICF model
SAW ↑ = factor positive associated with staying at work
SAW ↓ = factor negative associated with staying at work
* results of the systematic review (chapter 2)

Body functions and structures:

Low emotional distress was consistently observed to be associated with SAW.[1] During the interviews (chapter 3) it became clear that the thought of becoming sick-listed already triggered feelings of distress in many workers.[2] CMP is a serious event for individual workers, who are often confronted with the threat of sickness absence or work disability. It is understandable that workers who fear to become disabled for work, and experience dissonant feelings (I'm not half the man I used to be), become emotionally distressed (there's a shadow hanging over me). On the other hand, it is also known that people who feel emotionally distressed become easier sick listed compared to people who do not feel distressed.[9,10]

Three studies reported on the relation between pain intensity and SAW.[2,8,11] The evidence indicates that pain intensity is negatively associated with SAW. Workers who report higher levels of pain intensity may sooner experience problems to stay at work. However, in the several multivariate analyses we performed in this thesis, pain intensity rarely contributed significantly to group status. The reason for this might be that personal variables have moderated the effect of pain. It is unknown whether pain reduction would be effective to improve work ability and to support workers to remain at work.

Activities:
Large differences were observed between a SAW group and a SL-Rehab group concerning perceived physical disability, physical functioning, and physical role limitations (chapters 2 and 4). Low perceived physical disability was consistently associated with SAW. To support workers to stay at work, they ought to be encouraged to increase or maintain their physical ability. Staying fit and maintaining the physical ability to perform duties at work may contribute to sustained work participation.

Functional capacity was assessed in the SL-Rehab and SAW group, and in a healthy working population. Subjects' functional capacity was defined as sufficient to meet their work demands, when it exceeded the 5th percentile of healthy workers functional capacity. It was observed that sufficient functional capacity was not significantly associated with group status, indicating that workers in the SL-Rehab and SAW group were equally equipped to perform work. That was not in accordance with the different work status of both groups. Factors other than group status explained whether functional capacity was sufficient or not (age, gender, observed effort, kinesiophobia, perceived physical health).[4]

Activity level was investigated with a questionnaire[12] and accelerometers. Inconsistent results were observed. Self-reported activity level was not related to SAW[3], whereas objectively assessed activity level did.[5] More importance should be attached to the findings of accelerometry, however, differences between workers with and without sick leave were small. Activating patients with CMP to promote SAW may be only effective in subgroups.

SAW could be seen as endurance-behavior while being sick-listed could be considered as avoidance-behavior, as described in the Avoidance-Endurance model of Hasenbring et al.[13] According to the Avoidance-Endurance model, both behaviors may lead to chronic pain, disability or work incapacity. Workers in the SAW group have shown that endurance behavior can be successful coping behavior when it concerns sustained work participation. The idea that workers in the SAW group show typical endurance behavior and absent workers typical avoidance behavior, was not confirmed in our study. In the study on workers' experiences

of remaining in their work despite pain (chapter 3), some participants stated that neglecting the pain helped them to stay at work, while others indicated that behaving carefully was the key to success. What the effect of these behaviors is in a longitudinal view remains unknown. Future research may focus on the applicability of the avoidance-endurance model in relation to work ability, and investigate which factors predict work status in the long term.

Participation
No factors in the ICF participation domain were investigated.

Environmental factors
No factors in the ICF environmental factors domain were investigated.

Environmental work-related factors
In this thesis, no environmental work-related factors were observed to be associated with SAW. This is not in accordance with another study, where was observed that work environment factors such as peer cohesion, supervisor support, autonomy at work, work pressure and supervisor control were associated with SAW in patients with CMP.[11] In the same study, involvement in work, task orientation, clarity, innovation and physical comfort were not associated with SAW. Linton et al. investigated support at work and interpersonal relations, which were not associated with SAW.[14]

Personal factors
Pain acceptance, pain catastrophizing, fear avoidance beliefs, pain self-efficacy and locus of control were associated with SAW. The attributed importance which pain has on life largely determines the behavior of an individual. Workers appraisals of the impact of the pain on their (working) lives and their ability to exert any control over their pain and lives, were associated with SAW, and seem to affect the decision to continue work or not.[3] Those workers who perceive life control despite their pain, and who believed that they could continue functioning despite their pain, were able to stay at work. Locus of control and pain self-efficacy beliefs are promising issues in vocational rehabilitation to prevent future sick leave. Chronic pain sufferers often perceive a lack of control, which probably relates to their ongoing but unsuccessful efforts to influence the pain they experience.[15,16] It may help when they stop their resistance against the pain, and learn to accept it.[17,18]

In this thesis it was hypothesized that coping strategies could explain why some workers stay at work, where others do not. However, in this thesis none of the coping subscales was observed to be associated with SAW. This was in accordance with Linton et al., who observed that only two of the ten subscales of coping (ignoring pain and coping with pain)

were associated with SAW.[14] In the qualitative study described in chapter 3 was described that opposite coping strategies may be related to SAW: some workers with CMP indicated that taking pain medication was essential for SAW, while others stated the opposite, that pain medication should be avoided.[2] This made clear that the SAW group was a heterogenic group. Every individual who continues work with CMP has his own set of 'success' factors, which depend on personal and environmental context. *The* successful worker does not exist.

Personal work-related factors
Among several investigated work factors, only perceived workload was associated with SAW (chapter 4). Work satisfaction was not associated with SAW, which was in accordance with another study.[14] Work factors were underrepresented in the available quantitative studies on SAW in CMP. Three qualitative studies on SAW of workers with CMP identified several personal and environmental work-related factors[2,19,20], indicating that workers estimate work factors as important. Although qualitative studies do not contribute to the level of evidence according to the GRADE criteria[21], qualitative research is essential for identifying the experiences of workers concerning SAW, which should direct future research.

8.3 Methodological considerations

8.3.1 Strengths

This was one of the first studies which focused specifically on people who continued work with CMP. It provided an extended profile of workers with CMP who succeeded to stay at work despite pain, which complemented our view on work participation in CMP and may contribute to a better understanding of work participation in non-clinical groups. The data in this thesis provide a new context-specific reference which may be used in vocational rehabilitation for CMP, and is also relevant for occupational and insurance medicine.
A wide range of bio-psycho-social characteristics (including work factors) of workers who stay at work despite CMP were explored. New hypotheses about SAW of workers with CMP were developed. With this orientation on what went right, new opportunities emerged for the field of work and health. An approach of the positive site of the coin opens the mind for 'salutogenic', instead of pathogenic solutions and interventions.
A mixed method approach was applied to answer the research questions in this thesis, which means that quantitative and qualitative research complemented each other. By using different methods to examine determinants for SAW, the validity of the findings increased.
People who stay at work are less accessible for research. Yet, a considerable amount of 119 subjects who work despite CMP were included into the study. All participants in our study were physically examined and medical data were available, so diagnoses were not based on self-report.

