

Effectiveness of a
**SELF-MANAGEMENT
PROGRAM
FOR EMPLOYEES**

with complaints of the arm,
neck and/or shoulder



Nathan Hutting

**Effectiveness of a self-management
program for employees with complaints
of the arm, neck and/or shoulder**

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Some terms used in this thesis have been standardized throughout the different chapters. Therefore, the text may slightly differ from the articles that have been published.

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Voor Maartje

*Unsere Wünsche sind Vorgefühle der Fähigkeiten, die in uns liegen,
Vorboten desjenigen, was wir zu leisten imstande sein werden.*

Johann Wolfgang von Goethe (1749 — 1832)

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General introduction

Management of chronic musculoskeletal disorders in the work environment

Chronic musculoskeletal pain is a worldwide health problem resulting in negative effects on an individual's wellbeing, and substantial costs to society [1]. The most common musculoskeletal problems include osteoarthritis, rheumatoid arthritis, and spine-related neck and back problems [1-3]. Among occupationally active adults, musculoskeletal disorders are the main cause of disability burden [4]. People with musculoskeletal disorders face appreciable limitations in their activities of daily living, which have an adverse impact on their quality of life [5]. Although the aetiology of these disorders is complex, the role of physical and psychosocial work exposures in the initiation and progression of non-traumatic musculoskeletal disorders is well established [6]. Work-related musculoskeletal disorders (WRMDs) are a considerable problem in the workplace, leading to human suffering, lost time due to sickness absence, and lower work productivity [7]. WRMDs are those musculoskeletal disorders which are induced or aggravated by work and/or the circumstances of its performance, although activities such as housework or sports may also be involved [8].

Prevalence and incidence of WRMDs

In Great Britain in 2013-2014, the number of people reporting a musculoskeletal disorder was 526,000 from a total of 1,241,000 people reporting all types of work-related illnesses [9]. Activities in specialised construction work, agriculture, postal/courier services and in healthcare had higher rates of total cases of WRMSDs compared to the average across all industries [9]. The prevalence of WRMDs in Great Britain in 2013-2014 was 1,680 per 100,000 employees, and the incidence of new cases was 550 per 100,000 employees [9]. WRMDs are frequently underreported at the workplace, as many employees attempt to continue to work despite having complaints [10, 11]. In the Netherlands in 2013, the number of employees reporting absent because of a musculoskeletal disorder was 69 per 100,000 employees [12]. Repetitive strain injury, tennis elbow and low back problems were the most frequently reported WRMDs [12].

Complaints of the arm, neck or shoulder

This thesis addresses complaints of the arm, neck and/or shoulder (CANS), which are a major part of WRMDs [13]. It is difficult to establish the exact prevalence of CANS since there is no consensus regarding the exact diagnostic labels or classification of work-related upper extremity disorders [14]. The reported point prevalence for CANS ranges from 1.6% to 53% and the 12-month prevalence ranges from 2.3% to 41% depending on the setting, definition, and classification used [15-17]. In the Netherlands, the point prevalence of chronic complaints (persisting for >3 months) due to

CANS is 19% [18]; however, one prospective study reported chronic complaints in almost 50% of their participants [19]. Moreover, almost 60% of the people suffering from chronic CANS report the use of healthcare, e.g. care given by the general practitioner, medical specialist or physical therapist [15, 18].

Disability (impairments, activity limitations, and participation restrictions) can be present in employees with CANS [20]. In CANS, the following impairments can be involved: pain, stiffness, tingling sensations, numbness, swelling, loss of coordination, loss of strength, and skin discolouration in the neck, shoulders, upper back, arms, and/or hands [21-23]. CANS is not only associated with factors such as pain and its impact on work/sleep, but is also associated with the psychological aspects of pain and work [13]. CANS may also limit activities which may lead to problems in work participation (e.g. loss of productivity, sickness absence, and job loss) [13, 24]. The International Classification of Functioning (ICF; Figure 1) conceptualises functioning as a *'dynamic interaction between a person's health condition, environmental factors and personal factors'* [20]. Therefore, we hypothesise that, in individuals with CANS, there is an interaction between body functions and structures, activities, participation, and environmental and personal factors [20]. This interaction is complex, dynamic and often unpredictable [20].

In the Netherlands, in 2006 the total annual costs of neck and upper limb symptoms due to decreased productivity, sick leave, chronic disability for work, and medical costs was estimated at 2.1 billion euros [25]. In 2012, CANS was responsible for 11.2% of the total absenteeism in the Netherlands, with an average absenteeism of almost 30 working days per year per person [26]. A considerable proportion of health-related productivity loss is attributable to presenteeism, i.e. decreased work performance while at work [13, 27, 28]. Van den Heuvel et al. [28] found that in 26% of the cases reporting CANS, productivity loss was involved. Moreover, in 68% of all cases reporting productivity loss, this was due to decreased productivity at work, while the remaining 32% was due to sickness absence (absenteeism) [28]. In a study conducted among employees in the Netherlands with sickness absence due to CANS, 24% believed that work was the main cause of their complaints and 30% stated that these complaints are partly caused by work [29]. Also, 18% of the employees in the Netherlands stated that specific measures are needed at work for CANS, because facilities are either not, or are insufficiently, available [30].

Definitions

Although musculoskeletal disorders of the upper extremity and neck frequently occur there is no international consensus on related terminology [31]. Moreover, besides 'CANS', additional terms such as 'work-related upper extremity musculoskeletal disorders' [32], 'musculoskeletal upper extremity disorders' [33], 'neck and upper extremity complaints' [19], 'work-related upper limb disorders' [34] and 'repetitive strain injuries' [35] are frequently used, which has led to some confusion

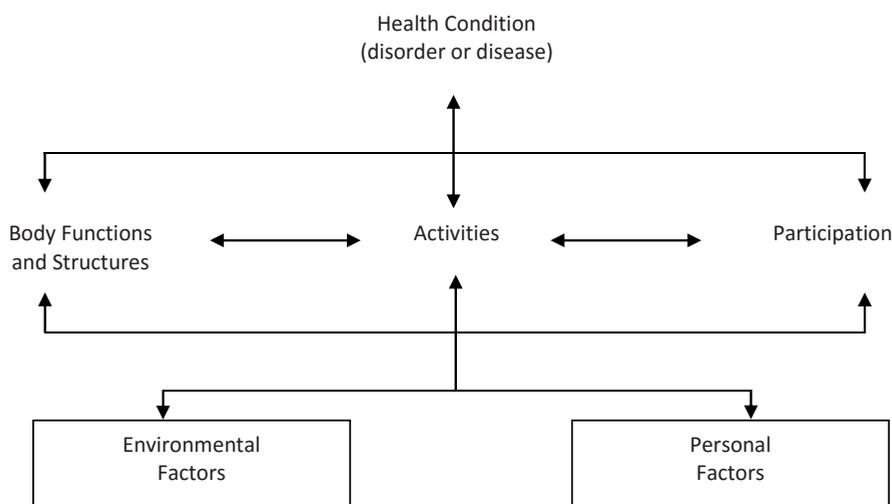


Figure 1: Relationships between the components of the International Classification of Functioning (ICF); the interactions work in two directions [20].

[14]. It is important to note that all these terms are ‘umbrella terms’ used to describe a wide range of symptoms of the musculoskeletal system, potentially caused or aggravated by work [14]. In addition, there is still variability in the literature regarding whether or not ‘neck disorders’ should be included in work-related upper extremity disorders, and whether or not ‘neck disorders’ should be considered as an upper extremity disorder [14]. When using the term ‘CANS’, which is frequently used in the Netherlands (*KANS*), it is obvious that neck disorders are included; however, since this is not the case with all the terms used, this can also contribute to the confusion. Moreover, neck pain is common in both the general population [36] and in the working population [37]. In the working population neck pain generally follows a persistent or recurrent course; for example, 60-80% of the workers who reported having neck pain at some initial point in time, reported neck pain again one year later [37]. Among employees, considering neck pain as a separate entity or as part of work-related upper extremity disorders or, more specifically as CANS, may place such complaints into a different perspective.

Specific versus non-specific CANS

In 2007 a consensus statement on CANS was published in the Netherlands [38]. In this multi-disciplinary statement, consensus on terminology was reached among healthcare professionals. This consensus supports the diagnosis and classification of all forms of CANS that are not caused by acute trauma or by any systemic disease [39]. However, the term CANS does not explain the possible causes or mechanisms of action of these complaints [18]. Based on these complaints,

23 disorders were classified as ‘specific’ because they were judged by experts to be diagnosable disorders, whereas all other complaints were labelled ‘non-specific’ [39]. In 2012 a multidisciplinary guideline for non-specific CANS was developed in the Netherlands [18, 21]. In this guideline the model of CANS was adapted to a model consisting of 36 specific diagnoses of CANS. In this guideline, nonspecific CANS is defined by pain, stiffness, or tingling sensations located in the neck, shoulders, upper back, arms, and/or hands for longer than two weeks and related to work or activity [18]. The complaints are not related to a trauma or systemic disease and a specific cause of the complaints is excluded as much as possible [18]. Many people suffering from CANS have complaints in more than one region [15, 19] and it is also possible to have a combination of specific and non-specific CANS [18]. In the early stages of CANS there is a relationship between the onset of complaints and work or activity whereas, later on, the complaints can persist without such a relationship [18]. In one Dutch study, 77% of the complaints involved the upper back/neck/shoulder region, in 25% the elbow/under-arm region, and in 19% the wrist/hand region was involved; in 42% of these cases the complaints were present in more than one region [40].

Risk factors for CANS

Although the exact aetiology of nonspecific CANS remains unknown, it is presumed to have a multifactorial origin [14, 23, 41-43]. Although many classification schemes exist [14], factors related to CANS are generally divided into three main categories: 1) work-related physical factors, 2) (work-related) psychosocial factors, and 3) personal factors [14, 19, 23, 41-45]. Examples of these factors are presented in Table 1. The importance of each factor, and its individual contribution to the risk profile, varies between individuals and work environments [45]. In addition, the employees’ work style may be involved [43]. The concept of work style indicates the individual responses to high work demands [43]. It is not conceptualised as a personality factor, but rather as a learned and reinforced strategy for completing, responding to, or coping with increased job demands that may affect musculoskeletal health [43, 46-48]. A high-risk work style implies: taking shorter or fewer breaks or even skip breaks, working through pain, anticipating the possible negative reactions of colleagues, and making high demands on one’s own performances at work. Exposure

Table 1: *Examples of risk factors for complaints of the arm/neck and/or shoulder (CANS).*

Work-related physical factors	(Work-related) psychosocial factors	Personal factors
Repetitive and forceful work [14, 23, 43]	Work stress [14, 43]	Psychoneuroticism and neurotic perfectionism [41]
Awkward or sustained positions [14, 23, 43]	Non-work related stress [43]	Female gender [14, 23]
Vibrations [14, 23]	High job demands [14, 23, 43]	Older age [14]
Cold temperature [14]	Control over work [14, 23]	Comorbidities [14]
	Social support [14]	Overcommitment [43]
	Effort-reward imbalance [14, 43]	

at work combined with specific personality traits could induce a high-risk work style and this work style may lead to neck and upper limb symptoms [43].

Interventions for CANS

A recent Cochrane review on conservative interventions for treating work-related CANS found no consistent effect of any specific treatment on pain, recovery, disability or sick leave. However, the study reported very low-quality evidence indicating that pain, recovery, disability and sick leave are similar after exercises, when compared with no treatment, or with minor intervention controls, or with exercises provided as additional treatment for people with work-related CANS. Low-quality evidence also indicated that ergonomic interventions did not decrease pain on short-term follow-up, but only on long-term follow-up. There was no evidence of any effect of exercises on any other outcomes. For behavioural and other interventions, there was no evidence for a consistent effect on any of the outcomes [49].

Self-management

Self-management is an approach increasingly used in chronic disease care to improve self-efficacy and wellness behaviours [50]. Barlow et al. [51] defined self-management as *“the ability to manage the symptoms, treatment, physical and psychosocial consequences, and lifestyle changes inherent in living with a chronic condition.”* Unlike the traditional medical model, self-management emphasises the importance of interactive, collaborative care between the patient and healthcare professional rather than a one-way, passive care from expert to patient [51]. Self-management programs aim to help participants to make informed choices and then to carry out these choices [52]. Self-management interventions have unique characteristics and emphasise the following essential elements: self-efficacy building, self-monitoring, goal setting and action planning, decision making, problem solving, self-tailoring, and partnership between the views of the patients and healthcare professionals [1]. Moreover, according to Lorig and Holman [52] self-management programs should be community based and provided close to home.

Program participants are up-skilled in personalised goal setting and action care planning. Collaborative problem definition is based on their readiness to change and on self-efficacy [53]. Self-management interventions focus primarily on encouraging patients to be involved with and in control of their own treatment, as well as improving their understanding of how their condition and treatment affect their lives [54]. As a result, self-management interventions require a change from a patient passively receiving care, to a collaborative model in which the patient and provider share their knowledge and work together to achieve optimal self-management [54]. In self-management interventions, the skills for day-to-day management of chronic conditions are

learned [55]. Self-management programs can be based on the model of Stanford University [56], acceptance and commitment therapy, or cognitive-behavioural therapy [55]. Self-management interventions are delivered using various formats, such as group sessions, individual sessions, telephone calls, self-study toolkits, or an eHealth [55]. Group sessions are currently the most common format, and combinations of delivery methods are also possible [55].

Self-management for musculoskeletal disorders

There are several self-management programs for people with musculoskeletal disorders, including interventions for osteoarthritis, rheumatoid arthritis, osteoporosis, upper limb pain, fibromyalgia, knee pain, temporomandibular disorders, (chronic) low back pain, and mixed conditions [1, 57, 58]. There is inconsistent evidence for the effect of self-management programs for patients with chronic musculoskeletal pain [1, 57, 59]. For example, Du et al. [1] concluded that there is insufficient evidence to show the effectiveness of self-management programs on pain intensity and disability in patients with chronic low back pain. In general, there is some evidence that group-delivered short programs (< 8 weeks) led by a healthcare professional have the best potential [57]. Bernaards et al. [46, 60] developed a work style intervention for computer workers, which focused on behavioural change with regard to body posture, workplace adjustment, breaks, and coping with high work demands. This intervention, which was included as a self-management intervention in some reviews [57, 58], was effective in improving recovery from neck/shoulder symptoms and reducing pain on the long term (12 months) compared to usual care, whereas no effects were found after six months and in arm/wrist/hand pain [29]. A multi-component pain and stress self-management group intervention was found to have better effects than individually administered physical therapy in the treatment of persistent musculoskeletal tension-type neck pain with regard to coping with pain, in terms of patients' self-reported pain control, self-efficacy, disability, and catastrophising pain, over the 20-week follow-up [61].

eHealth

The application of information and communication technology has grown exponentially since the 1990s and the term 'eHealth' came into use in the year 2000 [62, 63]. eHealth refers to health services and information delivered or enhanced through the internet and related technologies [63]. Internet-supported interventions can be classified into four categories, based on their primary approach: 1) web-based interventions, 2) online counseling and therapy, 3) internet-operated therapeutic software, and 4) other online activities [64]. With regards to web-based interventions, the program content, multimedia use/choices, provision of interactive online activities, and provision of guidance and supportive feedback, are the key components [64].

The development and use of internet-based supportive interventions have increased during the past decade and now offer a real alternative, or supplement, to the traditional face-to-face interventions [64]. Internet-supported interventions allow a broadening of the scope and more diversity of opportunities for different methods of interventions [64]. Advantages of internet-supported interventions include anonymity and invisibility, easy accessibility to treatments (no geographical, financial, physical or time barriers), empowerment regarding managing one's own health, and the flexibility of use in terms of self-determined pace and opportunity to review the material as often as desired [65]. Many studies investigating online interventions showed positive outcomes for a variety of psychological, physical, and behavioural health issues, including well-being [65].

In addition, an increasing number of online self-management interventions are available with promising results; for example, for people with diabetes [66, 67], serious psychiatric and/or medical disorders [68], asthma [69], and osteoarthritis [70]. These interventions are sometimes based on existing group-based programs [66]. Online material allows the participants to tailor interventions by providing opportunities for them to select topics of interest, re-read sections, and continue to receive self-management support outside a specific number of sessions [55].

A self-management program for employees with CANS

Given the need for effective intervention programs for people suffering from CANS [39, 44, 49] and in view of the multifactorial (biopsychosocial) origin of CANS, multi-component interventions that include both biomechanical and psychosocial components are recommended [32, 43, 60, 61, 71, 72]. Employees with CANS often continue working despite the feeling that, because of their health situation, they should have taken sick leave [28]; this can result in the persistence of their complaints. There are some indications that employees with CANS are very precise persons and are sometimes unable to deal with a heavy workload or with tight deadlines [41]. Moreover, employees with CANS have explained that they have high work standards and would often ignore the workload and onset of symptoms, despite knowing that these symptoms could become chronic within a few months [41]. Therefore, it seems important that employees suffering from CANS are enabled to make informed choices and carry them out, so that they have the ability to manage the symptoms, healthcare utilisation, physical and psychosocial consequences, and the lifestyle changes inherent to living with CANS. Self-management education is an empowering process that teaches patients to initiate behavioural changes and strengthen the management of their condition [73]. Empowerment is both a process and an outcome. It is a process when the purpose of an educational intervention is to increase one's ability to think critically and act autonomously. Empowerment is an outcome when an enhanced sense of self-efficacy occurs

as a result of the process [74]. Self-management interventions can be used to improve patients' self-efficacy and empowerment [75]. Self-management programs that address the physical characteristics, psychosocial characteristics, and personal factors of the individual worker, as well as the characteristics of their work environment, may be useful for employees with CANS.