8.3.2 Limitations

A few weaknesses in this thesis should be considered. Firstly, this innovative project was explorative, and therefore used descriptive designs to increase our knowledge about an unknown group of workers with CMP who continue work despite pain. The cross-sectional design resulted in descriptive data on experiences and characteristics of workers with CMP. However, this design does not allow to make causal inferences. Further research is needed to learn more about variables that predict work status.

Correspondingly, work status was assessed cross-sectional, with a retrospective view of 12 months. All participants were by inclusion at work for at least 12 months, but work status *after* participating in this study was unknown.

Secondly, subjects in the SAW group responded to calls in newspapers to participate in the study. Within this recruitment strategy, self-selection was inevitable, which reduced the external validity of the results. In our analyses, we used multivariate tests to adjust for potential confounding variables such as age, gender, educational level, pain intensity, and work demand category.

A third consideration concerns the differentiation of two groups on two factors, namely on 'work status' and 'rehabilitation status'. Consequently, the groups were not distinguished on work status alone, but on group status. Although sick leave and referral for vocational rehabilitation are related, this method of selection inhibits to do robust statements about work-status-associated variables. As the project was embedded in a vocational rehabilitation context, a comparison was made between a sick listed CMP-patient group referred to vocational rehabilitation and a working non-clinical group with CMP.

Fourthly, CMP was not defined as a uniform diagnosis group, and therefore might impede the interpretation of data. However, there is no consensus for the use of meaningful subgroups based on diagnosis. The Dutch Pain Rehabilitation working group has classified nonspecific chronic pain syndromes based on psychosocial complexity, and not on type of diagnosis.[22] In addition, in daily practice professionals are confronted with patients who present a diversity of diagnoses, whereby more than one pain site is more the rule than the exception.[23,24] Turk et al. described this point clear: 'Researchers should be less parochial in focusing their investigations on only one preferred syndrome, with the assumption that it is uniquely different from others. Actually, those who suffer from different conditions may have more in common than those with the same diagnosis'.[25]

Finally, in this thesis the biological and psychological domains of the biopsychosocial model get much attention. Although the social domain is covered by work factors, it needs further attention. Within the 'Working with pain' project, data was collected on significant others, such as partner, manager at work and occupational physician. The impact of these social variables on SAW will be investigated (to be submitted after publication of this thesis).

8.3.3 Other considerations

In this thesis, working with pain was considered as successful coping behavior. The positive consequences were emphasized. Whether working with pain is always wise, is debatable. There may be a few negative consequences of working with CMP, which should also be mentioned. Working with CMP may result in reduced work productivity or work quality. Reduced work productivity accounts for large costs[26,27] and may lead to work loss. There has been little investigation into how CMP is related to work quality. In a study on work productivity in nurses with health problems, working while having a health problem was significantly associated with a higher number of patient falls, a higher number of medication errors, and lower quality-of-care scores[28], causing considerable costs. Therefore, attention to workers who continue work with CMP is warranted, not only for the sake of productivity maintenance and cost-effectiveness, but also for the sustainable health and employability of these workers.

In addition, this project showed that SAW is not always easy or self-evident (chapter 3). It became clear that some workers who stay at work despite CMP had challenges to continue functioning or remaining productive, concerns about future functioning, and sometimes they were about to become sick listed. Sick leave may be prevented when there is attention for these employees. Simply advising a patient to stay at work, although reflecting clinical guidelines to remain active, is of little practical help and may be misconstrued by some patients as a lack of understanding of what it means to remain at work with CMP.[29] Not every worker with CMP is able to find a way to stay at work, often encouragement and support is needed to achieve sustainable work participation.

Working with pain is considered by some physicians as a health stressor or burdensome behavior which even could adversely affect health. Many health care practitioners persistent hold the belief that CMP necessitates some avoidance of activities and work.[30-32] There may be situations where this is a real concern, for example in acute herniated discs with radiculopathy or other specific medical causes (infection, neoplasm, metastasis, fracture, or neurological disorders). Information provided to low back pain patients has been shown to modify their fear-avoidance beliefs.[33,34] When nonspecific pain has been diagnosed, health care practitioners should not be afraid in advising to maintain active and to continue work.[35,36]

The results of this thesis may be extended to other health problems. SAW despite a health problem is not unique for workers with CMP. Many workers with other chronic health problems, such as rheumatoid arthritis, diabetes mellitus, or COPD and asthma, continue work despite their health condition.[37-39] Although knowledge of workers who stay at work despite pain is limited, a comparison can be made with SAW of workers suffering from other health problems.

8.4 Implications of the findings

8.4.1 Implications for the worker

An important finding in this thesis was that workers with CMP were able to continue work without taking sick leave. When workers suffer from CMP and face difficulties to continue work, there are some instructions that may be followed. Sometimes, the decision for sick leave or to claim incapacity benefits is made unnecessary. People do not always realize that work has advantages, transcending monetary benefits. Work can be an energizer and often is experienced as therapeutic.[2] Work meets important psychosocial needs, offers structure and social contacts.[40] Generally, work is good for well being, it provides income and participation in today's society, and is central to individual identity, social roles and social status.[41-44]

Workers may intervene in their private life or work context. Maintaining physical fitness by training, staying active and taking rest are tools to find a balance between load and capacity. For some persons, asking for help and finding access to healthcare facilities is not easy, but may be of great support.

Often, there is more opportunity for making changes in the work context than thought. Workers should be made aware of the latitude for adjustments, at work and private. Workers may negotiate with employers and job professionals to improve the match between job demands and capacities/capabilities. The support from management and co-workers is probably available, but will be only offered when requested for. Therefore, a pro-active attitude is required. The effective way workers in this project coped with CMP and remained productive, may inspire others in their efforts to stay at work.

8.4.2 Implications for the employer

Work is rated as an important value in life, and workers with CMP indicate that the experience to be of value in work is a strong motivator to keep working.[2] Therefore, the experience of work as value may contribute highly to sustained work participation of people with CMP. When employers want to keep in their employees who suffer from CMP, they can 'seduce' them by providing a job which meets their values. Good communication is essential to achieve this, and may be secured by conducting regular interviews with employees to screen their needs to be able to stay at work.[45] In addition, the employer may provide information to the worker about possibilities to increase the decision latitude, or possibilities to perform different tasks. Unfortunately, regular communication between manager and employee is not a matter of course, in particular not in unskilled labor. For sustainable employability of workers with CMP, a shared responsibility of worker and employer is needed.

8.4.3 Implications for vocational rehabilitation

The results of this thesis can be useful to develop vocational rehabilitation interventions to promote SAW. Vocational rehabilitation is defined as a multidisciplinary approach that is provided to individuals of working age with health-related impairments, limitations, or restrictions with work functioning and whose primary aim is to optimize work participation.[46] There is not one way of successful coping with CMP. In this thesis, different ways of coping were described which resulted into the ability to stay at work with CMP. In vocational rehabilitation, always the unique person within his own environment and work context should be taken into account.