A recent study by Detaille et al. [76] showed that, in the intervention group, the use of a self-management program for employees with different chronic somatic diseases improved their attitude towards self-management at work (enjoyment) after eight months. Moreover, it was found that employees in the intervention group with a lower level of education developed a better physical health quality compared to the control group, receiving care as usual.

Aim of the intervention

Based on the available evidence we decided to adapt the program of Detaille et al. and to add an eHealth module for use among employees with CANS. The process of adaptation of the original program following the intervention mapping protocol is described in Chapter 4 of this thesis. The overall goal of the intervention was defined as 'Self-management behaviour at work' with the aim to alleviate the perceived disability of the participants. Figure 2 presents a model representing how the adapted self-management program can influence determinants of self-management behaviour at work, including the impact of barriers, knowledge and skills.

'Self-management behaviour at work' was operationalized as 1) to be able to cope with pain, fatigue, limitations, and emotional aspects caused by CANS; 2) to be aware of which factors at the workplace cause stress and to adequately deal with work stress by re-organising work in view of the complaints and according to one's capacity (e.g. to modify the workload and work pace, to take pauses when needed, and to say 'no' when needed); and 3) to be able to communicate effectively about CANS with one's supervisor and colleagues (e.g. being able to explain the type of complaints, to ask for facilities at work, and to communicate about a possible change in job demands). The eHealth module provides participants with the opportunity to find additional resources which, together with the personal action plans made in the group sessions, allow to tailor the program to the needs of the individual participant.

The adapted self-management program is expected to positively influence the health condition of the employee with CANS. Self-management, self-efficacy and empowerment of the individual employee are considered important. The individual with CANS plays a central role in the management of complaints and in the developed program. The program mainly focuses on empowering the employee with CANS and providing information to the employee with CANS. In this way employees may be able to influence the personal factors and environmental factors which, in turn, influence their functioning and disability (i.e. body functions and

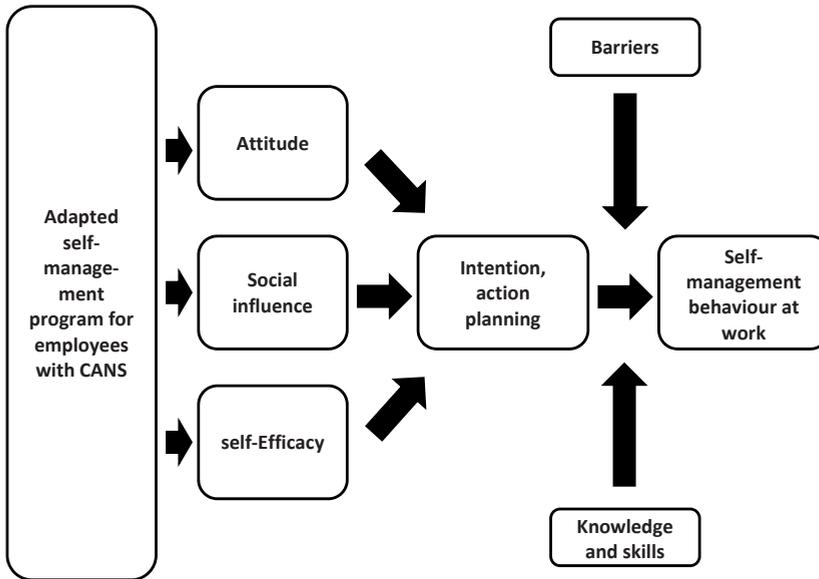


Figure 2: Model representing how the adapted self-management program can influence the determinants of self-management behaviour at work, including the impact of barriers, knowledge and skills. Based on the Attitude - Social influence - self-Efficacy (ASE) Model [77] and adapted from Detaillé SI, et al. [78].

structures, activities and participation), and thereby influence their health condition (CANS). For the involved stakeholders the study is entitled: 'Self-management and employability of employees with complaints of arm, neck or shoulder; CANS sustainable under control'. For the potential participants the intervention is called 'Control CANS'. Extensive details on the intervention are presented in Chapters 4 and 6 of this thesis.

Aims of the thesis

The aim of the research described in this thesis is twofold. First, to adapt an existing self-management program for employees with a chronic somatic disease into a self-management program, for the use in employees with chronic non-specific CANS, and to add an eHealth module for use in the target population. Second, to evaluate the effectiveness of a self-management program, including an eHealth module, compared to usual care, on outcome measures including the self-reported disability of arm, shoulder and hand; absenteeism; pain in the previous week; quality of life; catastrophising pain; self-efficacy; work style; presenteeism; fatigue; the use of usual care; and limitations experienced on the job. For this research data are collected at baseline and at three, six and 12 months follow-up, in employees with chronic non-specific CANS.

Outline of the thesis

This thesis comprises a series of studies, originally written as separate articles. The first is a qualitative study comprising three focus group meetings with 15 employees with CANS, which is described in **Chapter 2**. The aim of this focus group study was to identify the problems as experienced by employees with CANS. This information was then used to adapt the existing self-management intervention, and to include an eHealth module, to specifically fit the characteristics and needs of employees with CANS. **Chapter 3** describes the results of a qualitative study consisting of three focus groups involving 17 experts (with experience with CANS, self-management and/or eHealth interventions). The aim of that study was to determine whether a self-management program, including an eHealth module, would be a realistic option for employees with CANS, and to determine the content of the intervention. These two latter studies were part of the needs assessment of the intervention mapping protocol. Intervention mapping is a stepwise approach for theory and evidence-based development and implementation of interventions; in total, the protocol consists of six steps. **Chapter 4** describes how the intervention mapping protocol was used to adapt the original intervention to the target population. The adaptation of the original self-management program and the development of the eHealth module took a total of nine months. To evaluate the effectiveness of the self-management intervention, including an eHealth module, a randomised controlled trial (RCT) was designed. The design of the RCT is outlined in **Chapter 5**. The primary outcome of the study was the self-reported disability of arm, shoulder, and hand, measured with the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire. Secondary outcomes were: absenteeism, pain in the previous week, quality of life, catastrophising pain, self-efficacy, work style, presenteeism, fatigue, the use of usual care, and limitations experienced on the job. Data were collected at baseline and at 3, 6, and 12 months follow-up. To measure one of the outcome measures it was decided to use the SPS-6 (Stanford Presenteeism Scale). However, because no Dutch version of this scale was available, the aim of the study in **Chapter 6** was to develop a Dutch-language version of the SPS-6 and adapt it to the Dutch culture. Moreover, the second aim was to examine the reliability (in terms of test-retest reliability, item-to-total correlation and internal consistency) and the discriminant, discriminative and structural validity of the Dutch version of the SPS-6 (DSPS-6) in a population with musculoskeletal health problems. In the RCT, 123 patients with non-specific CANS were randomly assigned to either the self-management intervention or to a control group receiving care as usual. The results on the outcome measures, measured at 3, 6 and 12 months, are presented in **Chapter 7**. To investigate the experiences of participants of the combined self-management intervention, a process evaluation consisting of semi-structured interviews and questionnaires is presented in **Chapter 8**. Finally, **Chapter 9** provides a general discussion of the research presented in this thesis, including suggestions for future investigations and implications for clinical practice.

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Experiences of employees with arm, neck and/or shoulder complaints: a focus group study

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Abstract

Background: Many people suffer from complaints of the arm, neck and/or shoulder (CANS). CANS causes significant work problems, including absenteeism (sickness absence), presenteeism (decreased work productivity) and, ultimately, job loss. There is a need for intervention programs for people suffering from CANS. Management of symptoms and workload, and improving the work style, could be important factors in the strategy to deal with CANS. The objective of this study is to evaluate the experienced problems of employees with CANS, as a first step in an intervention mapping process aimed at adaptation of an existing self-management program to the characteristics of employees suffering from CANS.

Methods: A qualitative study comprising three focus group meetings with 15 employees suffering from CANS. Based on a question guide, participants were asked about experiences in relation to continuing work despite their complaints. Data were analysed using content analysis with an open-coding system. During selective coding, general themes and patterns were identified and relationships between the codes were examined.

Results: Participants suffering from CANS often have to deal with pain, disability, fatigue, misunderstanding and stress at work. Some needs of the participants were identified, i.e. disease-specific information, exercises, muscle relaxation, working with pain, influence of the work and/or social environment, and personal factors (including work style).

Conclusions: Employees suffering from CANS search for ways to deal with their complaints in daily life and at work. This study reveals several recurring problems and the results endorse the multi-factorial origin of CANS. Participants generally experience problems similar to those of employees with other types of complaints or chronic diseases, e.g. related to their illness, insufficient communication, working together with healthcare professionals, colleagues and management, and workplace adaptations. These topics will be addressed in the adaptation of an existing self-management program to the characteristics of employees suffering from CANS.

Background

Many people suffer from complaints of the arm, neck and/or shoulder (CANS). The reported point prevalence ranges from 1.6%-53% and the 12-month prevalence from 2.3%-41% depending on the setting, definition, and classification used [1-3]. CANS is persistent; 77% of employees with CANS reported to still have complaints after six months [4]. Although CANS is common, no international consensus has been reached concerning related terminology [5]. However, in the classifications of CANS, a distinction is usually made between specific CANS (such as epicondylitis and carpal tunnel syndrome) and nonspecific CANS [6].

CANS causes significant work problems, including absenteeism (sickness absence), presenteeism (decreased work productivity) and, ultimately, job loss [7, 8]. In the Netherlands, CANS is responsible for 15% of the total number of sick days [9] and the total annual costs for people with CANS are estimated at 2.1 billion euros due to medical expenditure (direct costs) plus decreased productivity, sick leave, and chronic disability (indirect costs) [10].

Although the exact aetiology of nonspecific CANS remains unknown, it is presumed to have a multifactorial origin [11-14]. Physical characteristics (e.g. wrong working posture), psychosocial characteristics (e.g. lack of social support from colleagues and/or management), personal factors (e.g. an ineffective approach to stress management, an adverse work style) of the individual worker, as well as characteristics of their work environment (e.g. facilities, work culture), contribute to the development and persistence of these complaints [4, 11-16]. The importance of each factor, and its individual contribution to the risk profile, varies between individuals and work environments [16].

There is conflicting evidence regarding the effectiveness of ergonomic interventions [17-21]. Nowadays, multi-component interventions that include both biomechanical as well as psychosocial components are recommended [13, 18, 22]. A work style intervention introduced by Bernaards et al. [23, 24] among computer workers focused on behavioural change with regard to body posture, workplace adjustment, breaks, and coping with high work demands. Compared with usual care, the intervention was found to be effective in improving recovery from neck/shoulder symptoms and reducing pain on the long term (12 months), whereas no effects were found after six months or for pain in the arm/wrist/hand.

Among Dutch employees with sickness absence due to CANS, 24% believes that work is the main cause of their complaints and 30% stated that these complaints are partly caused by work [9]. Also, 19% of the Dutch employees stated that measures at work are needed for CANS because facilities are either not, or are insufficiently, available [9].

Self-management is an increasingly used approach in chronic illness care to improve self-efficacy (described as beliefs in one's own capability to organise and execute the courses of actions required to reach one's goals), and wellness behaviours (behaviour leading to a healthier way of living) [25-27]. Barlow et al. defined self-management as *"the ability to manage the symptoms, treatment, physical and psychosocial consequences, and lifestyle changes inherent in living with a chronic condition"* [28]. Self-management programs aim to help participants make informed choices and then carry them out [26]. Self-management interventions focus primarily on encouraging patients to be involved with and in control of their own treatment, as well as improving their understanding of how their condition and treatment affect their lives [29]. As a result, self-management interventions reflect a change from a patient passively receiving care to a collaborative model in which the patient and provider share their knowledge and work together to achieve optimal self-management [29].

There is a need for intervention programs for people suffering from CANS [6, 15, 16]. Management of symptoms and workload, and improving work style, could be important factors in the management of CANS. In their intervention, Bernaards et al. mainly focused on the physical factors of work style [23, 24], whereas self-management programs also focus on psychological characteristics, personal factors and characteristics of the work environment. Moreover, the participants are asked to set targets: Specific, Measurable, Acceptable, Realistic, Time-bound (SMART), which then are formulated in terms of behaviour. In addition, action plans are made.

Detaille et al. developed a self-management program for employees in the Netherlands with a chronic disease; results showed that, for the intervention group, the attitude towards self-management at work (enjoyment) improved after 8 months [30, 31]. Our aim is to adapt that program for use among employees with CANS, and add an eHealth component following the process of intervention mapping (IM), which is a staged process used to develop evidence-based and context-relevant health promotion or injury prevention programs [32]. The eHealth component has been added because of the multifactorial origin and diversity of the symptoms of CANS: by adding an eHealth component, part of the subgroup-specific related information can be provided in a tailored way (in which participants can make their own choices). In this way, the time during the meetings can be used more effectively and the information is available at every moment. The present study focuses on the first stage of IM in which the problem is identified and the intervention context is investigated [33]. This phase is crucial to understand the end-users' perspective in order to determine the intervention content and to increase the likelihood that the strategies will be adopted and implemented [32].

Aim of the present study is to identify the problems as experienced by employees with CANS. With this information, the existing self-management program of Detaille et al. [30] can be adapted to specifically fit the characteristics and needs of employees with CANS.

Methods

Study design

In 2012, three focus group meetings were held among employees with CANS; all sessions took place at the HAN University of Applied Sciences (Nijmegen, the Netherlands). The Radboud university medical center medical ethic committee declared (registration number 2013/317) that the study does not fall within the Dutch law on 'Medical Research involving Human Subjects' (the WMO) and that therefore, for performance of this research, no approval is required from a medical ethic committee. The research protocol fulfilled the criteria of the Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects.

We used focus groups to investigate the range of ideas that people have about a certain topic; such groups can uncover factors that influence opinions, behaviour or motivation [34]. Focus groups can be used in program development and have proven helpful in the needs assessment, mostly because they provide an interactive environment in which ideas can emerge from the group [34]. A group possesses the capacity to become more than the sum of its parts, and to exhibit a synergy that individuals alone do not possess [34]. Therefore, focus groups were considered to be the most suitable method in view of the aim of this study, i.e. to identify the problems (at work) as experienced by employees with CANS.

Participants

A purposive, homogeneous sampling technique was used to identify potential participants. Participants were recruited from the staff of the HAN University of Applied Sciences and the Radboud university medical center (both located in Nijmegen, the Netherlands). Participants were recruited via electronic occupational news mails and informed about the research project by occupational health staff. Generally, self-management interventions focus on chronic conditions and, therefore, participants were only included if they had any complaints of the arm, shoulder and/or neck persisting for longer than 12 weeks, and if the complaints were caused or worsened by their job and/or limited their participation in work. The inclusion criteria used for the present study will also be used to include participants in the adapted self-management intervention for employees with chronic non-specific CANS. Each participant was informed that participation was voluntary and that data would be used anonymously. Employees fulfilling the inclusion criteria were asked to fill out a short questionnaire (demographics) prior to the focus group meeting. All

participants gave informed consent to participate in the study and to allow audio-recording of the sessions. All participants received a gift of 20 euro for their participation.

Focus group meetings

Following the recommendations of Krueger and Casey [34] a question guide with open-ended questions was developed (Appendix). The content and the order of the different question categories were developed based on the recommendations of Krueger and Casey [34]. The selected topics were based on a recent multidisciplinary guideline for nonspecific CANS [21] and on the original self-management program as developed by Detaille et al. [30]. The selected topics ensured the multifactorial perspective of the focus group sessions. Each focus group session was moderated by the first author (NH) using a standardised script. The group members were asked about their experiences at work and their needs for continuing work despite their complaints. The topics included participants' experiences with their complaints, experienced problems with work activities, dealing with work problems, support and help of others (at work and at home), and communication about their complaints. In addition, a healthy lifestyle was discussed. When the group discussion was not sufficiently facilitated by the question alone, or if the question was not clear enough, the moderator could give some examples. The moderator actively stimulated interaction and discussion between the participants. Finally, participants were asked what kind of information related to CANS they would like to receive and what they would like to learn if they would follow a self-management intervention.

All focus group sessions were audio-recorded and notes were taken by an assistant (LD). In each meeting the question guide was followed. The moderator made sure that every participant was involved in the discussions. Each session lasted about 120 min. Debriefing was performed after each session.

Data analysis

The audio-recordings were transcribed by the assistant (LD). Member checks were performed after drafting the manuscript, one year after the focus group sessions. If no response to the first email was received from participants within 10 days, a reminder was sent by email. The first author (NH), trained in qualitative research methods, performed the data analysis. Data were analysed using conventional content analysis [35, 36], which is generally used with a study design whose aim is to describe a phenomenon [35]. The aim of content analysis is 'to provide knowledge and understanding of the phenomenon under study' [37]. Content analysis has a long history in research and is used to analyse text data and can be used in analysing focus groups [35].

After reading each transcript multiple times, the transcript was analysed using content analysis with an open-coding system [36]. New codes were added when considered necessary. After this,

the codes were sorted into categories based on how different codes are related and linked [35]. Then, the emergent categories were used to organise group codes into meaningful clusters [35], expressing the experiences of employees with CANS.

The Atlas.ti (version 7.082) program was used for analysis. During data analysis, the emerging themes were discussed in a small expert group (NH, YH, SD). Moreover, by reading all the transcripts, the expert group checked that no themes were missed. The supporting quotes related to each theme were discussed in the expert group.

Results

Initially, 20 employees wished to participate; of these, two were excluded because they did not fulfil the inclusion criteria and three persons withdraw consent after obtaining more information about the study. Of the remaining 15 participants, three were interviewed individually as they were unable to attend one of the focus group meetings.