Increasing self-management behavior may be an important measure to increase the ability of workers to stay at work. Vocational rehabilitation should initiate a shift from beliefs about helplessness and passivity to resourcefulness and ability to function regardless of pain.[47,48] Vocational rehabilitation should target self-management skills by focusing on self-regulation of emotions, attention (for example mindfulness or acceptance) and planning (set priorities, plan activities and rest, or increase adjustment latitude).[2,3] A pro-active, well-motivated patient may be essential for therapy success. Therefore, the responsibility of therapy success should be shared with the patient, which can raise the attitude on the road to recovery or re-integration in work.[49,50] According to clinical experience, a 'patient oriented' approach should be avoided, while a 'person-centered' approach should be promoted. People admitted for rehabilitation should be approached as participants in a course, who get appropriate preparation and support, and who are self-responsible for making progress. The motivation to work and skepticism towards returning to work or SAW should be carefully assessed at the planning of the rehabilitation program.[51]

Pain acceptance was observed to be associated with SAW[3], and therefore may be an important target in vocational rehabilitation. Feelings of emotional distress, whether these are work related or not, should be assessed and, whenever relevant, treated and incorporated in vocational therapy. Workers with CMP who fear deterioration of pain or who are cautious to undertake activities, should learn that the pain is not necessarily a reason to be reluctant to engage in any activity. Attention for overcoming fear avoidance may contribute to better (work)functioning.

The rationale to activate patients with CMP to raise overall physical activity levels as a 'condicio sine qua non' to improve work participation is not robust.[5] Therefore, simply activating patients in graded activity programs probably will not be effective in workers whose level of activity was already high.

Because work performance in workers with CMP is reduced (chapter 7), vocational rehabilitation of workers with CMP should focus not only on absenteeism, but on presenteeism as well.[6]

8.4.4 Implications for occupational medicine

Although effects of multidisciplinary rehabilitation for RTW are well documented[52,53], the mean effect sizes are modest, and the effectiveness of treatment considering sustainable RTW still needs to be improved.[54-56] Probably, it would be better to intervene before work disability occurs, and consequently to prevent rather than to cure. The occupational physician is ideally suited and at the right place to intervene at an early moment before sick leave or disability occurs. However, this great opportunity is often not used. In occupational medicine, more effort should be made to prevent (needless) sick leave or work disability by supporting people to stay at work. Occupational health physicians often act reactively on absenteeism, where a more pro-active attitude would be appropriate.[57,58]

A better cooperation between occupational health disciplines, general practitioner and rehabilitation medicine would increase the possibilities of counseling work ability.[57,59,60] Workers with CMP and their employers benefit from sustainable work participation. Integrated care of occupational and rehabilitation physicians is needed to support SAW of workers with CMP. Both disciplines contribute specific knowledge, which should be shared.

One of the themes that emerged from the interview study was that many workers did not consider the occupational physician as an ally in the process of work maintenance (not presented results of the interview study, chapter 3). Taking sick leave and claiming incapacity benefits may be imposed on workers by the employer, who sometimes does not give the opportunity to continue work. Workers often felt that the occupational physician was not impartial, and avoided to communicate about their concerns or troubles to remain in the workforce. Sometimes, workers feared that in a time of economic decline, where jobs are lost, they would be the first one to be fired when it is known that their physical capacity is limited. Whether this attitude is correct or not, it should be taken seriously by stakeholders in the field of occupational health medicine. The image of the occupational physician is often not positive. With the emergence of private occupational health services, who more likely tend to take the perspective of the employer, it is important that the interests of employees do not get out of sight.

Another theme that repeatedly presented itself in the interview study was the advice of general practitioners or occupational physicians to take sick leave. A few workers with CMP felt that they were forced into incapacity benefit, although they had the feeling that they were able to stay at work. In their experience, because they had resisted the advice of the physician, they were still at work years later. Likely, not all workers stand that strong and are able to take decisions by themselves. The conviction of the physician that a worker is unable to work, or that working (with a bad back) is harmful, can hugely influence the behavior of workers. Short sick leave is one of the strongest predictors for long during sick leave.[61] Therefore, (occupational) physicians should be careful in their advice to take sick leave. Finally, it is important to add that there were also workers with CMP who stated that their occupational physician had been very supportive in the process of SAW with CMP.

8.4.5 Implications for insurance medicine

The majority of insurance physicians does not meet individuals who continue work with pain. Therefore, the results of this thesis may not be translated directly to the 'core business' of insurance medicine. Nevertheless, a few implications of this thesis should be highlighted here.

During the last five years, the focus of insurance physicians has been shifted from compensation to participation. The main task of insurance physicians in the Netherlands has long been to assess work disability of workers presenting after two years of sick leave, and to judge eligibility for incapacity benefits. Recently, insurance physicians have been additionally commissioned to recommend workers on their ability to return to the workforce and guide them back to work, with the aim to promote work participation. In the process of guiding workers back to work, the results of the project 'Working with pain' may be used. Workers who successfully participated in work despite CMP may serve as positive role models for other workers with CMP. One may learn from their behavior, which turned out to be adequate for sustainable work participation. This information may be applied to encourage participation behavior of clients. Insurance physicians may guide workers back to work by connecting to experienced success factors for SAW (chapter 3, Figure 1), and on SAW-associated factors (chapter 4). Between workers with CMP with and without sick-leave, clinical relevant differences were observed in fear avoidance, pain catastrophizing, pain acceptance, self-efficacy, life control and perceived workload. In efforts to assess relevant prognostic factors for work ability and return to work, these variables should be targeted. Because disease-related factors have been identified as weak indicators of work ability, insurance physicians should investigate non-disease related factors as well, to ensure that those factors will not hinder work ability.[62] It is argued that insurance physicians do not take these important factors into account in a structured manner.

This thesis raised our understanding of how workers with CMP are able to stay at work, and revealed a 'profile' of their characteristics. This knowledge provides a new 'reference to compare' for insurance physicians, which allows for reflection of their professional behavior. Because most insurance physicians only assess long-term sick listed workers, their reference of having chronic pain related to work participation is one-sided. In the assessment of being able to work or not, and reaching a reasoned judgment, it might be important to have a comparison with other workers who continue work despite pain. With a comparison group of workers who continue work with CMP, the considerations of the insurance physician during work ability assessments of workers with CMP may become better validated. Especially for the assessment of return-to-work prognosis, this knowledge may be valuable.

When return to work prognosis is poor, referral to a vocational rehabilitation assessment is a possibility that should be considered. The cost effectiveness of multidisciplinary pain programs is generally good.[63,64]

8.4.6 Implications for healthy aging at work

Due to demographic and social-economic developments, the working population in Western Europe is aging.[65] In addition, to be able to maintain the social security and (disability) pension system, governments promote prolonged employability of workers. Therefore, in the past decade, sustainable work participation of the older worker has become a major concern. Because older workers have an increased risk for health problems[45], and the prevalence of chronic disorders such as CMP in this group is high, the project 'Working with pain' is likely to be of value for the aging worker. The amount of workers who work with CMP or other health problems will rise considerably. Strong evidence exists that work is good for health and well-being[41], and one of the most promising interventions for healthy aging may be keeping people at work.[66] This is in accordance with the finding in this thesis, in which workers with CMP experienced work as beneficial for health, or even as therapeutic.[2] Although the group of workers who work despite CMP was older compared to the absent workers, they were fitter and experienced less health problems. These data are cross-sectional, so no causal inferences can be made, but it is in accordance with the findings of others.[41,44] The factors which promote sustainable work participation of workers with CMP, may also be applicable to support healthy aging at work.