Table 1: Characteristics of the study population (n=15).

Variables	Values
Mean age in years, (range)	46.9 (25-56)
Male, n (%)	1 (6.7)
Female, n (%)	14 (93.3)
Mean number of work days per week (range)	4.1 (2.4-5.0)
Mean hours of work per week (range)	30.7 (18-50)
Mean hours of PC work per day (range)	4.4 (0.5-8.0)
Education level, n (%)	
Preparatory secondary vocational education	1 (6.7)
Senior secondary vocational education	3 (20.0)
Higher professional education	7 (46.7)
Academic higher education	4 (26.7)
Mean disability score on work (1-10) (range)	3.8 (0-7.0)
Complaints, n (%)	
Hand	3 (20.0)
Wrist	3 (20.0)
Under arm	2 (13.3)
Elbow	1 (6.7)
Upper arm	4 (26.7)

Table 1: Characteristics of the study population (n=15). (continued)

Variables	Values
Shoulder	13 (86.7)
Neck	12 (80.0)
Duration of complaints in weeks, (range)	222 (20-936)
Side of complaints, n (%)	
Left	2 (13.3)
Right	7 (46.7)
Both sides	6 (40.0)

The mean age of the participants was 46.9 years and they worked in various professions within the organisations. Table 1 presents the characteristics of the 15 participants fulfilling the inclusion criteria and Table 2 presents the demographic profile of each participant. In general, the same issues emerged and were discussed in all three focus group meetings. In session three, no new issues were discussed and no new codes were added. All participants were successfully reached for the member checks. None of the participants indicated that our interpretation was not correct; no changes were made after the member checks. The topics that emerged during data analysis are described below.

Ideas about the causes of complaints

Causes of complaints vary between participants. Some employees stated that the cause of their complaints is mainly physical, e.g. hereditary, or (partly) caused by an underlying condition such as diabetes mellitus. Some participants have 'weak muscles or tendons' or their complaints are caused by continuous contraction of the muscles. Workload in the past, or in the current job, was also mentioned as a possible cause of complaints. Some participants were uncertain about the cause of their complaints.

At work, trying to meet expectations and maintaining a high level of standards can result in stress and taking insufficient time for breaks. Both these are mentioned as aggravating factors and a possible cause of complaints. One participant said:

What I've encountered at work on several occasions when the pressure and the workload were too high, is that my physical complaints increase very quickly. (Participant 6)

Stress and related muscle tension are reported to be a major trigger of symptoms. For example, one participant stated:

Table 2: Demographic profile of the study population.

Participant ID number	Gender	Age (years)	Education level	Profession	Organization	Hours of work per day	Hours on PC per day	Body region of complaints	Duration of complaints (weeks)	Disability score on work (0-10)
1	Female	56	AHE	Lecturer, supervisor, coach	HAN	26	2.0	Shoulder, neck	20	6
2	Female	44	PSVE	Secretary	HAN	32	6.0	Wrist, lower arm, shoulder, neck	52	2
3	Female	44	SSCE	Administrative assistant	HAN	18	4.0	Hand, elbow, upper arm, shoulder, neck	104	4
4	Female	51	HPE	Senior analyst IVF laboratory	RUMC	32	2.0	Lower arm, upper arm, shoulder, neck	104	2
5	Female	48	AHE	Research coordinator	RUMC	36	6.0	Shoulder, neck	780	3
6	Female	54	HPE	Intensive care nurse	RUMC	20	2.0	Shoulder	936	4
7	Female	46	HPE	Nurse	RUMC	32	2.0	Shoulder, neck	31	7
8	Female	55	HPE	Outpatient assistant	RUMC	28	8.0	Upper arm, shoulder, neck	104	0
9	Male	44	SSCE	Security officer	RUMC	40	6.5	Hand, wrist, shoulder, neck	400	6
10	Female	56	HPE	Intensive care nurse	RUMC	32	3.0	Hand, upper arm, shoulder, neck	416	5
11	Female	47	SSCE	Senior sterilization employee	RUMC	32	0.5	Shoulder, neck	30	3
12	Female	25	AHE	PhD student	RUMC	27	6.0	Wrist, neck	104	3
13	Female	42	HPE	Analyst	RUMC	32	6.0	Shoulder	70	7
14	Female	55	AHE	Pharmacist / PhD student	RUMC	50	5.5	Shoulder,	76	3
15	Female	37	HPE	Lecturer, trainer	RUMC	24	6.0	Shoulder, neck	104	0

PSVE = Preparatory secondary vocational education, SSCE = Senior secondary vocational education, HPE = Higher professional education, AHE = Academic higher education, HAN = HAN University of Applied Sciences, RUMC = Radboud university medical centre

For me, stress is a major trigger. If I'm stressed at work during the day - I have neck pain that evening. (Participant 6)

In addition, prolonged working in a wrong posture, e.g. on a computer (especially a laptop), as well as lack of alternation in work activities during the day, are mentioned as aggravating factors. Also, complaints are worsened by other sub-optimal working conditions and prolonged concentration on work tasks; one participant stated:

In fact it's the cause of my complaints. Remaining in one specific position for a longer time, particularly when I'm sitting behind the microscope and working in a focused way - I have the tendency to tense my neck muscles. (Participant 4)

Dealing with non-visible complaints

Participants often find it difficult to deal with the lack of understanding they may experience from others. Generally speaking, their colleagues and/or managers seem unable to easily observe that someone is in fact suffering from CANS. One participant said:

People don't notice that someone is sick or if something is wrong. It's better to break a leg! If you're walking with crutches, the door is certainly held open for you. But now, they don't notice anything about you. (Participant 9)

It is normal for employees to appeal to their colleagues (whether or not they have CANS) for various types of assistance. Participants find it difficult to say 'no' to these requests and to explain that they suffer from CANS. On the other hand, some participants mention that the advantage of having a 'non-visible' complaint is that this avoids being asked lots of questions about the complaints during the day.

Experiences with different forms of treatment

Most employees have tried various forms of treatment such as physical therapy, manual therapy and exercise therapy. In the case of physical therapy, treatment sometimes consisted of local treatment of the painful area and/or exercise. Many participants have also consulted their general practitioner and, in a few cases, a medical specialist (e.g. an orthopaedic surgeon, rehabilitation physician or rheumatologist). Occasionally the complaints were treated with injections. Within the organisation, many employees have consulted the occupational physician, occupational health staff, or physical therapist. Some participants have used the possibilities for workplace adjustment(s) and chair massage. Although all participants still suffered from CANS, their experience with care was mainly positive. However, in some cases it was difficult to find the appropriate healthcare professional, as one participant stated:

... the family doctor was repeatedly referring me to an orthopaedic surgeon who only wants to operate, and that's pointless in my opinion. Therefore, on each occasion, that was a dead-end street. (Participant 12)

Workplace adjustments

For some employees, a workplace investigation was performed by the occupational health staff and adjustments to the workplace were made - as one participant stated:

They made modifications to the work station: my desk was too high and that's been adjusted to my height... and they made sure that my computer screen was at eye level.
(Participant 5)

Some participants use adjustments, such as a writing tablet, voice recognition software, or repetitive strain injury software. One employee said she found it difficult to request adjustments because these were charged to the department budget. Very few participants used a brace for support.

Moreover, many participants experience problems with making (physical) adjustments to their workplace. In many cases the workplace cannot be properly adjusted, e.g. the computer monitors are too high, the chairs are not (properly) adjustable, or some doors are very difficult to open. In general, people have many problems with the construction and/or the furnishings of some buildings. Participants can become frustrated about this - as one person said:

... as with many important things - such as the distance from the computer screen - that is definite and is often not adjustable. (Participant 8)

Even when adjustments are possible, in many cases the workstations are multifunctional, e.g. if an employee does not have his/her own personal workplace, then customised adaptation is not possible. Also, in many cases participants can only adjust the seat height and little else. One participant remarked:

... provide me with at least seven adapted chairs, because I sit everywhere. Also, provide me with seven computer screens that can be placed in a lower position. (Participant 10)

Information is required about the work environment related to CANS. Adjustments at the workplace and use of shortcuts are recommended. If workplace investigations have not yet been performed, this is because the participants do not know what items they should examine, or do

not know how to initiate a workplace investigation within the organisation. This seems to be crucial information. Some identified needs of the employees focus more on working, e.g., working in a quiet environment because they cannot concentrate, working partly at home, or having more flexibility in their schedule at work; as one participant stated:

Flexible work - so you can get up once in a while and walk around. Flexible work hours.
(Participant 14)

Available information about complaints

Some participants indicate that because they have long-lasting complaints, they have sufficient knowledge about their complaints. However, participants stated that for employees with a shorter duration of complaints basic information is needed about the complaints, including causes and possible solutions. Participants would like specific information about possible treatments and an overview of treatment options within the organisation. Also, more general information about muscle relaxation (including exercises) is required. Participants are also interested in the psychological components of CANS and of pain in general. One participant stated that she changed her opinion about her pain when she understood that her pain was not a signal related to tissue damage, she remarked:

I handle my pain completely differently now. Pain that isn't followed by anxiety that possibly leads to even more suffering is much easier to treat. Your perception of pain makes a big difference. (Participant 5)

In conclusion, information about working posture and tips related to office work need to be addressed in intervention programs. Also, there seems to be a need for information about a variety of topics, such as exercises and psychological components of CANS.

Work-home balance and fatigue

Some participants report a lack of balance between their work and private life. At the end of the day they feel exhausted. In two of the three focus group meetings, fatigue emerged as a major issue. Fatigue increases during the day, participants sleep badly due to pain, and are often tired the following day. This becomes a vicious circle with fatigue having a negative impact on work performance and on concentration levels during the day. Thus, fatigue seems to play a major role in the life of most of the participants. The following was stated by one participant:

I find the feeling of tiredness extremely bothersome. Your concentration is then not 100% - you have to check what you're doing three times over, in my case that I have not

mixed up the patients. You're very aware that your feeling of fatigue increases as the day progresses. (Participant 14)

Coping with complaints

Participants find it difficult to deal with their complaints. This is mainly because they suffer from 'nonspecific' complaints for which no clear solution is available. In the present study, participants generally found it difficult to manage prolonged work activities and to take sufficient breaks, and needed to pay sufficient attention to their physical posture at work. It was said to be challenging to find a balance between all the requirements related to activities at work, e.g. to avoid physical overload. Alternating between different types of work activities is not always possible. In addition, dealing with ongoing pain is difficult and pain often limits the level of performance of work activities. One participant said:

For example, it's also a nuisance on a day when I'm interacting with many people. My processing capacity is limited due to my chronic neck pain. (Participant 1)

Participants tend to accommodate themselves to the complaints, which in some cases, makes the complaints more manageable. Some participants stated that it is important to accept that one has physical complaints. Nevertheless, they are still often confronted with their complaints in daily life, e.g. when picking something up, or simply when putting on a coat. Learning how to deal with the complaints and accepting them are considered to be important.

Participants tried to reduce the impact of their complaints in several ways, e.g. by making adaptations in various areas. They tried to reduce their physical load in general or during their work. Some also tried alternative tasks and paid more attention to their posture whilst working. Some participants started looking for other work or different types of work tasks.

I wanted to do something else, something more in the direction of education. However, my physical complaints played a role. I thought: I'm so young and have such a heavy burden of complaints, it would be better to change now. (Participant 13)

Other participants made adjustments in their planning of tasks and work schedule, and some decided to reduce their number of working days - as stated by one participant:

Eventually I did choose to work fewer hours - because I was simply no longer capable of working fulltime. (Participant 14)

Participants also stated that they tried to increase their understanding about their complaints and about the causes of their complaints. This awareness and reflection on their own situation were experienced as meaningful and were considered to be important skills. Other participants focused on other aspects, as stated by one participant:

I didn't make a serious effort to organise another workstation because I wasn't convinced that this should be my first priority. First, I have to try and improve my capacity as much as possible through better training of my muscles, or relaxing my joints. (Participant 13)

Some participants tried to influence their complaints through sports and exercises, and tried to upgrade their physical capacities. On the other hand, some participants stopped stressful sports activities because they thought these might aggravate their complaints. Although the importance of exercises is generally recognised, participants find it difficult to perform exercises over a long period, and mainly perform exercises at the moment they have more severe complaints.

Several participants were involved in running/walking, swimming, cycling, aerobics, or shooting sports. A few participants stated that their complaints had worsened when performing fitness training. Also, having too little time was a reason not to perform sport activities. In general, most participants recognise the importance of fitness training - as stated by one participant:

I have the idea that if I hadn't stopped my weight training (strength training) program then perhaps I would not have any physical complaints. (Participant 14)

Participants stated that in their spare time sufficient relaxation and time-off are important: some benefitted from the application of heat, a visit to the sauna, or yoga exercises.

Coping with workload and stress

Participants indicate that in recent years the workload has increased. For example, in one institution, due to financial cut-backs there is a hiring freeze; however, because there is more work and some colleagues might be on sick leave, the work accumulates. Moreover, the physical distances within an organisation have often increased due to rebuilding, and an increasing number of activities have to be registered. All of these activities involve considerable time and increase workload stress. One participant stated:

You have to be able to prove that you're the best hospital. Or that you have the best ratings ... and these are only obtainable through registration, registration, registration. Therefore, you have to be able to justify almost everything that you do, and you have to

register this, and you are also very aware of this. However, all this extra work often costs me more energy. (Participant 10)

Due to the increased workload participants perceive that there is no time to read emails during work time. Also, participants indicate that there seems to be insufficient time to take a break. All this causes stress at the workplace and gives the impression that one's leisure time is being swallowed up by work; one participant stated:

Before - I could still sometimes read emails during my office hours - but that's no longer possible. ... if I look at my emails at home during the evenings, then I see 12 mails, with attachments – read this, read that. Then I ask myself - what do they want? We always have to do the training and take exams in our own time. This is in addition to the enormous pressure at work that you already have. (Participant 8)

According to most participants, there is little opportunity for flexibility. For example, since work activities tend to be increasingly specific, it is difficult to change shifts. There is practically no possibility to influence one's work schedule, which increases the workload and stress. Due to this workload and stress, less attention is paid to maintaining a good physical posture and this can cause the CANS to recur faster. Participants find that it is not always easy to deal with the stress and pressure of work. Some participants have almost given up and just accept things - one participant stated:

At the moment I no longer have so many problems with stress at work - it's extremely busy, but 16:00 will come around anyway - and I can't do anything except to work.
(Participant 7)

Ensuring adequate relaxation, having sufficient discipline, and creating enough time for tasks/exercises is also considered important by the participants. All of these seem to be important skills.

The culture within an organisation also plays a role. Often participants perceive that there is less time to complete the work, although the employer expects participants to complete their work. Generally speaking, employees are not expected to be absent due to CANS. For example, it is acceptable for someone with a temperature of 40°C to stay at home, whereas for an employee with CANS the situation is different and they find it difficult to stay away from work. Moreover, participants stated that when an employee with CANS is at work he/she is expected to be 100% employable, which is often not the case. One participant stated:

... and when you're at work, they only think in terms of whether you're there or not there... and if you're there, then they think that everything is alright. This applies even though you're often walking around at work in a lot of pain. (Participant 5)

Several employees are aware of the financial restrictions within the organisation, which is a source of frustration. In many cases participants experienced that insufficient or no financial resources are available to make the required (physical) adjustments to the workplace, e.g. an adjustable desk. This, and a certain level of bureaucracy, is illustrated by a work situation where some hooks were placed too high for an employee:

... so I asked whether I can hang these myself, so that I can feel more comfortable - but that's not allowed. That has to be decided again by a committee, because everything has to be the same everywhere. Then it became ten times more expensive ... and then they said it's impossible because the costs are too high! (Participant 10)

Setting limits

Some participants do set a limit for themselves, or ask for help if they can no longer handle the work themselves. However, some have a problem with setting their individual limits: as one participant remarked:

I find it very difficult to set these limits - you want to do your work as well as you can, you really want to do everything that's asked of you. (Participant 5)

In general, participants seem to continue working for too long with their complaints without taking any action. Participants indicate that it is difficult for them to set limits in an early stage and this could be an aggravating factor.

Taking into account one's own limits, but also realizing one's own advantages, is considered important. One participant had a practical solution for the prevention of stress:

Many people are extremely busy at work, walking in and out; I now have a 'Do not disturb' sign hanging on my door. This works really well on days when it's really busy and I set the 'Do not disturb' sign in red; then I can concentrate on my work. (Participant 4)

Support from others

Participants do not always find it easy to talk about their complaints and/or to bother others about their problems. They do not want to complain, not even to healthcare professionals. Generally

there are no major problems with communication, but explaining the type of pain is sometimes difficult.

Most participants experienced sufficient support from colleagues (although a few experienced no support from colleagues). Support is sometimes interpreted as help/support with work, and sometimes as a sympathetic ear and/or 'mental' support. One participant stated:

If I let anyone know that I'm having problems, then my colleagues are very considerate or want to take over some of my workload. But because my problem is not always so evident, I'm not continuously being helped by my colleagues. I have to be the one to let them know - but then I do receive understanding and support. (Participant 4)

Participants do talk with their colleagues about their complaints, especially if others also have physical problems. However, not everyone feels the need to talk about their problems at work, as one participant remarked:

I don't talk much about it at my work unless it becomes a real problem. Up to that point, I just continue doing what I have to do ... I do discuss it once I'm home. (Participant 12)

Thus, some of the participants prefer to keep their problems to themselves and only talk about their complaints with colleagues or a supervisor if they really have to.