8.5 Recommendations and future perspectives

Most workers with CMP have no sick leave due to their health condition, and neither have highly reduced work performance. They generally perform their work tasks just like their co-workers without CMP.[23,67,68] This is relevant information for occupational health care professionals, employers, and workers with CMP in the first place. It is recommended to be aware of the fact that CMP standing on itself is often not the reason for sick leave and disability, but regularly personal and environmental factors play an additional decisive role. Notwithstanding, some workers who SAW with CMP experience difficulties to continue functioning or to remain productive. Employers, occupational health physicians and other stakeholders who have interest in sustainable work participation of workers, should not overlook this group.

8.5.1 Recommendations for clinical practice

When a worker is suffering from CMP, (s)he may be confronted with different health professionals, such as the general practitioner, physical therapist, manual therapist, and many others. When the pain has consequences for work participation, the worker may face the occupational physician, mostly after disability has occurred. If return to work is not achieved within two years, the disabled worker will face the insurance physician and a labor expert. In the process from working to disability, health care is fragmented and incoherent. To

increase the likelihood of SAW, or a quick return to work, collaboration between disciplines is needed. Vocational rehabilitation should start at the beginning of the pain episode, preferably long before sick leave occurred. Every health care professional should have a responsibility for rehabilitation, and take the work of their patients into account. Lötters and others concluded that visiting a medical specialist (orthopedist, neurologist, surgeon, or other medical specialist) was associated with a delayed (full) return to work[30,69,70], and they argue for more attention to the factor 'labor' in regular healthcare, especially for those patients experiencing substantial functional limitations. Therefore, principles of vocational rehabilitation should be integrated into clinical practice of general practitioners and occupational physicians. That would create the opportunity to work on prevention of sick leave at an early stage. One of the prerequisites may be that in the future the occupational- and rehabilitation physician have mutual access to patient records.

In vocational rehabilitation, greater on-the-job involvement should be incorporated. In addition, the accessibility of vocational rehabilitation for workers should be improved. Currently, there are often delays (waiting lists), which hamper referral of sick listed workers by occupational physicians. In one study on occupational health care interventions, the referral of sick-listed workers to vocational rehabilitation was significantly associated with no return to work after 7-9 months[71], so it is understandable that occupational health care professionals are reserved in referring their clients to vocational rehabilitation. On the other hand, multidisciplinary rehabilitation has proven to be effective in CMP, leading to the best results when workers were referred early after sick leave.[55,63,72]

Because work performance in workers with CMP is observed to be poor to moderate (chapter 7), vocational rehabilitation and occupational medicine should focus not only on absenteeism, but on presenteeism as well.[6] Maintaining work performance is an important issue for workers in the decision to stay at work or not.[2,73]

People who demonstrate persistence to stay at work possess high levels of 'career adaptability', which means the ability to resolve novel problems so that work conditions better suit their abilities and preferences.[74] Self-efficacy may be related to career adaptability. Many participants suffering from CMP arranged a modified job adapted to their own capacity and needs. This proactive behavior of re-designing their job is called job crafting.[75] Job crafting can be used as a tool for people to be able to stay at work with CMP. It is a way of self-regulated monitoring of a job. Regularly, people who are resilient, have high feelings of coherence and an internal locus of control, are more likely to develop initiatives of job crafting.[75] People who are confronted with CMP may be encouraged to pursue the principles of job crafting. Job crafting may be used as tool for workers to stay at work with CMP.

For many instruments that were developed to measure chronic pain conditions and related constructs, such as fear of pain or pain self-efficacy, no norm scores were available. Since chronic pain is often persistent and sometimes resistant for therapy, the norm should and

cannot be obtained from healthy controls without pain. It is hard to obtain norm data for chronic pain from samples who experience no pain. Therefore, the data in this thesis provide a new context-specific reference which may be used in vocational rehabilitation for CMP, and is also relevant for occupational and insurance medicine.

8.5.2 Recommendations for further research

This thesis is one of the first studies which focused specifically on a working group suffering from CMP. Because many determinants of SAW with chronic pain are still unknown, future research on this topic is recommended. For further research on SAW, we recommend to use the experiences of our participants who revealed which factors and strategies were essential for them to stay at work with CMP. Future research on this topic should connect to the themes that workers estimated as important, such as motivation, self-management strategies, personal and work context. Qualitative research on motivators to discontinue work in people suffering from CMP would add to the findings of the present thesis.
Longitudinal studies on SAW are needed to obtain a more robust view of the determinants of sustained work participation in workers with CMP.

Future research may differentiate the study samples only on work status, which implicates that all participants (with and without sick leave) are included from one organization or industry, or from one clinical group within the same treatment.
The results of this thesis may be extended to other health problems. Therefore, future research on SAW should include other health conditions too.
In addition to existing questionnaires based on self-report, objective instruments to determine work performance should be developed.

8.6 Valorization

The new knowledge that emerged from the project 'Working with pain' may be developed into societal value. The Center for Rehabilitation of the University Medical Center Groningen may establish a 'Pain desk', which can be consulted by workers with chronic pain who have difficulties to continue working. At the 'Pain desk' expertise is available about sustainable work participation of workers with chronic health problems, in particular CMP. The 'Pain desk' is available to all workers who suffer from chronic pain, but also for their supervisors, team managers or staff employees. The personal situation of a worker within the work context will be analyzed. Workers can be supported to find solutions to warrant sustainable employability, inside or outside their present job.
Policies designed to lessen the impact of occurring disorders on workers will contribute to a reduction in absenteeism and presenteeism. As the indirect costs of disorders are much

higher than their medical costs, prevention and treatment of these conditions may be cost-effective. Insurance companies should embrace initiatives such as a 'Pain desk', which will probably be cost-effective.
In occupational health departments of companies the principles of the 'Working with pain' project may be implemented. A self-management tool should be developed for workers with CMP, that empowers them to prevent sick leave and promote sustainable work ability.

8.7 Final conclusions

This thesis identified unique data concerning sustainable work participation of workers with CMP. It provides a large range of characteristics of workers with CMP who continued work despite pain, which has added to our understanding of sustainable work participation in people suffering from CMP.
Comparison of workers who continued work with CMP with sick listed workers with CMP admitted for rehabilitation revealed that these groups differ significantly on several factors. In this thesis evidence was found that the workers' motivation to work, self-management skills, and the attributed importance of pain on their (working) lives are important factors to manage SAW with CMP. Because these factors can be influenced, they offer opportunity to promote SAW. The findings of this thesis potentially contribute to promotion of sustained work participation and prevention of sick-leave in workers with CMP. The effective way workers in this project coped with CMP and remained productive, may inspire others in their efforts to stay work. Extensions of this research may direct vocational rehabilitation to pay more attention to increasing self-management skills. Longitudinal studies on SAW are needed to further increase our knowledge about SAW with CMP.

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Summary

Most people with chronic nonspecific musculoskeletal pain (CMP) stay at work with normal amount of sick leave. That seems to be a wise choice, because work is generally good for health and well-being. However, scientific knowledge about this large group of workers who stay at work with CMP is scarce. To enlarge our knowledge of working with pain, in 2008 the research project 'Working with pain' was started. In this project, the characteristics of workers who stay at work with CMP were investigated and compared with the characteristics of a group workers with (considerable) sick leave. Starting point of this project was the assumption that workers who continue work despite CMP do something right, from which we can learn. Specific attention to this group may broaden our views on chronic pain and work participation. Understanding of factors that contribute to staying at work (SAW) of workers with CMP may offer possibilities for preventive programs aimed at sustainable work participation while having a health problem. Effective vocational rehabilitation programs might be developed.

In this thesis, *CMP* was defined as pain that lasts longer than 6 months, without known underlying specific medical cause (e.g. infection, neoplasm, metastasis, osteoporosis, rheumatoid arthritis, fracture, neurological disorders, and serious spinal pathology), located in the back, neck, shoulder, extremities or more sites at the same time (disorders such as widespread pain, fibromyalgia and whiplash were included).
SAW was operationally defined as ≥ 12 months sustainable work participation with a maximum of 5% sick leave due to CMP; the cut-off of 5% sick leave was chosen because it reflected the average amount of sick leave in the Netherlands and Europe. Workers who, after a period of sick leave, have returned to work for more than 12 months could also participate into the study.

The first aim of this thesis was to describe physical, psychological and social characteristics of people that continue work despite CMP. The second aim was to compare these characteristics with sick listed workers with CMP admitted for vocational rehabilitation. The third aim was to identify success factors for SAW with CMP. It was intended to learn from a 'successful' working group. When modifiable factors that promote SAW could be identified, interventions can be developed to support the ability of workers with CMP to stay at work. In the research project 'Working with pain' different methods were used to answer the research questions and to examine factors which are related to SAW in workers with CMP. In chapter 2 to 7 of this thesis the different studies are described.

The purpose of the study described in **chapter 2** was to retrieve determinants for SAW in people suffering from CMP. By means of a systematical literature review, five cross-sectional and two qualitative studies were identified reporting on determinants for SAW in people with

CMP. We searched the databases of PubMed, EMBASE, PsycInfo, CINAHL and the Cochrane Library. We included studies reporting on working subjects without present CMP-related sick leave. A total of 83 factors relevant for SAW were identified, however, the level of evidence was low. Consistent evidence of promoting SAW was observed for low emotional distress and low perceived physical disability. Duration of pain, catastrophizing, self-esteem and marital status were consistently not associated with SAW. Qualitative studies indicated that personal adjustments and workplace interventions are important determinants for SAW. It was concluded that the amount of literature and the level of evidence about factors related to SAW is limited, narrowing our views on work participation of workers with CMP. Further research is required to fill the current gap in our knowledge. Future interventions aimed at promoting SAW could consider reducing perceived physical disability and emotional distress, and promoting adjustment latitude at work, support from supervisors, and the workers' motivation and self-management skills.

The aim of the study described in **chapter 3** was to investigate why people with CMP stay at work despite pain (motivators) and how they manage to maintain working (success factors). Taken into account that knowledge of workers who stay at work despite their pain is limited, a qualitative research approach was chosen as starting point for exploration into research hypotheses. A semi-structured interview was conducted among 21 subjects who stayed at work despite CMP; their motives and success factors for SAW were explored. Participants were included through purposeful sampling, resulting in a varies sample. Interviews were audio-recorded, transcribed verbatim, and imported into computer software Atlas.ti. Data was analyzed by means of thematic analysis. A total of 16 motivators and 52 success factors emerged in the interviews. Four themes of motivation (work as value, as therapy, as income, as responsibility) and five themes of success factors (personal characteristics, adjustment latitude, coping style, use of healthcare services, pain beliefs) were categorized. Work was experienced as beneficial for health, increasing mental and physical well-being. Many participants made a work transition because of CMP and arranged a modified job adapted to their own capacity. The findings of this study indicate that personal characteristics, well-developed self-management skills, and the drive to work are prerequisites for SAW, because these traits foster behavior which increases the ability to remain at work. Behaviors experienced to promote SAW were raising the latitude for balancing work and capacity, improving pain coping strategies, organizing modifications and conditions at work, finding access to healthcare services and asking for support. Motivators and success factors for SAW may be used for interventions in vocational rehabilitation and occupational medicine, to prevent absenteeism, or to promote a sustainable return to work.

The aims of the study described in **chapter 4** were to describe the physical, psychological and social characteristics of people who stay at work despite CMP (SAW group), and to compare

these with sick-listed workers with CMP following vocational rehabilitation (SL-Rehab group) and healthy working controls. Subjects in the SAW group (n=119) were recruited by announcements in newspapers and websites of national patient associations. Subjects in the SL-Rehab group (n=122) were referred for vocational rehabilitation and consecutively included from usual care. An extensive profile of both groups was presented. Logistic regression analysis was used to assess differences between the groups and to determine which variables predicted group status (SAW versus SL-Rehab). On average, workers in the SAW group perceived their quality of life higher than workers in the SL-Rehab group. Being in the group workers who stayed at work despite CMP was significantly associated with lower levels of fear avoidance, pain catastrophizing, perceived workload, and higher levels of pain acceptance, life control and pain self-efficacy, even after controlling for confounders. The groups did not differ on physical activity level, active coping and work satisfaction. Six main predictors were identified that best discriminate between both groups: pain intensity, duration of pain, pain acceptance, perceived physical workload, mental health, and psychological distress. It was concluded that clinically relevant differences from sick-listed workers with CMP were observed in all domains of the bio-psycho-social model. It appears that the meaning and importance of pain on life is different across the SL-Rehab and SAW group.

The first aim of the study described in **chapter 5** was to analyze whether the functional capacity (FC) of workers in a SL-Rehab group and workers in a SAW group differs from FC of healthy workers without sick leave (HW group). The second aim was to analyze if FC of workers with CMP is insufficient to meet work demands, and to assess factors associated with insufficient FC. A total of 942 subjects were included: 122 in the SL-Rehab group, 119 workers in the SAW group, and 701 in the HW group. All subjects performed a short Functional Capacity Evaluation (FCE) and completed questionnaires assessing demographics, personal and work characteristics. The participants' FC was considered insufficient to meet their work demands when their FC was lower than the 5th percentile of healthy workers' FC. Both SL-Rehab group and SAW group had significantly lower FC compared with healthy workers, and workers in the SL-Rehab group had lower FC than their working counterparts. Having CMP was strongly associated with insufficient FC to meet work demands. Insufficient FC was associated with group status (CMP versus no pain), having physically high demanding work, female gender, higher age, and lower effort level during FCE. It was observed that workers in the SL-Rehab and SAW group were equally equipped to perform work. That, however, was not in accordance with the different work status of both groups. It was concluded that other factors than group status (SAW versus SL-Rehab) explained the variance of insufficient FC (age, gender, observed effort during FC evaluation, kinesiophobia, perceived physical health). Not the pain itself, but personal and work-related factors are related to insufficient FC.