Most of the participants received sufficient support and interest from their supervisor; one person remarked:

I certainly have that, in fact one supervisor recently asked how I was really doing: "I don't see you very often with the brace, are you OK?" And then it's certainly noticeable when I'm walking around with that thing, or not. That lets everyone know whether I am doing OK or not - that's a pleasant feeling. (Participant 4)

However, some participants experienced insufficient or no support. In those cases the supervisor seems to be more concerned with the overall state of the department than with how an employee with CANS can be supported. One participant said:

I don't receive any support - because my manager is not present. And if she comes by, what will I say - she never stops walking. And if you say something, it's "OK" (and she continues on her way), and it's not worth the effort to have three discussion points, because she's already gone after the first. (Participant 11)

All participants experienced adequate support at home. If a family has some experience with similar problems, then family members can empathise with the situation. Regarding support at home, one person stated:

Yes absolutely, my husband regularly gives me hell in terms of “what are you doing now?”... He proposed to lower the desk and table and to try to work more with hotkeys - this has helped a bit. (Participant 3)

Asking for help and support

Most participants have a relatively high threshold before asking for help and some participants think they should reduce this threshold for asking for help. Some participants do not ask for help because they want to stay ‘in control’ as long as possible. Generally, most participants set high standards and expectations for themselves. Participants who do ask for help usually get it, but sometimes feel burdened by it. People try to find alternatives or perform the tasks at another time, rather than asking for help. One participant stated:

I’m not quick to ask for help because I think I can come up with all sorts of tricks to solve it in another way. If I do ask for help, then it really is needed - and then people provide it without any problem. (Participant 4)

Sometimes participants do ask for help, but if support is perceived as not immediately available they tend to do the work themselves because, generally speaking, they think it cannot wait. Moreover, sometimes they want to do tasks again because their colleagues’ work does not meet their own standards, sometimes resulting in additional work and/or an angry client. Some of the participants realise that it can be detrimental to do all the work themselves, to avoid asking for help, and to control things themselves; this often causes stress and aggravates complaints.

Participants consider social support at work and at home important. One participant said:

... and also if my supervisor can’t help, I still want her to support me. Especially to listen to me, this is the most important. (Participant 3)

Some find it difficult to ask for support, whereas others find it easy to ask for support or do not need it. Although no major problems with communication were experienced, communication skills can help with asking for help or support. Participants consider the exchange of experiences with others and informing colleagues at work about the complaints as important. Although generally there are no major problems encountered with communication, participants stated that providing communication tools for discussion with colleagues/supervisors about their complaints is important.

Discussion

To our knowledge this is the first study to investigate the experiences of employees suffering from CANS. In both their daily life and at work, employees suffering from CANS are faced with the challenge to deal with their complaints. The present study indicates that participants do not always have sufficient insight into the causes of complaints, and are not always fully aware of the possibilities to influence their complaints and of their own role in coping with their complaints. Generally, all participants suffered from pain and feel that they cannot manage this adequately. Some participants are aware that they have a problem with taking their own limits into account, while others often approach/go beyond their individual limits because they have a relatively high threshold before asking for help. Many participants feel that fatigue has a serious impact on their daily life and the management of their complaints. They feel uncomfortable about dealing with various disrupting physical factors (pain, disability, fatigue), psychosocial factors (stress, lack of balance work/private life, difficulties in communication, misunderstanding from others), personal factors (difficulties in setting limits, high threshold before asking for support, high level of personal standards and expectations) and environmental factors (non-optimal workplace, culture within the organisation). All these factors should be addressed in future interventions.

The identified needs of participants include information about possible causes of CANS and possible solutions (e.g. treatment, facilities); (relaxation) exercises; working and dealing with pain, limitations, fatigue, workload and stress; work(place) adaptations; work style; taking into account one's own limits and asking for help; communication with others; and awareness of one's own advantage. Tools for dealing with these factors should be provided.

Although the aetiology of CANS is multifactorial, most participants in the focus groups mention physical factors as the primary cause of their problems. Although this can indeed be the case, people may not be fully aware of the contribution of other factors in the aetiology of their problem. Although psychosocial, personal and environmental factors are also mentioned, this is generally more in the sense of more aggravating factors.

The fact that CANS is a 'non-visible' complaint has various consequences. On the one hand participants indicate that this may contribute to their feeling of not being well understood whereas, on the other hand, it prevents colleagues from asking questions during the day. Thus, it seems that at least some participants find it difficult to communicate about their complaints. Moreover, if colleagues are not aware of the complaints, asking for help and obtaining social support may seem to be even more difficult.

Employees suffering from CANS are often confronted with a wide range of problems. Although most participants have taken many steps in an attempt to reduce their complaints, which vary from workplace adaptations to different types of (physical) therapies, they still have complaints and some are still looking for alternative treatment options. A few participants stated that their complaints had worsened when performing fitness training. Therefore, it seems important that people with CANS have sufficient knowledge and insight into the possible benefit and harm of sports activities, and that activities are well chosen and properly 'dosed'. However, the awareness that there are opportunities for self-management differs between participants and most do not know how to cope with the working environment. Given the multifactorial origin of CANS, it was found that the variability between participants in taking into account all the possible contributing factors was relatively high.

In our study population the mean duration of symptoms was 222 weeks, indicating that most had suffered from these complaints for several years. This also implies that this group might be a useful source of relevant information for other employees with CANS in the a similar work environment, because they have experience in working with and finding solutions for their complaints. On the other hand, although most have tried various ways to reduce their complaints, the majority still suffer from CANS and still reported coping problems due to work environmental factors, to personal factors, and due to physical factors.

It should be noted that, because this study setting is rather specific and the participants relatively highly educated, the participants in this study are a specific group thereby making it difficult to generalise these results to other populations and to other settings. Therefore, the information gathered in this study will be used to select the most important topics for the self-management intervention; employees with CANS must be empowered to take control over their complaints in their work environment. The exact content of the identified topics may vary between different types of work settings.

The present study provides insight into perceptions and experiences of employees suffering from CANS and identifies a number of recurring problem areas. The results endorse the multifactorial (e.g. physical, psychosocial, environmental and personal) aetiology of CANS [13]. Our results may help identify important areas that need attention in the treatment of employees suffering from CANS. This study identified several needs of employees with CANS. Insight in the symptoms of CANS and in its causal factors seems to be the first important point. Secondly, awareness and reflection on one's own behaviours related to the working circumstances are considered important. Thirdly, participants need to develop their exercise, relaxation, coping, management and communication skills to deal with their problems on the long term. It is likely that knowledge and sufficient insight in the different causes of the complaints are important in order to raise

awareness and reflection, and develop communication skills. All these items could be topics in the self-management intervention.

This study has several limitations. First, selection bias may have occurred regarding the study group as most participants were working in a hospital and, generally, have a long period of living with CANS. However, because participants in our study experienced some problems similar to those of employees with other types of chronic diseases, it seems plausible that these problems are also experienced by employees with CANS working in other settings. Moreover, we think that not (only) the work environment, but rather the personal characteristics of employees with CANS are (also) important when considering the causes of the complaints and when dealing with the complaints. However, this study was conducted in a healthcare and an educational setting, and the participants were relatively highly educated. Therefore, participants in our study group may be 'better equipped' to express themselves regarding CANS, due to the setting they work in and their higher level of education. Therefore, our results do not reflect the experiences of workers in different types of setting, such as factory workers.

Only one man participated; this is due to the larger proportion of woman working in the hospitals and the fact that women have a higher risk of developing CANS compared with men [38, 39]. Moreover, we purposively selected participants based on some specific characteristics. We were interested in employees with complaints of the arm, neck and/or shoulder persisting for longer than 12 weeks. Moreover, the complaints must be caused or worsened by their job and/or limit their participation in work. Therefore, we purposively selected employees who met these criteria, using the described selection criteria. Because the aim of focus groups is not to infer but to understand, not to generalise but to determine the range, and not to make statements about the population but to provide insight into how people in the groups perceive a situation [34], the present results represent the experiences and perceptions of the participants of this particular study.

Moreover, three participants were interviewed individually as they were unable to attend any of the focus group meetings. This implies that these participants were not part of a group process and that, for these participants, the ideas did not emerge from the group. However, because these three participants wanted to participate and fulfilled the inclusion criteria, and all information about the experiences of employees with CANS was needed, we decided to perform interviews and analyse them together with the focus group results. Although this could have influenced the results, this does not seem to be the case, because no major differences in perceptions and experiences between participants of the focus groups and the interviews were identified.

The question guide was based on a recent multidisciplinary guideline for nonspecific CANS [21]. The question guide was also based on the original self-management program [30] in order to determine how the topics of the original program should be adapted. We assumed that some multifactorial aspects of CANS (physical characteristics; personal factors, e.g. stress management) would be mentioned and discussed by the participants themselves. Other topics (psychosocial characteristics, e.g. social support; the work environment, e.g. facilities; and some personal factors, e.g. asking for help) would perhaps need some more facilitation during the focus group. Therefore, these topics were individually addressed in the question guide to assist the moderator. Moreover, if new topics were introduced by the participants these were also facilitated. Due to the fact that the same issues were identified and discussed in all three focus group meetings and no new topics were introduced in the final session, it is highly likely that saturation was reached.

Another limitation is that, given the aim of this study (i.e. investigating the experiences of employees with CANS) and the multifactorial origin of CANS and many influencing factors, it was not possible to investigate all the topics and to extensively discuss all the emerging topics. We were mainly interested in the participants' perception of the topics addressed in the question guide and therefore focused on topics fulfilling this aim.

Although member checking was performed, this took place one year after the focus group meetings. Therefore, it is possible that participants did not (exactly) remember the details of the focus group meetings. However, by providing the preliminary results of each session to the participants it seemed possible to check whether our interpretation of the data was correct; this was endorsed by the fact that none of the participants indicated that our interpretation was not correct.

Data were coded by one researcher. Multiple coding involves the cross-checking of coding strategies and interpretation of data by independent researchers [40]. However, the degree of concordance between researchers is not very important [40]; the main value of multiple coding is to supply alternative interpretations [40]. It is important that a transparent and systematic process is followed which can be carried out by one researcher, by a team, or by involving independent experts [40]. By discussing the emerging themes and looking for alternative interpretations in a small expert group, we addressed the potentially competing explanations.

In the present study, it is noteworthy that participants experienced some problems similar to those in employees with other types of chronic diseases [41, 42]. Problems related to their illness, insufficient communication with supervisors, working together with healthcare professionals, colleagues and management, and adaptations at the workplace are considered important among employees with chronic somatic diseases [41, 42]. Therefore, it seems plausible that a self-management intervention, including an eHealth module, covering these topics, and adapted to

employees suffering from CANS with disease-specific information, may be effective in employees with CANS. Although there is inconsistent evidence for the effect of self-management programs for patients with chronic musculoskeletal pain [43-45], there is evidence that group-delivered short programs (<8 weeks) with a healthcare professional have the best potential [43]. In a recent study, a multi-component pain and stress self-management group intervention had better effects than individually administered physical therapy in the treatment of persistent musculoskeletal tension-type neck pain in terms of patients' self-reported pain control, self-efficacy, disability, and catastrophizing over the 20-week follow-up [46].

The topics identified in the present study can contribute to the adaptation of an existing self-management program [30], combined with eHealth, to the experiences and needs of employees with CANS. Moreover, the results may also be useful for healthcare professionals and management aiming to support these employees. As part of the needs assessment (step one in the IM protocol) we also reviewed the Dutch multidisciplinary guideline for nonspecific CANS [21] and conducted focus groups with intervention and eHealth experts. We expect that focus groups with experts can have a surplus value. By comparing experiences of clients and interventionists we are able to analyse in which way the eHealth and self-management program needs to fit existing intervention strategies and which delivery strategies should be used. The results of these latter focus groups, and the results of the development of the intervention following the IM protocol, will be published in two separate forthcoming articles.

In conclusion, employees suffering from CANS have to deal with their complaints in their daily life and at work. Several recurring problem areas have been identified and the results endorse the multifactorial origin of CANS. In general, participants experience problems similar to those of employees with other types of complaints or chronic diseases. These problems are related to their illness, insufficient awareness of possibilities to influence and manage their complaints themselves, inadequate communication with supervisors, and lacking adaptations at the workplace.

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Appendix: Question guide for the focus group sessions

Introduction (5 minutes)

Introduction of participants (10 minutes)

- Name, work, what do you like about your work?
- What complaints do you have and how long have you had them?

Complaints (20 minutes)

- What have you done to decrease your complaints?
- Have you searched for information about your complaints?
- Do you still have a need for more information?
- What do you think are the causes of your complaints?

Work (25 minutes)

- Which problems do you experience at work due to your complaints?
- How do you deal with these problems?
- Are there any problems about which you would like to have more information or training?

Pause (10 minutes)

Facilities (10 minutes)

- There are various facilities within the institution for CANS. Which facilities do you use and which not? Why (not)?
- Which facilities do you need in order to continue your work, despite your complaints?

Social support (5 minutes)

- Do you receive enough support from your colleagues?
- Do you receive enough support from your family?
- Do you receive enough support from your superiors?

Asking for help (5 minutes)

- If needed, do you ask for help? With whom? Why not?
- Which healthcare professionals did you have contact with for your complaints?

Communication (5 minutes)

- With whom do you communicate about your complaints
- What problems do you experience in the communication about your complaints with colleagues, your manager(s) and healthcare professionals?

Lifestyle (10 minutes)

- Do you participate in sport activities? If yes, what kind of activities?
- Do you perform exercises for your complaints?
- Do you need more information about sport activities and/or exercises?

Closure (10 minutes)

- What would you like to learn in a self-management program for employees suffering from CANS?
- What kind of information would you like to obtain?
- What do you consider as most important when designing a self-management program for employees suffering from CANS?
- Is there anything else you would like to say?

3

Development of a self-management intervention for employees with complaints of the arm, neck and/or shoulder (CANS): a focus group study with experts

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Abstract

Background: Many people suffer from complaints of the arm, neck and/or shoulder (CANS). The complaints are persistent and there is a need for intervention programs for those with longstanding CANS. Literature suggests that a behavioural change is needed in employees with CANS. A self-management program with an add-on eHealth module might be an effective option to achieve this behavioural change needed to manage the complaints in employees with CANS. The aim of this study is to determine the content and strategies of the intervention and to gain insight in possible barriers and facilitators for implementation. Therefore, we wished to examine the perspective of experts on the problems and characteristics of employees with CANS and their view on a self-management program consisting of self-management sessions and eHealth.

Methods: A qualitative study consisting of three focus groups involving 17 experts in total (with experiences with CANS, self-management and/or eHealth interventions) was performed. Experts were asked their opinion about the content and requirements of a self-management program for employees with CANS, including an eHealth module. Data were analysed using qualitative data analysis. After coding, the emergent themes were used to organize the data into main categories, expressing the ideas and opinions of experts on CANS, self-management and/or eHealth interventions.

Results: The experts pointed out that the intervention should focus on increasing employees' self-efficacy and empowerment, and should address topics related to the possible risk factors for CANS, symptoms, work environment, social environment and personal factors. The eHealth should be self-explanatory, attractive and the information provided should be brief, clear and concise.

Conclusions: Experts appear to see a role for a self-management program for employees with CANS. They indicate that the combination of group sessions and eHealth can work well. Experts provided valuable information with regard to the content of the self-management intervention and the design of the eHealth module.

Background

Many people suffer from complaints of the arm, neck and/or shoulder (CANS). Reported point prevalence for this disorder ranges from 1.6-53% and the 12-month prevalence from 2.3-41% depending on the setting, definition, and classification used [1-3]. In various working populations, the reported 12-month prevalence ranges from 22-40% [3]. Although the exact aetiology of nonspecific CANS is unknown, it is reported to be of multifactorial origin in which work-related factors may play a major role [4-7]. Physical characteristics (i.e. awkward working posture, repetitive work), psychosocial characteristics (i.e. lack of social support from colleagues or supervisor), personal factors (i.e. an ineffective approach to stress management) of the individual worker, as well as characteristics of their work environment (i.e. high job demands, lack of control), contribute to the development and persistence of complaints [4-13]. The importance of each factor, and its individual contribution to the risk of provoking symptoms, varies among individuals and work environments [14].

CANS may cause significant work problems, including absenteeism (sickness absence), presenteeism (decreased work productivity) and, ultimately, job loss [15, 16]. A recent focus group study showed that employees with CANS have to deal with their complaints in their daily life and at work [17]. That study also showed that participants are not fully aware of the possibilities to influence their complaints, or of their own role in coping with their complaints. Participants generally suffer from pain, are often approaching their individual limits, and fatigue has a major impact on their life; in addition, they also have to deal with hindering physical and social environmental factors, such as misunderstanding from others [17]. Employees with CANS are often confronted with a wide range of problems. Most have taken many steps in an attempt to reduce their complaints, which can vary from workplace adaptations to different types of (physical) therapies [17].

About 19% of the patients report chronic complaints of which 58% report the use of healthcare, such as care given by the general practitioner, medical specialist and physical therapist [1]. Thus, there seems to be a need for intervention programs for people with longstanding CANS [17-19]. Therefore, information on the experiences and needs of employees with CANS can be valuable in developing such interventions. To determine the content of the intervention, and to guarantee that strategies will be adopted and implemented, the perspective of the healthcare professional should also be taken into account, because they refer clients to these programs or give the care themselves. Experts on care for those with CANS can probably provide valuable information that can be used in the development of intervention programs for employees with CANS.

Self-management is an approach increasingly used in chronic disease care to improve self-efficacy and a healthy lifestyle [20]. Self-management interventions focus primarily on encouraging

patients to be involved with and in control of their own treatment, as well as improving their understanding of how their condition and treatment affect their lives [21]. Self-management often includes preparing people to manage their health behaviours on a day-to-day basis, participating in treatment or education designed to attain specific results, practicing tasks, and developing attitudes that reduce the emotional or physical impact of illness, with or without assistance from clinicians [22]. There is inconsistent evidence for the effects of self-management programs for patients with chronic musculoskeletal pain [23-25] and there is some evidence that group-delivered short programs (< 8 weeks) with a healthcare professional involved have the best potential [23].