The aim of the study described in **chapter 6** was to investigate whether physical activity (PA) levels and day patterns of sick-listed workers with CMP admitted for multidisciplinary rehabilitation were different from those of workers with CMP. PA level and PA day pattern in 27 sick-listed patients and 107 working people with CMP were presented. All subjects wore an accelerometer for 5 consecutive days. The results of this study showed that workers with CMP have a 30% higher PA level compared with sick-listed patients (p=0.01). After correction for confounders, work status explained 3.5% of the variance observed in activity counts. No significant interaction was observed between time and group status, indicating that the PA day pattern did not differ significantly between the two groups. A decreasing PA level in the evening was observed in both groups. It was concluded that the PA level of both groups was different, while the PA pattern was similar.

The aim of the study presented in **chapter 7** was to assess self-reported work ability and work performance of workers who stay at work despite CMP, and to explore which variables were associated with these outcomes. Although this group of workers may be successful in terms of low absenteeism, their levels of work ability and work performance remain unclear. In a cross-sectional study we assessed work ability (Work Ability Index, single item scale 0–10) and work performance (Health and Work Performance Questionnaire, scale 0–10) among 119 workers who continued work while having CMP. Hierarchical multiple regression and logistic regression analysis was used to analyze the relation of socio-demographic, pain-related, personal- and work-related variables with work ability and work performance. Mean work ability and work performance were 7.1 and 7.7. Many workers with CMP who stay at work report poor to moderate work ability and work performance. Higher work ability scores were associated with lower age, better general health perception, and higher pain self-efficacy beliefs. Higher work performance was associated with lower age, higher pain self-efficacy beliefs, lower physical work demand category and part-time work. It was concluded that a subgroup of workers with CMP can stay at work with high work ability and performance, especially when they have high beliefs of pain self-efficacy. Our results further show that not the pain itself, but personal and work-related factors relate to work ability and work performance.

In **chapter 8** the main findings of this thesis are discussed, integrated and reflected on. Methodological and other considerations are discussed. Implications of the findings for the worker, the employer, vocational rehabilitation, occupational and insurance medicine, and healthy aging at work are discussed. Recommendations for clinical practice and further research are made. A short paragraph is dedicated to the relevance of the thesis for the theme ‘healthy aging at work’ and possibilities for valorization are presented. Ultimately, the final conclusions are presented. This thesis provides a large range of characteristics of

workers with CMP who continued work despite pain, which has added to our understanding of sustainable work participation in people suffering from CMP. The findings of this thesis potentially contribute to promotion of sustained work participation and prevention of sick-leave in workers with CMP. The effective way workers in this project coped with CMP and remained productive, may inspire others in their efforts to stay at work.

Samenvatting

De meeste mensen met chronische pijn aan het bewegingsapparaat werken door zonder arbeidsverzuim vanwege hun pijn. Dat lijkt een verstandige keuze, want werk is in het algemeen bevorderlijk voor de gezondheid en het welzijn van mensen. Wetenschappelijke kennis over deze grote groep doorwerkers is echter schaars. Om onze kennis over werken met pijn te vergroten, is in 2008 het wetenschappelijke onderzoeksproject 'Werken met pijn' gestart. Daarin is onderzocht wat de kenmerken zijn van werknemers die doorwerken met pijn. Deze kenmerken zijn vergeleken met de kenmerken van een groep werknemers met (fors) arbeidsverzuim. Uitgangspunt in dit promotieonderzoek was dat mensen die doorwerken met pijn iets (goed) doen waarvan kan worden geleerd. Inzicht in factoren die bijdragen aan het blijven functioneren in werk van mensen met chronische pijn biedt mogelijk een goede basis voor preventieprogramma's gericht op duurzaam blijven werken met gezondheidsproblemen en voor effectieve revalidatieprogramma's gericht op arbeidsreintegratie.

Chronische pijn aan het bewegingsapparaat is in dit proefschrift gedefinieerd als pijn die langer dan 6 maanden aanwezig is, waarvoor geen medische verklaring (infectie, metastase, osteoporose, reumatische artritis, botbreuk, neurologische afwijkingen, en ernstige pathologie aan de wervelkolom) is gevonden. De pijn wordt gevoeld in de rug, nek, schouders, extremiteiten of in meerdere locaties tegelijkertijd (zoals fibromyalgie). *Aan het werk blijven met pijn* is in dit proefschrift gedefinieerd als meer dan 12 maanden arbeidsparticipatie, waarbij niet meer dan 5% werd verzuimd vanwege chronische pijn aan het bewegingsapparaat. De grens van 5% verzuim is gekozen omdat deze het gemiddelde arbeidsverzuim in Nederland en Europa representeert. Werknemers die na een verzuimperiode langer dan 12 maanden zijn teruggekeerd in werk, behoren dus ook tot de groep doorwerkers en konden deelnemen aan het onderzoek.

Het doel van dit proefschrift was lichamelijke, psychologische en sociale kenmerken te beschrijven van mensen die doorwerken met chronische pijn aan het bewegingsapparaat en deze te vergelijken met mensen die niet in staat zijn gebleken te blijven werken met pijn, waardoor zij zijn doorverwezen naar arbeidsrevalidatie. Het tweede doel was te onderzoeken welke factoren gerelateerd zijn aan doorwerken met pijn. In het onderzoek 'Werken met pijn' is een aantal methoden gebruikt om de onderzoeksvragen te beantwoorden en te achterhalen welke factoren gerelateerd zijn aan doorwerken met pijn. In de hoofdstukken 2 tot en met 7 van dit proefschrift worden de verschillende studies en onderzoeksresultaten beschreven.

De doelstelling van de studie beschreven in **hoofdstuk 2** was het achterhalen van determinanten voor doorwerken met chronische pijn in de literatuur. Het systematische literatuuronderzoek (PubMed, EMBASE, PsycInfo, CINAHL and the Cochrane Library) leverde 5 cross-sectionele en 2 kwalitatieve artikelen op waarin werd gerapporteerd over doorwerken met chronische pijn aan het bewegingsapparaat. In totaal werd over 83 factoren gerapporteerd en werd beschreven of deze een relatie hadden met doorwerken met pijn. Lage emotionele belasting en laag ervaren fysieke beperkingen waren consistent gerelateerd aan doorwerken met pijn. De duur van de pijn, het catastroferen van pijn, zelfwaardering en huwelijkse staat waren consistent niet gerelateerd aan doorwerken met pijn. Doordat het hier in alle gevallen cross-sectioneel onderzoek betrof, is de bewijskracht laag. Uit de kwalitatieve studies bleek dat persoonlijke aanpassingen en interventies op het werk belangrijke determinanten zijn voor aan het werk blijven met pijn aan het bewegingsapparaat. Conclusie van dit hoofdstuk was dat de hoeveelheid literatuur over werken met pijn beperkt is en het beschikbare bewijs zwak. Nader onderzoek is nodig om meer te weten te komen over hoe mensen blijven werken met chronische pijn aan het bewegingsapparaat. Dat onderstreept het belang van dit proefschrift en de studie 'Werken met pijn'.

Het doel van de studie die in **hoofdstuk 3** is beschreven, was te onderzoeken waarom mensen met chronische pijn aan het bewegingsapparaat doorwerken en hoe zij dat voor elkaar krijgen. In deze studie zijn 21 doorwerkers geïnterviewd op de hoofdthema's motivatie en succesfactoren die ten grondslag liggen aan doorwerken met chronische pijn. De geïnterviewde deelnemers zijn geïncludeerd door middel van doelgerichte selectie, resulterend in een gevarieerde steekproef. De interviews werden opgenomen, uitgeschreven en verwerkt met behulp van computer software Atlas.ti en geanalyseerd volgens thematische analyse. De geïnterviewde doorwerkers bleken allen zeer gemotiveerd te zijn om aan het werk te blijven. Vier centrale motivatoren voor doorwerken met chronische pijn (werk als waarde, als therapie, als inkomen en als verantwoordelijkheid) en vijf succesfactoren (persoonlijke kenmerken, aanpassingsmogelijkheden, omgaan met de pijn, gebruik van de gezondheidszorg en pijncognities) werden gecategoriseerd. De doorwerkers vonden in hun werk erkenning, waardering, sociale status, betrokkenheid bij de samenleving en een manier om zichzelf te ontplooien. Werk werd meestal als therapeutisch ervaren, leidde af van de pijn, leverde energie, gaf structuur, sociale contacten en zelfrespect. Conclusie was dat persoonlijke kenmerken, goede zelfmanagement vaardigheden en de motivatie te werken voorwaarden zijn om aan het werk te blijven met pijn. De resultaten laten zien dat werk zo belangrijk was voor de deelnemers, dat zij gedrag vertoonden dat doorwerken mogelijk maakte. Veel deelnemers regelden vanwege hun pijn een aangepaste werkplek of een baan die in balans was met hun fysieke capaciteiten. Op het werk en thuis organiseerden

zij voldoende regelmogelijkheden, aanpassingen of arbeidsvoorwaarden, zij veranderden de manier waarop zij omgingen met de pijn, vonden hun weg in de gezondheidszorg en vroegen zelf om hulp. De motivatoren en succesfactoren voor doorwerken met pijn kunnen gebruikt worden bij de ontwikkeling van interventies om arbeidsverzuim te verlagen en duurzame terugkeer in werk te bevorderen.

Het doel van de studie beschreven in **hoofdstuk 4** was de fysieke, psychologische en sociale kenmerken van doorwerkers te beschrijven, deze te vergelijken met werknemers met arbeidsverzuim die waren doorverwezen voor arbeidsrevalidatie en met referentiewaarden ontleend aan normgroepen zonder pijn. Doorwerkers (n=119) werden gerekruteerd door oproepen in plaatselijke kranten en nationale websites van patiëntenverenigingen. Verzuimers (n=122) waren verwezen naar arbeidsrevalidatie en werden geïncludeerd in het onderzoek vanuit 'usual care'. Een uitgebreide beschrijving van de onderzochte kenmerken werd in deze studie gepresenteerd. Logistische regressie analyse werd gebruikt om verschillen tussen de groepen te onderzoeken en om te achterhalen welke variabelen 'groep status' (doorwerkers versus verzuimers) het beste verklaarden. Klinisch relevante verschillen tussen de twee groepen waren aanwezig in alle domeinen van het biopsychosociale model. Gemiddeld waardeerden de doorwerkers hun kwaliteit van leven hoger dan de verzuimers die waren doorverwezen voor revalidatie. Doorwerkers rapporteerden een lagere pijnintensiteit, maar na multivariate analyse bleek dat de intensiteit van pijn niet significant bijdroeg aan de variantie van de onafhankelijke variabelen. Dus niet zozeer de pijn zelf, maar de manier waarop de pijn interfereerde met het dagelijks leven verschilde tussen de groep doorwerkers en verzuimers. Een aantal van de factoren is multivariaat getoetst door middel van regressie analyse: doorwerkers hadden gemiddeld minder bewegingsangst, catastroferende gedachten over pijn en ervaren arbeidsbelasting en meer vertrouwen met pijn te kunnen functioneren, een hoger gevoel van controle over hun leven en een betere acceptatie van pijn. Beide groepen verschilden niet in hoeveelheid activiteiten in hun dagelijks leven, actieve coping en plezier in werk. Zes factoren bleken beide groepen het beste te onderscheiden: pijn intensiteit, duur van de pijn, acceptatie van pijn, ervaren arbeidsbelasting, mentale gezondheid en psychisch/lichamelijk disfunctioneren.

Het doel van de studie beschreven in **hoofdstuk 5** was de functionele capaciteit (FC) van doorwerkers en verzuimers te beschrijven en deze te vergelijken met normscores van een gezonde groep werkenden zonder pijn. Het tweede doel was te onderzoeken of de FC van werknemers met pijn aan het bewegingsapparaat voldoende is om aan hun fysieke arbeidsbelasting te voldoen. Ten slotte werd beoordeeld welke factoren gerelateerd zijn aan onvoldoende FC om het werk te verrichten. In totaal werden 942 proefpersonen betrokken in het onderzoek: 122 verzuimers verwezen voor arbeidsrevalidatie, 119 doorwerkers en

701 gezonden. Alle proefpersonen volbrachten een korte Functionele Capaciteits Evaluatie (FCE) en vulden vragenlijsten in over demografische en persoonlijke factoren en werk. De FC van werknemers werd onvoldoende beschouwd om het werk te verrichten als deze lager was dan het 5e percentiel van gezonde werknemers. Werknemers met chronische pijn aan het bewegingsapparaat, ongeacht of er al dan niet sprake was van verzuim, scoorden lager op de FCE dan gezonde werknemers. De verzuimers presteerden gemiddeld minder goed op de FCE dan de doorwerkers. De aanwezigheid van pijn aan het bewegingsapparaat was sterk gerelateerd aan onvoldoende FC om het werk te verrichten. Onvoldoende FC was gerelateerd aan groep status (aanwezigheid van pijn aan het bewegingsapparaat versus geen pijn), zwaar werk, vrouwelijk geslacht, hogere leeftijd en lager inspanningsniveau tijdens FCE. Het bleek dat verzuimers en doorwerkers met pijn fysiek gelijkwaardig zijn toegerust om hun werk te verrichten. Andere factoren dan groep status (doorwerkers versus verzuimers) verklaarden de variantie van onvoldoende FC. Niet de pijn zelf, maar persoonlijke en werkgerelateerde factoren waren gerelateerd aan onvoldoende FC om het werk te verrichten.