A promising medium for facilitating patient empowerment is the Internet [26]. Many home-based disease-management programs have been developed to improve the health of patients [27]. eHealth interventions have become popular in number and reach [28]. A recent systematic review indicates that web-based interactive interventions have a beneficial effect on patient empowerment and/or physical activity in patients with various chronic conditions [26].

Unfortunately, web-based interventions also have some possible disadvantages. For example, it is common for users who experience difficulties with the program to discontinue program use or dropout of a study before completion [29, 30]. Moreover, for the specific group of participants with CANS, who often work with computers at work, more prolonged computer use (by following an eHealth program) could worsen their physical problems [31]. Also, eHealth alone limits the (often very supportive) personal contacts between participants. Therefore, a combination of a self-management program with an add-on eHealth module could be an effective option achieving behavioural change in the management of complaints in employees with CANS, especially in those suffering from longstanding complaints. CANS has a multifactorial origin and symptoms are diverse; by adding an eHealth module, information can be provided in a more tailored way (in which participants can make their own choices) [17]. In this way, the time during the meetings can be used more effectively, whilst relevant information is available at every moment due to the eHealth module. Our research group plans to adapt the self-management program developed by Detaille et al. [32, 33] following the process of intervention mapping [34, 35] and to add an eHealth module for use in employees with CANS for more than 12 weeks.

The aim of the present explorative study is to determine the content and strategies of the self-management program and eHealth module and to gain insight in possible hindrances and facilitators for implementation. Therefore, this study evaluates the experiences and opinions on the problems and characteristics of employees with CANS of experts in the field of CANS, self-management or eHealth, as a step towards developing a self-management program consisting of self-management sessions and an eHealth module. Using this information, the existing self-management program developed by Detaille et al. [32, 33] can be adapted and designed to

fit the needs of the target population in order to make healthy behaviour and management of symptoms for them more achievable.

Methods

Study design

In March 2012, three focus groups with experts in the field of CANS, self-management and/or eHealth were held. Two focus groups were held at the HAN University of Applied Sciences, Nijmegen, and one focus group was held at a hotel in Utrecht (both in the Netherlands). The Medical Ethical Committee at Radboud university medical center declared (registration number 2013/316) that the study does not fall within the Dutch law on 'Medical Research involving Human Subjects' (the WMO) and that therefore, no approval is required from a medical ethic committee. The research protocol fulfilled the criteria of the Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects.

We used focus groups to investigate the broad range of ideas that experts had about CANS, self-management and eHealth. Focus groups can uncover factors that influence opinions, behaviour or motivation [36] and provide an interactive environment in which ideas can emerge from the group [36]. A group possesses the capacity to become more than the sum of its parts and to exhibit a synergy that individuals alone do not possess [36]. Therefore, focus groups were considered the most suitable tool to address the aim of this study.

Participants

Between January and March 2012, a purposive sampling technique was used to identify potential participants. Experts (defined as persons with a high degree of practice skills or knowledge, i.e. relevant post graduate professional qualifications, a PhD, and/or experienced clinicians) in the field of CANS, self-management and/or eHealth interventions were identified by the authors, contacted by email or telephone, and asked to participate in the study. The different areas of expertise represented by the experts distributed over the three focus groups, thereby ensuring that all areas of expertise were represented in all focus groups. Each participant was informed that participation was voluntary and that data would be used anonymously. All participants were asked to fill out a short questionnaire (demographics) prior to the start of the focus group. All participants agreed to audio-recording of the sessions. All participants received a gift of 75 euro for their participation.

A total of 17 experts, divided in three groups of five or six participants each, participated in this focus group study; of these, 12 (70.6%) were female and five (29.4%) were male. The mean age of

Table 1: Demographic profile of the participating experts.

Expert number	Gender	Age (years)	Group	Education level	Education	PhD	Profession	Expertise		
								CANS	SM	EH
1	Female	60	1	AHC	Psychology	Yes	Researcher	No	Yes	No
2	Female	44	1	HPE	Physiotherapy, occupational health physiotherapy	No	Physiotherapist	Yes	Yes	Yes
3	Male	57	1	AHC	Medicine	No	Occupational health physician	Yes	Yes	No
4	Female	31	1	AHC	Occupational therapy, health sciences	No	Occupational therapist, lecturer	Yes	No	No
5	Female	50	1	HPE	Work and Organization	No	Work and Organization expert	Yes	No	No
6	Female	45	1	HPE	Physiotherapy, occupational health physiotherapy	No	(Occupational health) physiotherapist	Yes	Yes	No
7	Female	53	2	HPE	Management	No	Health and Safety Coordinator	Yes	No	No
8	Female	47	2	AHC	Speech therapy, speech and language pathology	PhD.c	Researcher	No	Yes	Yes
9	Female	30	2	AHC	Psychology	PhD.c	Researcher	No	Yes	Yes
10	Male	47	2	AHC	Occupational therapy	PhD.c	Lecturer, researcher	Yes	Yes	No
11	Female	47	2	HPE	Occupational therapy	No	Occupational therapist	Yes	Yes	Yes
12	Female	42	3	AHC	Health sciences	Yes	Researcher	Yes	No	Yes
13	Male	33	3	AHC	Movement sciences, epidemiology	Yes	Product manager eHealth	No	No	Yes
14	Male	56	3	AHC	Physiotherapy, occupational health physiotherapy	No	(Occupational health) physiotherapist	Yes	Yes	Yes
15	Female	42	3	AHC	Health sciences	Yes	Researcher	No	Yes	Yes
16	Female	58	3	AHC	Sociology	Yes	Researcher, development	No	Yes	Yes
17	Male	28	3	AHC	Physiotherapy, health sciences	PhD.c	Researcher	Yes	No	Yes

HPE = Higher professional education, AHC = Academic higher education, CANS = Complaints of arm, neck and/or shoulder, SM = Self-management, EH = eHealth, PhD = Doctor of Philosophy, PhD.c = Doctor of Philosophy candidate

the participants was 45.3 (range 28-60) years. The demographic profile of the participating experts is presented in Table 1. Experts worked in various professions. All participants had post-graduate qualifications in the field of CANS, eHealth and/or self-management. Five experts (29.4%) had a higher professional education and 12 (70.6%) had an academic higher education. Of the participants, 64.7% was an expert on CANS, 64.7% an expert on self-management, and 58.8% an expert on eHealth (some experts had more than one kind of expertise).

Focus groups

Following the recommendations of Krueger and Casey [36] a semi-structured interview guide with open-ended questions was developed (Appendix) by the authors. The interview guide was based on the expertise of our research group (NH, JE, BS, YH, MN, and SD). The expertise's included: guideline development, self-management, work-related disorders, and clinical experience with CANS. The interview guide was pilot-tested in the first focus group and no modifications were necessary, so we used the same interview guide in all three focus groups. The group members were asked for their opinion and experiences on CANS and/or self-management, including an eHealth module. Moreover, they were asked their ideas on the content of the self-management intervention, and the requirements to be fulfilled by the eHealth module and the self-management sessions. Moreover, possible barriers and facilitators were explored. The participants had no knowledge about the results of the focus groups held earlier with employees with CANS, described in an earlier article [17] and no other information was provided. Each focus group was moderated by the first author (NH) using a standardized script. All focus groups were audio-recorded and notes were taken by an assistant (LD). In each meeting the pre-developed interview guide was followed. The moderator made sure that every participant was involved in the discussion. The moderator actively generated interaction and discussion between participants. Each of the three sessions lasted about 120 min. After each session, the moderator and the assistant discussed the group dynamics and made a summary of the most striking results [36].

Data analysis

The audio-recordings were transcribed by an assistant (LD). The draft version of the Results section was sent to all participants and participants were asked to screen the text for misinterpretations and to make additions if necessary. A reminder by email was sent to the participants in case they did not respond to the first email within 10 days. The first author (NH), who was trained in qualitative research methods, performed the data analysis.

After reading each transcript multiple times, the transcripts were analysed using qualitative data analysis with an open-coding system [37]. New codes were added when considered necessary. After that, the codes were sorted into themes based on how the different codes are related and linked [37]. Then, the emergent themes were used to organize the data into main categories

[37], expressing the ideas and opinions of experts on CANS, self-management and/or eHealth interventions. Moreover, exploration of the relationships between categories was performed [37].

The Atlas.ti (version 7.082) program was used for analysis. During data analysis, the emerging themes were discussed in the research group. Moreover, by reading all the transcripts, the research group, checked that no main categories were missed. The supporting quotes related to each theme were discussed by the research group.

Results

With regard to the development of the intervention, experts for example indicated that insight in the complaints and self-awareness and knowledge about the complaints (for example about risk factors) are important. It was also stated that self-management starts as a personal problem of the employee and that it is important that the employee him/herself is in control. The attitude of employees towards their complaints and possible social support was also considered important. During data analyses, it appeared that these identified categories emerging from the data, showed similarities with the I-Change model (2.0) (see Figure 1), which consists of three phases of behavioural change [38]. Therefore, the derived categories with regard to the content of the intervention were clustered according to these three phases (Awareness, Motivation and Behaviour) of the I-Change model (2.0) [38]. Moreover, experts gave their opinions about the combination of self-management sessions and an additional eHealth module and the conditions and

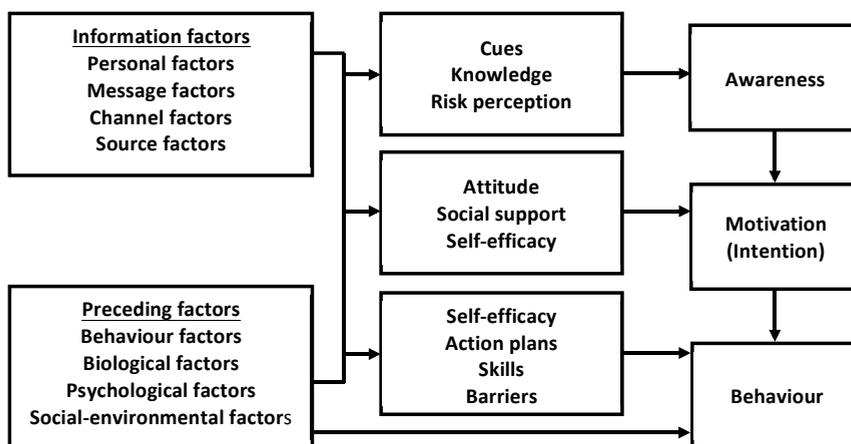


Figure 1: The I-Change model (2.0) [38].

requirements concerning the eHealth module. All data presented are opinions and statements of the experts.

Awareness

Insight in the complaints

Experts in the focus groups stated that employees with CANS have to work on identifying factors regarding the onset and persistence of their complaints. Experts considered it important that, at the start of the intervention, participants evaluate their individual problem areas, gain insight into their complaints, and develop self-awareness. It was mentioned that identifying risk factors and contextual factors can start in the self-management sessions, because here people feel most at ease and reassured. In addition, the eHealth can be helpful because it can give additional explanations and background information. According to the experts, it also seems advisable to involve an expert on CANS in the program, to provide information and to answer company-specific questions of the participants.

Some experts indicated that for successful participation in a self-management program participants should have a certain cognitive level and must have a learning capacity. One must have the ability to perform self-reflection and to look critically at their work environment, colleagues and at themselves. For awareness and self-reflection a considerable amount of information must be available and appropriate tools must be provided during the intervention. People need to examine their own problems and address them individually. Incorporating a screening tool or test to gain insight into their own situation and contributing factors is also advisable.

Putting priority on the health problem

Listening to the body was considered important. One expert said that if workers have complaints for more than 12 weeks, then they have not listened properly to their body. Self-awareness was indicated as one of the most important items; in addition, employees must be able to manage their own workload and complaints. One expert said:

It's striking that most of the employees who I see are under a lot of pressure at work and take almost no breaks... and then they also have difficulty in being able to self-manage. Because they think that they have to finish their work, there is no time for a break. Then you come into a type of conflict situation. (Expert 4)

Experts stated that many employees have a high workload and take almost no breaks, leading to a type of conflict, because they feel they cannot take the time to take these breaks. So, it is difficult to manage their own health problems and the workload. Especially for this group of workers,

awareness and behavioural change were considered important. Complaints do not always go away, but a self-management program could offer support to these employees. One expert stated:

At the time that someone personally achieves insight into the causality of the story and can thereby also take control into his/her own hands, then you retain someone in the work process. (...) As such a person is then busy with self-correction. (...) I consider this to be the most meaningful activity that you (...) can provide. (Expert 3)

This latter view was widely shared. It was stated that employees with CANS must put priority on their own health problem. Experts stated that it is important to be aware of the relationship between complaints and their causes and that individuals realize that they need to change their behaviour.

Knowledge about the complaints

Experts agreed that providing relevant knowledge can be a part of a self-management intervention. This can also create cues that prompt people to become aware. Awareness with regard to possible risk factors and how participants can influence these risk factors themselves, can be a cue to take action. In general, experts believed it is important that employees with CANS get information about their complaints, e.g. regarding symptoms such as pain, tingling, muscle spasms and loss of coordination. Moreover, most experts found it important that the intervention deals with possible risk factors related to the complaints. This also facilitates risk perception of employees. The diversity of these topics is often not known and all these topics should be addressed. For employees with CANS, clarity of information is important. Experts agreed that the risk factors related to CANS are multifactorial and that causes can vary from person to person:

Quite often the causes simply arise from the relationship with the boss or employer... but the cause can also arise from a large number of other things. That your office material or equipment is not right, or your monitor is not good. Or just because you don't feel comfortable in the group, or you're having family problems. (Expert 15)

Experts found it important to address the reasons why employees can be overloaded. They also found it important to address possible risk factors related to the persistence of the complaints, which employees are often unaware of. Employees must be aware that the body gives signals of overload. These signals should be a cue to take action. Experts stated that employees often carry on too long and often fail to take action until it is too late.

Experts believed it to be important to discuss the potential risk factors related to CANS, for instance, by giving some general examples and explaining the effects of several risk factors on the

onset of complaints. The employee's behaviour was seen as an important factor related to the onset of symptoms. Some experts suggested possible risk factors that are important to discuss in the intervention: (work) stress, posture, workplace (materials and equipment), work tasks (repetitive tasks, extreme workload, extreme positions of joints), social factors (colleagues, relationship with supervisor), personal circumstances, and lack of physical activity.

In one focus group there was some discussion about the role that work plays as a cause of the onset of symptoms:

I agree that you have to do something about the pain, I don't agree that all of these non-specific complaints are caused by work. They are relevant to carrying out the work, they impede the work, and perhaps it's difficult to recover from these complaints if no accommodation is made in the work environment. But I don't know if it's always the cause ... but it is work-related. (Expert 12)

This quote indicates that work is considered a factor in the onset and chronic character of symptoms and that complaints are believed to have at least a relationship with work. However, experts indicated that the actual work itself is not necessarily the cause of the complaints.

Some experts indicated that employees with CANS generally have high demands (on themselves) and are often perfectionists. One expert stated that particular highly educated employees develop CANS and that the content of the work may also play a role:

It's also a combination of stress and a high level of pressure at work. I also often see data typists, these people listen to music and are thus inputting things ... that's very repetitive work but these people often have less problems. And what I really have noticed is that these dedicated ITers, who also work on the computer at home for an extra 8 hours, have no complaints at all. It's often a combination of self-imposed stress and actual stress and repeated movements. Because of the deadlines and self-imposed stress they work through the pain. (Expert 14)

Some experts also indicated that, in employees with CANS, the problem is less related to the workplace itself than to the behaviour (i.e. experiences and the intensity) of the employee at work. Generally, employees with complaints for more than 12 weeks have already tried many different options related to work adaptations. Regarding the causes, one expert stated:

It more closely resembles a burn-out than an irritation of a tendon or capsule. The intensity at which people work affects the development of complaints much more than

the physical conditions of the work environment. After 12 weeks it really is more about the psychological aspects. (Expert 14)

Taken together, experts stated that it is important to inform employees with CANS about all possible causes and potential risk factors, and to stimulate them to analyse their own situation. Moreover, experts stated that the intervention should focus on psychosocial aspects, especially during the self-management sessions. Moreover, it was stated that working conditions and environmental factors can be discussed in the eHealth module.

Motivation

Motivation for making changes

Experts agreed that self-management begins with the intention to take action; this is a prerequisite for a chance of success. Motivation is an important condition, participants must see the need for a change and the need to have control in their disease management.

Then it doesn't matter whether someone is working somewhere for a sheltered workplace or whether that person is a manager at the Shell Corporation. Both will go well, as long as the motivation is present to do something about it. (Expert 11)

Experts agreed that self-management should start from a personal problem experienced by an employee. This ensures sufficient motivation. One has to recognize the possibilities to make changes. It is very important that people come up with their own solutions, are in control, and feel empowered. In the situation that healthcare professionals are involved, it is important that they support the client, but that the client stays in control and indicates his/her needs. One expert stated:

Self-management is by definition oriented towards decision-making. Therefore, you need a problem, which means that this person her/himself has to have a problem. Then you can come with (amongst others) some knowledge, or with advice and counselling, that can be instrumental - but self-management starts with a problem that you yourself have.
(Expert 1)

A barrier of self-management is that clients may be (too) passive. Therefore, healthcare professionals must be aware of this and facilitate the client to stay in control. According to most experts, it is important that healthcare professionals involved in self-management also undergo a change themselves.

Attitude towards the complaints

Experts stated that employees with CANS must be proactive rather than reactive. One must take action and make changes. People have to think about what they need to make a successful change; it is important that they think in terms of possibilities rather than problems. Concerning 'positive thinking' one expert remarked:

People often adopt the attitude that 'I can't do this anymore' - whereas you have to turn them around to adopt the attitude that 'I simply have this condition at this moment in time but I can still do other things'. Therefore, they have to actually see the opportunities rather than the limitations. (Expert 7)

Experts believed that by providing information about CANS and by understanding the course of the disorder, the attitude of employees with CANS can be influenced. For example, in the chronic stage the pain can be present continuously, the course can also be erratic, and it can take a long time before the changes made have an effect. Therefore, to change the attitude towards pain, providing information about pain is considered important; for example, about what (chronic) pain is and what the function of pain is. Employees should be aware of this and understand it. Learning to deal with the pain is important. Attention should also be paid to the emotions that arise with pain, the cognitive aspects surrounding pain, and the use of pain medication. Regarding the experienced pain one expert said:

It's quite different when people suffer pain for 12 weeks than when you hit your thumb (with a hammer). I work with companies, which I visit every two weeks, where people can sign up, and then you might see only those who have had problems for two days. This is a completely different situation than when I see someone after about three months; in the latter situation, far more explanation is needed. (Expert 14)

Social support and asking for help

According to the experts, people suffering from CANS for more than 12 weeks are in the chronic stage of CANS. Often, they do not know what they can do to reduce their symptoms. One expert indicated that there is a hidden need for reassurance in this group:

The first non-verbalized need - is that of reassurance. There are many people who say that it will never get better. When repetitive strain injury first appeared 15 years ago, the major newspapers went along with this: if you ever develop it, you will never get better. (...) What I did was to try to say that this is the situation right now, at this moment in time it's not going very well, but you don't have rheumatism or any other similar condition. (Expert 14)

Experts said that in the group sessions people can recognize themselves and their problems and feel supported. Experts found that the exchange of experiences is a particularly important advantage of the group sessions:

... and then they learn a lot from each other, and see that 'yes' you also have this, I also experience it in the same way ... and then someone tells how he dealt with it and then the other person thinks - 'I'm going to try the same thing'. My experience is that discussing something like this takes an enormous amount of time. (Expert 16)

The experts noted that it is sometimes difficult to properly formulate a request for support, and to discuss experiences and needs with the supervisor at the right moment. Therefore, employees should acquire the tools to communicate with their supervisor. One expert indicated that workers themselves must decide whether and how they want to talk with their supervisor, or perhaps choose another possible solution:

I believe that people have to think about that on their own - if you personally want to change something in your work environment then you have to consider that you will have to discuss this point. That's the approach which you have chosen for yourself, because you could choose different solutions which would not involve the need for this discussion. (Expert 5)

According to some experts, relationships at work may play a role in the onset or persistence of complaints. It is important to reflect on the work environment and relationships:

... important is the work situation, the employer, how the work is organized and how the different spheres of influence work out. It's valuable to provide information in recognisable themes, perhaps also use role playing... but make it on a larger scale than only focusing on the employee with arm, neck and shoulder complaints. (Expert 10)

Experts believed that employees with complaints can feel very unhappy if an employer does not cooperate. Social support was considered very important. Workers should be able to obtain social support from colleagues, managers, friends, family and/or healthcare professionals. One expert stated that support at the workplace, as well as in the private sphere, is one of the most important issues to be addressed. Knowing how to obtain these resources of social support, without feeling threatened, is an important skill. Employees are not always aware that this lack of workplace support may be an extra burden. In addition, there may be psychosocial factors at home, whether temporary or not, affecting the complaints or the personal capacity. Experts considered it important that employees are aware of these possible factors.

Experts mentioned communication as an important topic which can stimulate social support. Good communication starts with self-reflection: How do I communicate? In addition, suggestions for good communication were considered important, including training of communication skills. Employees with CANS are often highly engaged with their job and do not easily say 'no'. More assertiveness towards the employer may be required. It is also important that employees acquire the tools and skills to communicate with their supervisor, e.g. about their needs and experiences. Employees may also feel that their supervisor does not listen to them, so it is useful to examine how employees communicate their needs and experiences:

I occasionally meet people who say 'I want another computer mouse but I don't think my direct manager allows me to'. Then I ask whether he/she already made this request to his/her boss. That piece of competence - to approach your boss with your request for help - is important. (Expert 7)

Behaviour

Self-efficacy and empowerment

Experts saw a role for a self-management program for employees with CANS and agreed with each other that the intervention should focus on increasing the employee's self-efficacy and empowerment. Employees must have the confidence to handle situations they are confronted with in the right way. Participants of a self-management program should also be challenged to take the lead in the management of their complaints. To achieve this, information may be provided, skills can be trained, and participants must identify possible solutions themselves. By offering a wide range of information and knowledge, and by practicing skills, each individual employee can select for themselves the relevant topics and then take action. Regarding the breadth of the information that should be provided, one expert said:

I would say that it must not only be about the arm, shoulder and neck, but primarily about work, about yourself, and how you manage to restore yourself to a good balance. And starting to work and continue working on a healthy way. (Expert 10)

Taking action

No ready-made solutions should be offered. Participants should be facilitated to find a tailored solution. Participants themselves must take action and find solutions; in this way they will also be highly motivated. Participants must consider various solution options and make choices between them. One expert stated that three possible solutions must be available before one can make a 'real' choice. According to experts, an additional eHealth module could have added value because it may provide ideas for possible solutions. It is important that participants consider their own so-

lutions; these will differ for each individual depending on the underlying problem(s) and personal situation. One expert explained:

I do believe that - which also is the challenge - to let it come from themselves. To use what they experience as support. Each person has his/her own manner. (Expert 6)

It was assumed that the target group of the intervention, i.e. workers with longer-term CANS, are open to such an approach. Employees with CANS have often taken various steps with the aim to reduce their complaints.

Setting goals and making choices

Setting goals was indicated as important. Experts considered it important to split the main goal into sub-goals. Achieving some success in between can also work as a motivating factor. It is also important that participants feel strengthened. People gain confidence as they tackle a part of the problem and gain control over this problem. This increases the chance that, once the program has ended, the participants will continue working in this way.

I also think it's very rewarding if you really do have actual complaints and you have learned through reflecting on these complaints, discussing them with people, looking up information on the subject, and by trying out various things - and that you realize that the complaints become less severe over time. I can understand that this approach works well. Also, in different but similar situations, you can perhaps also use the same approach through which you can achieve success. (Expert 5)

According to experts, another role of a self-management intervention is to ensure that employees are aware of the possible facilities and treatment options (with regard to their complaints) within and outside their organization or company. In this way, employees can more easily find the right facilities and care. Overall, experts believed that participants should be able to make their own choices. One expert stated:

For one person it mainly concerns the development of talent, identifying your own strengths and then using these optimally. For another person it involves the physiotherapist coming by and then, together with your employer, you determine where you can find the financial resources to obtain a better monitor. (Expert 15)

Important skills and behaviour

Besides communication skills, according to some experts, other important skills can be related to physical activity, private life, load and capacity, setting limits, taking breaks, relaxation and

ergonomics. Experts stated that participants must realize that what is good for one person may not be good (or not useful) for another.

Physical activity

Some experts in the focus group who had employees with CANS tried to improve their complaints through sports/exercise and tried to upgrade their physical capacities. Experts agreed that the importance of physical activity should be emphasized and participants should be encouraged to undertake more physical activity. Exercises were also considered important. Experts said that physical activity and exercise must be gradually increased, because muscles may not be in optimal condition; in some cases activity should be supervised by a physical therapist. One expert stated:

One of the causative factors is also the lack of movement, and fear of movement.

(Expert 3)

Private life

Experts stated that it is important that employees have sufficient relaxation in their spare time. A good balance between work and home activity was considered important. Concentrating on one's hobbies and interests can help with this. In addition, the home situation can also be a physically stressful factor, as indicated by one participant:

A lot of people work at home - many people work on the computer or are gaming online, have painted the ceiling, or have laid paving stones for a sidewalk. (Expert 15)

Load and capacity

Physical capacity can vary greatly from person to person. Employees can influence this by adjusting/lowering the load, or increasing their physical capacity. According to experts, employees should give priority and listen to signals from their own body. Employees should correctly estimate their capacity, set their limits, and ask for help from others when needed. One needs to find a good balance between one's load and one's capacity:

That is therefore the balance: which means that you know from experience that if you don't set this limit, then you will develop very serious complaints. (Expert 5)

Setting limits

As mentioned, employees must set their own limits; this was considered as an important skill. Experts also indicated that setting limits is not a convenient term in relation to self-management. In fact, in an intervention focused on self-management, participants should find their own solutions.

Experts stated that the experienced problems should therefore give rise to looking for solutions and alternatives. Employees with CANS should realize that if they carry on without changing anything their complaints will worsen, and then alternatives and solutions will also be more difficult to find. Setting their own limits could be a part of this solution. However, this is not always easy, for example in certain occupations:

I also see this during clean-ups or in the cantina where people have to repeatedly perform the same activities. Then you cannot easily say that you need to take your time. (...) I recognize this situation quite clearly in administrative work. In all work situations there is this constant pressure to keep working at all costs. (Expert 2)

Taking breaks

Taking regular breaks was considered important. Employees need to take a break at certain time intervals and not wait until they experience symptoms. One expert reported that in some companies taking a break is obligatory because of the increased risk of developing complaints when persisting with work. Employees are, for example, also encouraged to get up and move around during the breaks. About the role of taking breaks one expert stated:

There is a logic underlying the link between the development of complaints and the duration of the period when this actually occurs. There are intermediate stages, which precede the actual appearance of the complaints. If someone becomes aware of the fact that he has complaints after one and a-half hours, he could also have become aware of this within three-quarters of an hour when the first complaints became evident, if he'd known how the symptoms would manifest. I think that someone has to take breaks earlier. (Expert 3)

Relaxation

Experts believed it is important that participants receive information about stress and relaxation. Also, information on the negative effects of stress and information on stress in relation to the development of symptoms are considered important. Information on activities in relation to muscle tension is also helpful. Some experts stated that practical advice on how to relax (muscles) is essential.

Ergonomics

Information on the ergonomics of the workplace is valuable: e.g. how to adjust the desk, chair and monitor, and the proper use of keyboards and/or mouse. One expert remarked:

On a completely different level, it's just about the competence to adjust your office chair.

(Expert 10)

Other aspects such as lighting, sound, climate, working posture, and work techniques were also important topics. Also, the ergonomics of the workplace at home was considered a matter of concern, because many people use a laptop at home where posture is often far from optimal. Within the framework of alternative workplace strategies this topic must also be addressed.

Combination of self-management sessions and eHealth

Experts indicated that the combination of group sessions and eHealth can work extremely well. The sessions and eHealth can strengthen and complement each other. Topics may be initiated in the sessions and participants can, if interested, sort these out in the eHealth. Additional assignments or exercises can also be offered in the eHealth. In general, experts endorsed the additional value of the eHealth: as one expert stated:

I really do view eHealth as a very definite support to this. (...) In fact, it can be considered as an additive you can offer to the palette ... and a great way in which you can provide a lot of information. Through this approach people can very selectively choose what they need. (Expert 8)

The self-management intervention was seen as a roadmap, in which participants work on their personal goals, and have interaction with other participants. The eHealth lends itself to provide more information. Participants could then use this information in the sessions in order to achieve their goals. Participants can use the eHealth to solve the formulated problems and fulfil their action plans. Because CANS has a multifactorial origin, experts expected that eHealth can offer the opportunity to sift through a considerable amount of information. The eHealth is ideally suited to address all dimensions of the related topics. It is important to determine in advance which topics should be addressed in the self-management sessions, and which topics should be covered in the eHealth. Regarding what should be addressed in the meetings and the eHealth one expert stated:

For example, about office skills and adjustment to the office chair. Perhaps you actually don't do this in the sessions - but rather (a discussion of) a very distinct office chair and a description of the five most popular office chairs. (Expert 10)

Table 2: Conditions and requirements concerning the design, layout and interactivity of the eHealth module.

Design
<p>The eHealth should be designed in such a way that people can work with it themselves and can search for possible solutions. It should be self-explanatory.</p> <p><i>... and with as little distraction as possible. The person has to immediately understand the correct button to be clicked on... and a short demonstration film, that sort of thing, is also often crucial. That its use does not represent a barrier to continue... and indeed, you must not want to fill in a website, no long texts. Visual support as much as possible, then you have to achieve something with a drawing/record or something interactive (Expert 9)</i></p>
<p>There must be a guiding line: for example, phases or themes. Some parts can be obligatory and other parts can be optional.</p>
<p>The information should be short and concise. With the use of tabs: so that it is possible to distinguish between the main themes and to distinguish several levels.</p>
<p>If possible, the eHealth should be designed as an independent program, so that in the implementation phase it can be used without the group meetings. In some sub-groups the eHealth itself may give sufficient support.</p>
Layout
<p>The layout should be attractive.</p> <p><i>Irrespective whether or not people find the concept of eHealth appealing, the way you present it - the interface - its attractiveness is very important. (Expert 13)</i></p>
<p>Paying attention to apparently 'smaller' details is important: for example, the font that is used. What seems trivial may have considerable influence.</p>
<p>Preferably use images, video and/or voice messages.</p>
Interactivity
<p>There is some discussion as to whether the website should be interactive. On the one hand this makes the website more attractive, but eHealth then becomes more complicated - which is not desirable for this purpose. These considerations should be evaluated.</p> <p><i>If you say interactive then you first have to have a goal to reach - and only then can you say interactive or not. (Expert 13)</i></p>
<p>Implementing a diary feature is a possibility:</p> <p><i>Regarding a diary - hopefully most participants won't have any objection to fill in a diary on the computer. If they already do that, then it's a good preparation for the next session. If people want to share the diary with each other - then they can. (Expert 10)</i></p> <p>But another expert stated:</p> <p><i>What is of course also interesting, is that there are people with complaints that arise from regular computer use (Expert 10)</i></p> <p>Therefore, use of the computer for additional features needs to be considered, in order to prevent more hours spent behind the computer.</p>
<p>Experts have different opinions about adding a forum/community with participants and experts. A community with healthcare providers is frequently used nowadays, and an online consultation is also an option. However, a forum/community has the disadvantage that participants might 'whine' about their complaints. Moreover, participants can contact each other in the group meetings and with small groups it is difficult to have an active community online.</p>

Table 3: Most important item as reported by the experts.

Group 1	
Expert 1	<i>On looking back, I think that you look back together with your colleagues. The colleague has done many things that she/he reflects on her/his own activities so that she/he feels stronger or learns from it. You only achieve the effect if you ask to reflect.</i>
Expert 2	<i>I think it's very important that you convey some degree of enthusiasm, so that they become convinced that you yourself to a large extent possess the key to the solution. And that you need some additional help with this - then they can go and do it on their own.</i>
Expert 3	<i>I think that knowledge on the symptoms and on the consequences of the symptoms for the activities that these people are carrying out is important information.</i>
Expert 4	<i>A little understanding, development of insight into the risk factors, and in this way to be able to work out what to do with it in more detail.</i>
Expert 5	<i>I have written down 'socially desirable behaviour, assertiveness and social skills'.</i>
Group 2	
Expert 6	<i>One thing that I find important is that people learn to feel what their body is telling them - and learn to listen to their body. And also to once again come into contact with themselves - a little bit of mindfulness.</i>
Expert 7	<i>For me it is important that people can establish a connection between what they are doing and the effect of what they are doing on their body. (...) And perhaps quite simple, but to celebrate successes. People sometimes find it quite normal that an action is successful. Subsequent processes are sometimes small steps but ones which are important to someone - for these you certainly require courage, perseverance, insight. Therefore, you may also celebrate the success that you have actually accomplish.</i>
Expert 8	<i>I say: the user interface of the eHealth. Therefore, that what people see is attractive.</i>
Expert 9	<i>I think what is important is the retention, the retention of the effect of the treatment. That there is a way to prevent relapse.</i>
Expert 10	<i>Perhaps the deeper question is what I consider to be more important, the pain in my arm or my work. (...) And about work load and capacity to work, the making of choices, most certainly with those people whom you know will always have minor complaints - they have to set priorities. Then the question which remains is what do I think is the most important.</i>
Expert 11	<i>I think I should say work ethics, norms and values. When do you find yourself (to be) a good employee. What are your criteria?</i>
Group 3	
Expert 12	<i>What I just said - the evaluation process, and what I said in the beginning - safety and support. That is very important.</i>
Expert 13	<i>I would in any case include physical activity, the stimulation of more physical activity in the program.</i>
Expert 14	<i>I think, whether you focus on the work environment or on the physical aspect, in both cases cognition is essential. How do people personally think about these things. There are many incorrect prejudices and opinions. Often there is too little knowledge about the human body.</i>
Expert 15	<i>What we just said - that people acquire insight into how behavioural changes work and how do I personally view such changes. In which phase are you - and how is that going - so that they also understand why their goals are not being reached. That you then - once again - can do something. Insight into behavioural change is very important.</i>
Expert 16	<i>The role of the supervisor in the development and solving of the problem.</i>
Expert 17	<i>I think that you also really do have to support the use of the website.</i>

Generally the experts saw the self-management sessions as the main focus of the intervention, with the support of the eHealth. The eHealth is thought to contain additional information, including scientific publications. In the eHealth it is also possible to look at topics from another perspective. Experts indicated that it is important to facilitate the use of the eHealth, e.g. by referring to this in the self-management sessions.