Het doel van de studie beschreven in **hoofdstuk 6** was het activiteitenniveau en het activiteitenpatroon te onderzoeken gedurende de dag van een groep mensen die doorwerkt met pijn aan het bewegingsapparaat en een groep met arbeidsverzuim vanwege de pijn. Van 27 verzuimers en 107 doorwerkers werd het activiteitenniveau en activiteitenpatroon geregistreerd met een accelerometer gedurende vijf achtereenvolgende dagen. Het activiteitenniveau van doorwerkers was 30% hoger dan dat van verzuimers. Ook na multivariate toetsing bleek dit verschil significant. Groep status (doorwerkers versus verzuimers) verklaarde 3,5% van de variantie in het activiteitenniveau. Er werd geen significant interactie effect gevonden tussen tijd en groep status. Beide groepen vertoonden ‘s avonds een afnemend activiteitenpatroon. De conclusie van deze studie was dat het activiteitenniveau van werknemers die doorwerken met pijn hoger is dan dat van werknemers met arbeidsverzuim. Het activiteitenpatroon van beide groepen verschilde echter niet significant.

Het doel van de studie beschreven in **hoofdstuk 7** was het werkvermogen en de werkprestatie te onderzoeken van mensen die doorwerken met chronische pijn aan het bewegingsapparaat en te analyseren welke factoren gerelateerd zijn aan deze uitkomstmaten. Hoewel de doorwerkers een laag arbeidsverzuim hadden, was onbekend wat hun werkvermogen en werkprestatie is. In deze cross-sectionele studie is werkvermogen (Work Ability Index, schaal 0-10) en werkprestatie (Health and Work Performance Questionnaire, schaal 0–10) onderzocht bij 119 mensen die doorwerken met chronische pijn aan het bewegingsapparaat. Hiërarchische en logistische regressie analyse zijn gebruikt om de relatie te analyseren tussen sociodemografische, pijngerelateerde, persoonlijke en werkgerelateerde factoren

en werkvermogen en werkprestatie. Werkvermogen en werkprestatie waren gemiddeld 7,1 en 7,7; veel doorwerkers rapporteerden een matig werkvermogen en een matige werkprestatie. Doorwerken met pijn gaat blijkbaar samen met een lichte beperking van de werkprestatie, hoewel deze daling vergeleken met normwaarden van gezonde werknemers gering was. Hoger werkvermogen was geassocieerd met lagere leeftijd, een betere algemene gezondheid en meer vertrouwen met pijn te kunnen functioneren. Hogere werkprestatie was geassocieerd met lagere leeftijd, meer vertrouwen met pijn te kunnen functioneren, lagere fysieke arbeidsbelasting en parttime werk. De conclusie van deze studie was dat een subgroep van mensen met pijn aan het bewegingsapparaat in staat is door te werken met behoud van een hoog werkvermogen en een hoge werkprestatie, met name als zij veel vertrouwen hebben met de pijn te kunnen functioneren. De resultaten laten verder zien dat niet de pijnintensiteit, maar persoonlijke en werkgerelateerde factoren gerelateerd zijn aan werkvermogen en werkprestatie.

In **hoofdstuk 8** zijn de belangrijkste resultaten van dit proefschrift samengevat en bediscussieerd. Door middel van een synthese van de verschillende studies die zijn uitgevoerd in dit proefschrift, passeren alle factoren gerelateerd aan doorwerken met chronische pijn aan het bewegingsapparaat de revue. De sterke kanten, methodologische overwegingen en beperkingen van dit proefschrift zijn besproken. Tevens zijn de relevantie en implicaties van dit proefschrift voor de werknemer en werkgever, alsmede voor de vakgebieden (arbeids)revalidatie-, bedrijfs- en verzekeringsgeneeskunde besproken. Een korte paragraaf is gewijd aan de relevantie van dit proefschrift voor het thema ‘gezond ouder worden’ en de mogelijkheden voor valorisatie. Tenslotte zijn aanbevelingen gedaan voor de klinische praktijk en toekomstig onderzoek. Het onderzoek ‘Werken met pijn’ beschrijft een groot aantal kenmerken van werknemers met chronische pijn aan het bewegingsapparaat die werken ondanks de pijn, hetgeen bijdraagt aan de kennis en het begrip over duurzame inzetbaarheid van mensen met chronische pijn aan het bewegingsapparaat. In het onderzoek werd aangetoond dat de motivatie voor werk, zelfmanagement vaardigheden en het belang dat wordt toegekend aan pijn, belangrijke factoren zijn die werken met chronische pijn aan het bewegingsapparaat faciliteren. Omdat dit in principe beïnvloedbare factoren zijn, kunnen deze dienen als aangrijpingspunt voor het verhogen van duurzame inzetbaarheid en preventie van arbeidsverzuim van mensen met chronische pijn aan het bewegingsapparaat. De effectieve manier waarop deelnemende werknemers in het onderzoek met hun pijn omgingen en productief bleven, kan anderen inspireren aan het werk te blijven.

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Lieve Rixt, jij had vanaf het begin zeer veel vertrouwen in mijn onderzoekscapaciteiten. Het heeft even geduurd voordat ik dat vertrouwen zelf kreeg. Iedere publicatie werd met gejuich door jou begroet en gevierd in een luxe restaurant. Dankzij jou is het gelukt!

Haren, september 2012

Curriculum Vitae

Haitze de Vries is op 5 september 1970 geboren in Leeuwarden. Na het VWO studeerde hij bewegingswetenschappen aan de Rijksuniversiteit Groningen. In 1994 studeerde hij af bij de afdeling revalidatie van het Academisch Ziekenhuis Groningen met de scriptie 'De kracht-relaxatie test'. Na zijn studie werkte hij 12 jaar bij het Spine & Joint Centre in Rotterdam, een pas opgericht revalidatiecentrum, gespecialiseerd in de behandeling van nek-, rug- en bekkenklachten. In het Spine & Joint Centre heeft hij veel ervaring opgedaan met het begeleiden van patiënten, lesgeven, ontwikkelen van behandelprotocollen en onderwijs. Ook hield hij zich bezig met onderzoek, wat resulteerde in een wetenschappelijke publicatie. Tijdens de periode in Rotterdam is Haitze getrouwd en kwamen er twee dochters.

In 2008 begon Haitze aan het promotieonderzoek 'Werken met pijn', dat werd uitgevoerd bij pijnrevalidatie in Beatrixoord, onderdeel van het Centrum voor Revalidatie van het Universitair Medisch Centrum Groningen. Hij beschreef kenmerken van mensen die doorwerken met chronische aspecifieke pijn aan het bewegingsapparaat, onderzocht waarom zij doorwerken en hoe zij dat voor elkaar krijgen. De resultaten van dit onderzoek staan beschreven in dit proefschrift.

Sinds begin 2012 houdt hij zich als postdoc onderzoeker bezig met een onderzoek naar duurzame inzetbaarheid van oudere werknemers. In december 2012 zal dat onderzoek worden afgerond. Haitze wil graag blijven werken als onderzoeker en deze werkzaamheden combineren met onderwijs.


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