According to the experts, the eHealth should be self-explanatory with short and concise information. It should be attractive and could include a forum or an online community. An overview of the experts' opinions on the conditions and requirements concerning the layout and design of the eHealth module are presented in Table 2. The most important items regarding the intervention as reported by the experts are presented in Table 3.

Discussion

Experts seem to see a role for a self-management program for employees with CANS. However, as shown in Table 3, many items are indicated to be important by the experts. Experts emphasized that an intervention that aims at understanding or, moreover, decreasing CANS in employees, should focus on increasing employees' self-efficacy and empowerment. Employees with CANS have difficulty in managing their own health problem and their work. Informed awareness and behavioural change are considered important for this group of employees. Complaints will not always go away, but a self-management program can offer support to these employees.

Experts indicated that self-management begins with the intention to take action. Self-management starts from awareness of a personal problem of the employee. It is very important that people come up with their own solutions, are in control, and feel empowered. Providing knowledge can also be a part of a self-management intervention. It can consist partly of creating awareness with regard to possible risk factors, cues to prompt people to become aware, and about how participants can influence these risk factors themselves. According to the experts, self-management also involves self-efficacy; people must develop confidence that they can handle situations that they are confronted with in an appropriate way. The view of the experts on self-management finds support in literature [20, 39, 40].

Experts indicated that the combination of group sessions and eHealth can work extremely well. The sessions and eHealth can strengthen and complement each other. To our knowledge, no group-based self-management intervention including eHealth currently exists. In a systematic review on the use of information technology for diabetes self-management, no single intervention combined group sessions with eHealth [41]. Topics may be initiated in the sessions and par-

ticipants can, if interested, sort this out in the eHealth. In general, experts endorse the additional value of an eHealth module. It is important to determine in advance which topics should be addressed in the self-management sessions and which can be covered in the eHealth.

During data analyses, it appeared that the identified main categories emerging from the data, showed similarities with the I-Change model (2.0). Therefore, the main categories emerging from the data were clustered according to the three phases (Awareness, Motivation and Behaviour) of the I-Change model [38]. The I-Change model also assumes that behaviour is the result of intentions and abilities and explicitly makes a distinction between three phases of motivational change and their corresponding determinants [38]. In the pre-motivational phase (Awareness), people need to become aware of their risk behaviour. In the motivational phase (Motivation), people need to become motivated to change their behaviour; in this phase, an intention is formed. In the post-motivational phase (Behaviour) people need to translate intentions into actions, so several preparatory actions to facilitate the actual behaviours need to be planned and executed [38]. The I-Change model is built on the Attitude – Social influence – Efficacy (ASE) Model [42] (comparable to the theory of planned behaviour [43-45]), on which the original intervention of Detaille et al. [32, 33] was based, and has incorporated ideas from several social cognitive models [38]. As can be seen in Figure 1, the I-Change model assumes that motivational factors are determined by various factors, such as awareness factors, preceding factors and information factors [38]. By using the I-Change model we were able to relate the outcomes of this study to the stages of behavioural change.

In general, experts found it important that the intervention deals with the possible (multifactorial) risk factors related to the complaints and the underlying problems; this is because employees with CANS are often unaware of the diversity of the possible risk factors. Moreover, earlier focus groups with employees revealed that not all employees are aware of the actual cause of their complaints [17]. The multifactorial risk factors of CANS are supported in the literature [4-7, 46]. The earlier focus groups with employees with CANS also indicated that basic information about the complaints, including potential risk factors, is needed [17]. The importance of other topics identified in the focus groups with employees [17], such as information on symptoms (including chronic pain), as well as workload and physical capacity, are also endorsed. According to the experts, employees with CANS should be more proactive. Also, in the intervention, difficulties should be identified and participants should make their own choices and obtain reassurance.

Employees with CANS find it difficult to deal with their complaints and may have difficulty in managing prolonged work activities and paying sufficient attention to their physical posture [17]. Dealing with and acceptance of complaints are topics that also arise in relation to other chronic musculoskeletal disorders, such as low back pain [47]. Finding a balance between all the

requirements related to activities at work is challenging; therefore, information about the work environment related to CANS, including workplace adjustments, is required [17]. Experts indicated several areas related to the work environment, including workplace ergonomics, that should be addressed in the intervention; therefore, the work environment seems to be an important topic, especially in the eHealth.

The importance of exercises is generally recognized by employees with CANS [17] and is also indicated by patients with low back pain as a way to manage complaints [47]. Some experts recommended that employees with CANS might improve their complaints through sports/exercise and should upgrade their physical capacities. On the other hand, in our focus groups with employees, some participants stopped stressful sports activities because they thought these activities would aggravate their complaints [17]. Experts recognized the value of physical activity and the importance of exercises. Both experts and employees with CANS also indicated the importance of having information on and exercises about (muscle) relaxation [17], which is supported by others [48].

Addressing the negative effects of stress, and information about stress in relation to CANS, is considered important by experts. Employees do not always find it easy to deal with the stress and pressure of work [17]. Experts stated that employees must set their own limits and that this is an important skill. Related to the setting of limits, employees with CANS have a relatively high threshold before asking for help, whereas others think they should tighten up their limits [17]. Focus groups with employees identified a relationship with stress in the development and worsening of their complaints [17]. In fact, work stress is associated with common health complaints, such as musculoskeletal pain [49]. Moreover, (work)stress is associated with musculoskeletal problems of the upper extremity [50]. Also, employees with CANS indicated that taking into account one's own limits is important [17].

Experts considered communication skills to be important. Employees with CANS did not always find it easy to talk about their complaints and/or to bother others about their problems [17]. Generally, there are no major problems encountered with communication, but employees with CANS considered providing communication tools for discussion with others about CANS to be important [17].

Social support is considered valuable by the experts. Patients with low back pain considered emotional support and encouragement as essential [47], and social support was also considered important by patients with rheumatoid arthritis [51], which emphasizes the importance of this topic. In general, employees with CANS experienced sufficient support from their colleagues and from those at home [17]. Most employees experienced sufficient support from their supervisor; however, some employees who participated in earlier focus groups experienced insufficient or no

support from the supervisor [17]. This could indicate that knowing how to obtain social support is also an important skill.

Experts found it important to address the importance of finding a good balance between work and home. This is endorsed by some participants in the focus group with employees complaining that there is a lack of balance between their work and private life [17]; this can also occur in other chronic conditions, for example a neuromuscular disease [52].

Limitations of the study

This study has several limitations. A total of 17 experts in the field of CANS, self-management and eHealth participated, this is probably a rather arbitrary selection of all experts on these topics in the Netherlands. We decided to divide the different areas of expertise into the three focus groups, thereby ensuring that in all focus groups all topics could be discussed. The alternative, placing all experts of one area together in one group might have produced more discussion about each of the topics but separately. By having mixed focus groups all experts participated in the discussions on all topics, which made it possible to establish relationships between topics. Although we did not set a point of saturation in advance, it is highly likely that saturation was reached because the same issues were identified and discussed in all three focus groups. Data were coded by one researcher. Multiple coding involves the cross-checking of coding strategies and the interpretation of data by independent researchers [53]. However, as Barbour (2001) [53] stated, the degree of concordance between researchers is not very important; the main value of multiple coding is to supply alternative interpretations [53]. It is important that a transparent and systematic process is followed which can be carried out by one researcher, by a team, or by involving independent experts [53]. By discussing the emerging main categories and looking for alternative interpretations for our findings in a small research group, we investigated the potentially competing explanations.

As mentioned in the Introduction, for the specific group of participants with CANS, more prolonged computer use (due to following an eHealth program) could worsen their physical problems. However, this was not specifically mentioned by the experts.

Content of the intervention

Important topics of the intervention indicated by experts are the possible causes of complaints, addressing potential symptoms, identifying difficulties and problems, making choices, and reassurance and self-awareness. The intervention should also address behaviour such as setting limits, taking breaks and ensuring sufficient relaxation. Ergonomics, social relationships and social support, the importance of physical activity and exercises, and a good balance between work and home activity are also considered important. The topics identified in this focus group study generally meet the needs of employees with CANS [17] which are related to exercises, muscle

relaxation, working with pain, work environment, social environment and personal factors (including workstyle), all of which are supported by earlier studies [6, 7, 18, 19, 54-63].

Conclusions

The present study provides valuable insight into experts' opinion on a self-management program for employees with CANS. Experts seem to see a role for a self-management program for employees with CANS and the intervention should focus on increasing the employee's self-efficacy and empowerment. Experts indicated that the combination of group sessions and eHealth can work extremely well. Moreover, experts from different fields provided valuable information regarding the development of a self-management program for employees with CANS, which can be used in the adaptation of a self-management program following the intervention mapping protocol [35]. This information can also be used to develop other interventions and for the treatment of employees with CANS.

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Appendix: Interview guide for the focus group sessions

Introduction (5 min)

- Brief introduction about the research project and the aim of the focus group.

Introductory questions (20 min)

- Introduction of the participants (name, type of work, experience with CANS, self-management and eHealth).
- What is self-management for employees suffering from CANS?
- Does a self-management program for employees suffering from CANS for more than 12 weeks make sense?

Content of the intervention (55 min)

- Which topics should be addressed in a self-management intervention for employees with CANS?
- What kind of information about the onset and persistence of CANS needs to be discussed in the intervention?
- What kind of information about dealing with and reducing complaints should be included in the intervention?
- What kind of skills should employees with CANS have developed after the intervention?

Break (10 min)

Development of the intervention (30 min)

- Which requirements should a good eHealth module fulfill for the target group?
- What are potential pitfalls and/or important points in the development of an eHealth module?
- Which requirements should a good self-management program for the target group fulfill?
- What are effective methods to use in the self-management program?

Self-management program including eHealth (20 min)

- Which topics, or what kind of topics, should be covered in the self-management sessions and which topics, or what kind of topics, should be addressed in the eHealth?
- How can the self-management program and eHealth module complement each other?

Closure (10 min)

- What would you say is the most important topic or item in the goal or the development of the intervention?
- Which topics did you miss during this meeting, but are important in the process of developing the intervention?

4

Development of a self-management program for employees with complaints of the arm, neck and/or shoulder: an intervention mapping approach.

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Abstract

Purpose: To develop a self-management program with an additional eHealth module, using the six steps of the intervention mapping protocol, to help employees with complaints of the arm, neck and/or shoulder (CANS) cope with their problems.

Method: In step 1 of the intervention mapping (IM) protocol a needs assessment was performed consisting of a review of the Dutch multidisciplinary guideline on CANS, and of focus group sessions with employees with CANS (n=15) and with relevant experts (n=17). After the needs assessment, the objectives of the intervention and the determinants of self-management at work were formulated (step 2). Furthermore, theory-based intervention methods and practical strategies were selected (step 3) and an intervention program (including the eHealth module) was developed (step 4). Finally, plans for implementation and evaluation of the program were developed (step 5 and 6).

Results: Step 1 of the IM protocol revealed that employees with CANS should be stimulated to search for information about the cause of their complaints, about how to deal with their complaints, and in which manner they can influence their complaints themselves. In step 2 the overall goal of the intervention was defined as 'Self-management behaviour at work' with the aim to alleviate the perceived disability of the participants. Step 3 described how the intervention methods were translated into practical strategies and goal setting was introduced as an important method for increasing self-efficacy. The product of Step 4 was the final program plan, consisting of six weekly group sessions of 2.5 h each and an eHealth module. In Step 5 a recruitment plan and course materials were developed, a steering committee was set up, trainers were recruited and the final program was tested. In Step 6 an evaluation plan was developed which will consist of a Randomized Controlled Trial with a 12-month follow-up period and a qualitative evaluation (interviews) with part of the participants.

Conclusions: This study resulted in a theory and practice-based self-management program, based on behavioural change theories, guideline-related evidence and practice-based knowledge, that fits the needs of employees with CANS.

Background

Work-related disorders of the upper limbs, also known as work-related upper extremity disorders or complaints of the arm, neck and/or shoulder (CANS), are an important health problem [1]. CANS can cause major problems in work participation, which can lead to sickness absence and job loss [2, 3]. In the Netherlands, the point prevalence of chronic complaints (persisting for >3 months) due to CANS is 19%; of these patients, 60% reports the use of healthcare facilities in the past year [1]. The yearly costs due to CANS have been estimated at 0.5% to 2% of the gross national product in the Nordic countries [4]. Thus, work-related neck and upper limb disorders have both a health and substantial socio-economic impact [5].

In 77% of the patients the complaints are located in the upper back/neck/shoulder region, in 25% in the elbow/underarm region, in 19% in the wrist/hand region, and in 42% the complaints occur in a combination of these regions [6]. A distinction is usually made between specific CANS (such as epicondylitis, carpal tunnel syndrome) and non-specific CANS [7]. Non-specific CANS is defined as pain, stiffness, tingling and/or numbness in the neck, upper back, arms and/or hands, related to work, that has persisted for ≥ 2 weeks [1].

A recent Cochrane review on conservative interventions for treating work-related CANS, found very low-quality evidence showing that exercises did not improve pain compared with no treatment, or with minor intervention controls, or when provided as additional treatment on the short or long-term follow-up; [8] these results were similar for recovery, disability, and sick leave. Specific exercises led to increased pain on short-term follow-up compared with general exercises [8]. The authors also found very low-quality evidence indicating that ergonomic interventions are not effective for pain reduction when compared with no intervention on short-term follow-up, but did decrease pain on long-term follow-up. There was no effect on disability, but sick leave decreased in two of the included studies. None of the ergonomic interventions was more beneficial for any outcome measure when compared with another treatment, or with no treatment, or with placebo [8]. Behavioural interventions had inconsistent effects on pain and disability, with some subgroups showing benefit and others showing no significant improvement when compared with no treatment, minor intervention controls, or with other behavioural interventions [8].

Another study showed that the use of a generic self-management program for employees with a chronic somatic disease (intervention group) improved the attitude towards self-management at work (enjoyment) after eight months ($p=0.03$) [9]. An interaction effect showed that low educated workers in the intervention group developed a better physical health quality (SF-12) compared with workers in the control group. The attitude towards self-management at work (importance)

improved in the intervention group for older and female workers, and the attitude toward enjoying self-management at work improved for female workers only [9].

Given the need for intervention programs for people suffering from CANS [7, 8, 10] and the multifactorial (biopsychosocial) origin of CANS, a multi-component intervention that includes both biomechanical and psychosocial components is recommended [11-13]. Therefore, we aimed to adapt an existing self-management program [9, 14, 15] for employees with a chronic disease to the specific needs of employees with CANS. In addition, by developing an eHealth component, some of the subgroup-specific information can be provided in a tailored way, so that participants can make their own individual choices. In this way, the time during the group meetings can be used more effectively and the information is available for everyone at every moment [16]. There is evidence that web-based, interactive interventions have a beneficial effect on patient empowerment and/or on physical activity in patients with various chronic conditions [17]. Moreover, in view of the discontinuity in program use and/or dropout from a study before completion of an internet intervention [18, 19], plus the potential advantage of face-to-face meetings, the combination of a self-management program with an add-on eHealth component seemed to offer the best possibility for the management of complaints in employees suffering from CANS. Finally, it is a challenge to design an eHealth environment suitable for employees with CANS, who potentially suffer from complaints due to computer use.

In the present study, the intervention mapping (IM) protocol [20, 21] was used to adapt an existing self-management program and to develop an eHealth component. IM is a problem- and theory-driven protocol reported to be suitable for the development and implementation of evidenced-based intervention programs [22, 23]. Here, we present a detailed overview of how IM was used to modify an existing self-management program to develop an intervention to meet the needs of employees with CANS.

Method

IM is a stepwise approach for theory and evidence-based development and implementation of interventions [23]. The IM protocol consists of six steps (Figure 1). Each step of IM comprises several tasks (Figure 1) and completion of the tasks creates a product that guides the next step [23]. Program developers use an iterative strategy in which each step is based on the previous steps, moving back and forth between tasks and steps in case new perspectives are gained [23].

In the present study, IM is used to adapt an existing self-management program [9, 14, 15] to fit the needs of employees suffering from chronic (> 12 weeks) non-specific CANS, including the devel-

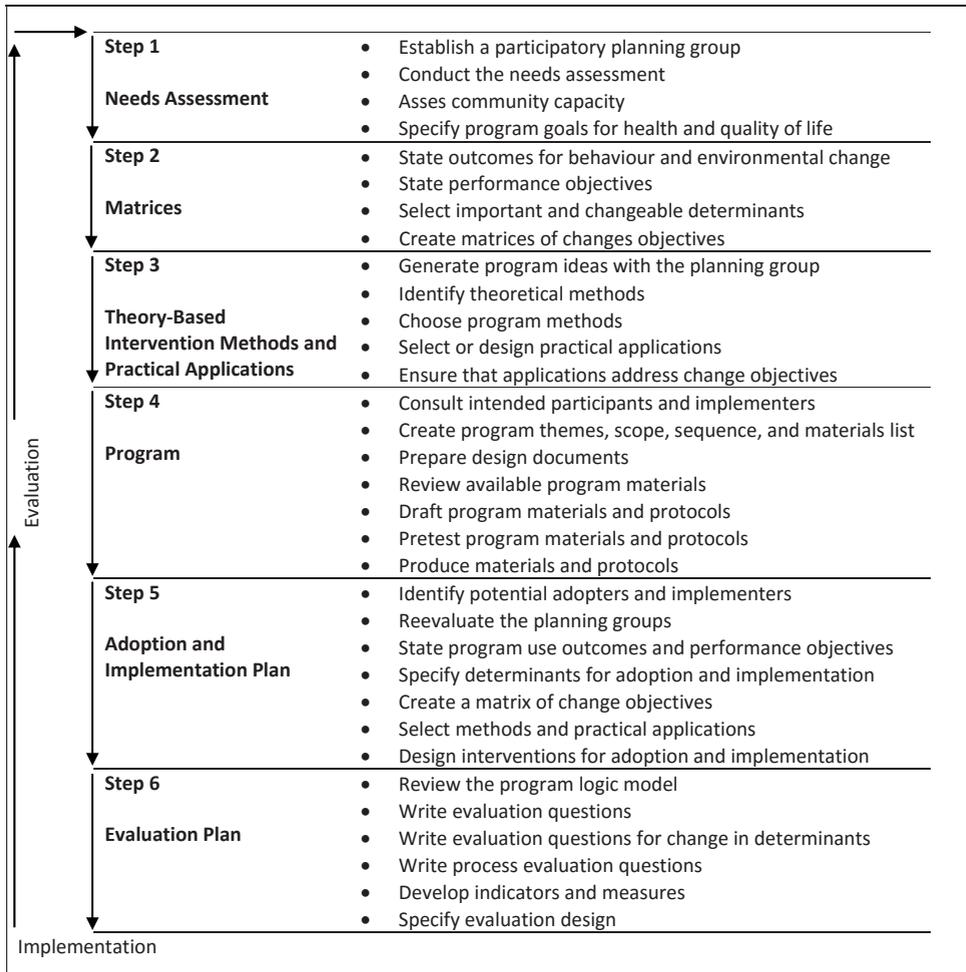


Figure 1: Visual representation of the six-step intervention mapping protocol, adapted from Bartholomew et al. [23].

opment of an eHealth component. This paper focuses mainly on how steps 1-4 of the IM protocol were used to adjust the intervention to the needs of the target population. The implementation plan (step 5) and evaluation plan (step 6) are only briefly outlined and are described in detail elsewhere [24].

Step 1: Conduct a needs assessment

First, a needs assessment was conducted to describe the health problem, the impact of the health problem on the patient's quality of life, and the behavioural and environmental determinants of the health problem for the target population. Furthermore, the underlying determinants and the

target population were defined, resulting in several desired behavioural outcomes that were selected to be targeted by the intervention [23]. This resulted in a description of the health problem, its impact on quality of life, behavioural and environmental causes, as well as the determinants of behavioural and environmental causes [23]. As advised by Bartholomew et al. [23], the needs assessment was structured and summarized using the modified PRECEDE model [23, 25]. This model prescribes an analysis of the causation of health problems at multiple levels and the consideration of multiple determinants of health-related behaviour and environment [23].

For the needs assessment, different research methods were used. Firstly, the recently developed Dutch multidisciplinary guideline for non-specific CANS [26] was examined to assess current knowledge on CANS, and to identify possible causes of CANS and the needs of the target population. Secondly, focus group sessions were held with employees with CANS (n=15) to explore the experienced problems and the needs of the target population [16]. Thirdly, focus group sessions were held with experts (n=17) in the field of CANS, eHealth and self-management to acquire their opinions about the needs of employees with CANS, employees' prerequisites for continuing working, and the advantages of using self-management and eHealth for this group [27]. Also, the experts' opinions on the design and content of the intervention was investigated. All these methods were used to gain insight into the health problem, the behavioural and environmental causes, the determinants of behaviour in the environment, and the impact of CANS on work participation and quality of life [23].

The results of the needs assessment were used to determine the content of the new intervention for employees with CANS. The existing self-management training for workers with a chronic disease [9, 14, 15] was modified according to the themes arising in the needs assessment for employees suffering from CANS.

Step 2: Create matrices of change objectives

The purpose of step 2 was to provide the basis for the intervention by specifying the behavioural change objectives of the intervention [23]. To analyse the determinants of self-management behaviour at work, the Attitude-Social influence-Efficacy (ASE) Model [28] (comparable to the theory of planned behaviour [29-31]) was used. This model postulates that intention, the most proximal determinant of behaviour, is determined by three independent constructs: attitude, social influence and perceived behavioural control (self-efficacy) [14]. A model representing how the intervention can influence the determinants of self-management behaviour at work, including the impact of barriers, knowledge and skills [14], is presented in Figure 2. The behavioural change objectives of the intervention were formulated on the level of determinants of behaviour (attitude, social influence and self-efficacy), which influence the experienced problems of employees

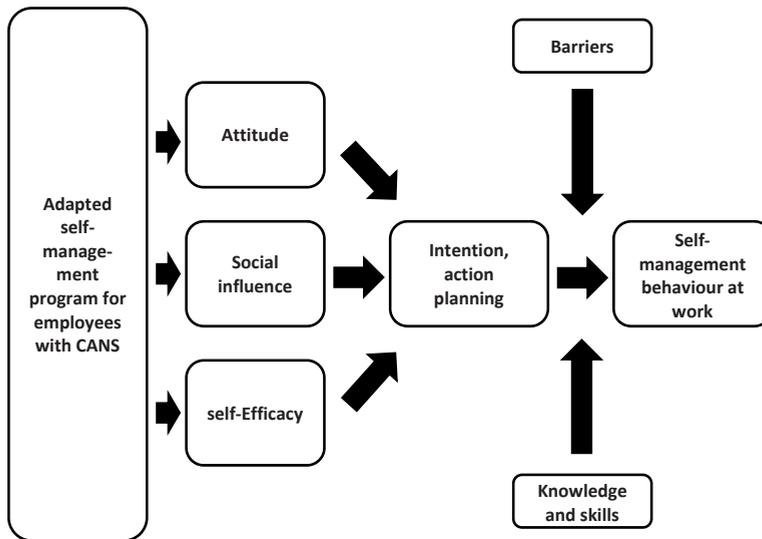


Figure 2: Model representing how the adapted self-management program can influence determinants of self-management behaviour at work, including the impact of barriers, knowledge and skills. Based on the Attitude-Social influence-Efficacy (ASE) Model [28] and adapted from Detaille et al. [14].

with CANS. The product of step 2 was a set of matrices of change objectives for personal and environmental determinants, i.e. the most immediate target of an intervention [23].

Step 3: Select theory-based intervention methods and practical applications

Step 3 of the IM included the identification and selection of theory-based methods and practical strategies to change the selected determinants of health behaviour [23]. Intervention methods that corresponded with the change objectives of step 2 were selected [23]. For each determinant, appropriate methods were identified from the literature [14, 23, 30], partly based on the methods and practical applications identified in the original training of Detaille et al. [14].

Step 4: Organize methods and applications into an intervention program

The product of this step included a description of the scope and sequence of the components of the intervention, an overview of the program materials, and program protocols [23]. For the present study we compared the performance objectives of the self-management training of Detaille et al [15] with the performance objectives formulated for the modified version of the training for employees with CANS. The self-management sessions were completed with the development of an eHealth module (the content of which was discussed between NH, SD, YH, JE, JBS and MN). All possible modifications to the original self-management program were first discussed between

NH, SD and YH; hereafter, all modifications made were discussed between NH, SD, YH, JE, JBS and MN.

Step 5: Plan for adaptation, implementation and sustainability of the program

The focus of step 5 was to develop a plan for the adoption and implementation of the program, including the consideration of program sustainability [23]. To test the sustainability of the program, an evaluation of the effectiveness of the intervention is necessary. Therefore, several actions were taken to prepare an evaluation of the program in a randomized controlled trial (RCT).

Step 6: Generate an evaluation plan

Step 6 (the generation of an evaluation plan) is actually started with the needs assessment and is developed together with the intervention map [23]. In this step we developed a plan for both quantitative and qualitative evaluation of the program integrated in the RCT. The design of the study, a recruitment plan, and promotion materials for the participants were developed.

Results

Step 1: Conduct a needs assessment

The results of the review of the Dutch multidisciplinary guideline for non-specific CANS [26] showed that several behavioural and environmental factors can influence CANS and that these should be included in the intervention. Although there is a lack of hard evidence, providing information and knowledge about the causes of CANS to employees suffering from CANS is considered important, as is also the case in patients with a chronic disease [26]. Furthermore, in the Dutch guideline, aetiological and prognostic factors were found to influence the occurrence and cause of CANS and should be addressed in the training; e.g. physical factors such as long-standing use of the computer, repetitive work tasks, heavy physical, mental and/or difficult work, unfavourable working times, and the ergonomics of the workplace/posture are important topics addressed in the guideline [26]. Moreover, psycho-social factors such as high work demands, experienced stress, work satisfaction, experienced support and personal characteristics are important factors mentioned in the guideline and should be addressed in the training (when relevant). Also, the role of several behavioural components which can positively influence the complaints (e.g. decreasing workload, taking breaks, muscle relaxation and physical activity in managing the complaints), were considered important topics that can influence CANS [26].

The results of the focus groups with employees and experts indicated that the employee's behaviour was considered as an important factor related to the onset of symptoms of CANS. It appeared that employees with CANS should be stimulated to search for information about the cause of

Table 1: Summary of the results from the focus group sessions [16,27].

Focus group sessions with employees with CANS
<ul style="list-style-type: none"> • Although employees with CANS tried various ways to reduce their complaints, they still suffered from CANS • Employees are faced with the challenge to deal with their complaints on a daily basis in both their private and working life • Employees are not fully aware of the possibilities to influence their symptoms and their own role in triggering and coping with their complaints • Employees generally are often approaching their individual limits • Fatigue has a serious impact on the daily life of employees • Employees have to deal with disrupting physical/socio-environmental factors at work • Employees have to deal with misunderstandings from supervisor and colleagues • The identified recurring problem areas endorse the multifactorial aetiology of CANS • There is a need for information about possible (multifactorial) causes of the complaints • The following needs were mentioned during the focus group sessions: knowledge about exercises, muscle relaxation, working with pain, the work environment, and socio-environmental and personal factors (including work style)
Focus group sessions with experts
<ul style="list-style-type: none"> • Awareness and behavioural change are found to be important for this group of employees • The employee's behaviour is seen by experts as an important factor related to the onset of symptoms of CANS • CANS is less related to workplace interior modifications than to the behaviour (i.e. experiences and the intensity) of the employee at work • Experts indicate that employees with CANS generally have high demands (on themselves) and are often perfectionists • Employees who experience a high workload and work pace should learn to be aware when the body gives signals of overloading, and one must react at the appropriate time, such as to take breaks at regular times • Employees suffering from CANS have difficulty in managing their own health problem and work • Employees with CANS should be more proactive; in the intervention bottlenecks should be identified and employees should make their own choices and obtain reassurance Most experts find it important that the intervention deals with the possible causes of the complaints and the underlying problems that may trigger CANS • Experts stated that it is important that employees with CANS receive information about topics related to the possible relief of their complaints, such as load and capacity, setting limits, taking breaks, ergonomics, relaxation, social support , social relationships and physical activity, including exercises • Moreover, experts find it important that employees are aware of the possible facilities and treatment options within and outside their organization • Experts seem to see a role for a self-management program for employees with CANS. • Complaints will not always go away, but a self-management program can offer support to these employees in learning them how to handle their problems. • The intervention should focus on increasing employees' self-efficacy and empowerment. • Experts indicate that the combination of group sessions and an eHealth module can work extremely well and can strengthen and complement each other. • The self-management intervention is seen as a roadmap, in which participants work on their personal goals, plus the interaction with other participants. • The eHealth module lends itself to providing more information. Participants could then use this information in the sessions in order to fulfil their action plans.

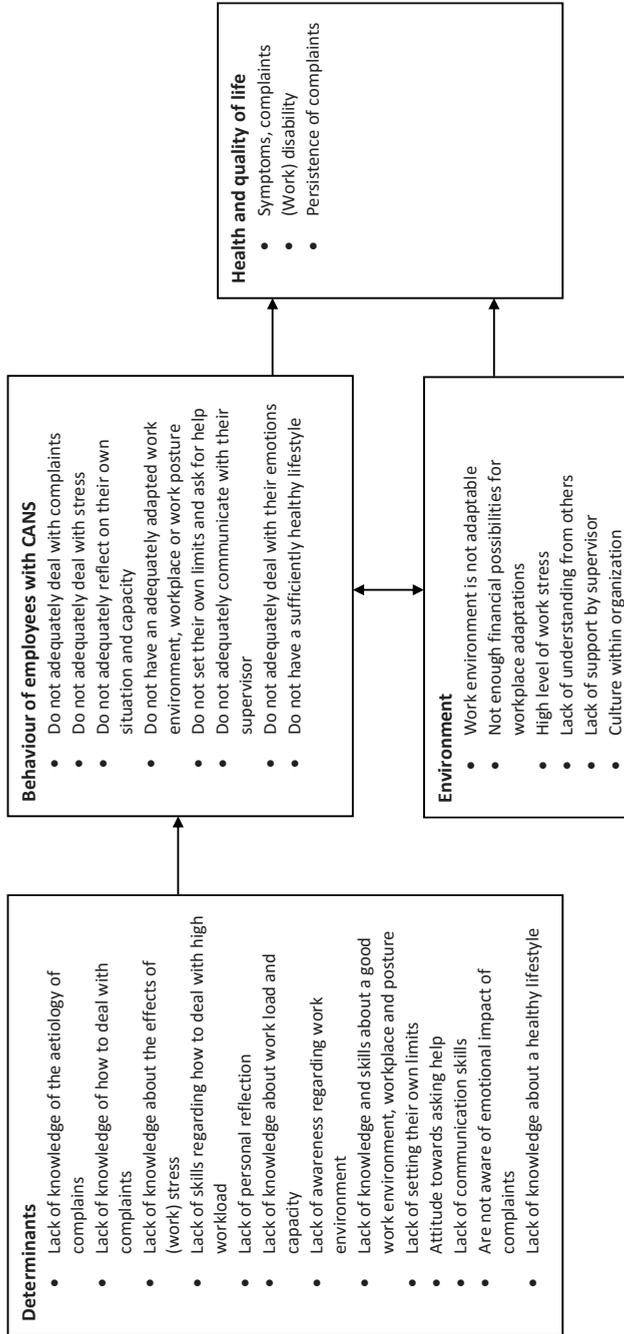


Figure 3: Modified PRECEDE model of behaviour, determinants and environment in employees with CANS.

Table 2: Matrix of change objects and determinants of employees with CANS.

Performance objectives	Attitude	Self-efficacy	Social influence	Knowledge	Skills
Adequately deal with their complaints (pain, fatigue, limitations, disability)	Recognise that CANS is a multifactorial health problem which can be influenced by certain health behaviour Are aware of factors which could have caused and/or influenced their own complaints	Express confidence that they can influence their complaints		Have knowledge about factors involved in the aetiology and persistence of complaints Have knowledge about the influence of a healthy and active lifestyle and specific exercises	Have an healthy and active lifestyle Perform specific exercises for their complaints Adapt their workload to their personal capacity Perform self-reflection Have the skills to adapt their work environment, workplace or work posture if necessary
Adequately deal with stress	Recognise that (work) stress could be a factor in the persistence of complaints and to recognise which factors lead to stress	Express confidence in their ability to influence their level of (work) stress		Have knowledge about (the effects) of stress, time management and making a good planning	Perform techniques to influence their stress level Perform muscle relaxation exercises Have the skills to make a realistic and feasible planning
Communicate about their complaints and needs with healthcare professionals, colleagues and supervisor, if necessary	Recognise that communicating about their complaints and asking for support needs may be useful	Express confidence that they can communicate about their complaints and needs with healthcare professionals, colleagues and supervisor	Have the feeling that they are being listened to and feel supported	Have knowledge about how to communicate	Have the skills to communicate with healthcare professionals, colleagues and supervisor, if necessary Have the skills, and ask for support, if necessary Ask for workplace adaptations and advice on ergonomics, if necessary

their complaints, about how to deal with their complaints, and about the manner they can influence their complaints themselves. Therefore, for example, information and skills with regard to setting limits, dealing with stress, and communication were considered important. The results of the focus group sessions with employees with CANS, and with the experts, were described extensively elsewhere [16, 27]. Table 1 presents a summary of the results of the focus group sessions with employees with CANS and of the focus group sessions with experts. Figure 3 presents the modified PRECEDE model [23, 25] of behaviour, determinants and environment in employees with CANS, based on the three parts of the needs assessment.

Step 2: Create matrices of change objectives

Based on the needs assessment, the overall goal of the intervention was defined as 'Self-management behaviour at work' with the aim to alleviate the perceived disability of the participants. This outcome is the same as that used by Detaille et al. [14] and did not need to be changed. The objective of the total program was subdivided into performance objectives, presented in the first column of the matrix in Table 2. In this matrix of behavioural change objectives (based on the determinants of behaviour identified in the needs assessment) 'Self-management behaviour at work' was operationalized as follows:

- 1) To be able to cope with pain, fatigue, limitations, disability and emotional aspects caused by CANS.
- 2) To be aware of which factors at the workplace cause stress and to adequately deal with work stress by re-organizing work in light of the complaints and according to one's capacity (e.g. to modify workload and work pace, to take pauses when needed, and to say 'no' when needed).
- 3) To be able to communicate effectively about CANS with one's supervisor and colleagues (e.g. being able to explain the type of complaints, to ask for facilities at work, and to communicate about a possible change in job demands).

Furthermore the main determinants of behaviour change according to the ASE Model[28] i.e. the attitude, social influence and self-efficacy, were operationalized as follows:

- 1) Attitude: a person's attitude consists of the perceived cognitive and emotional advantages and disadvantages of the health behaviour [14]. Employees with CANS should be aware that the aetiology and persistence of CANS are multifactorial and that individuals can influence the complaints themselves by being aware of the factors that cause stress and taking care of these factors at work. Therefore, awareness is considered very important with regard to a person's attitude.
- 2) Social influence: (perception of) social support at work and acquiring social support at work. Social influences consist of the perception of others carrying out this type of behaviour (social modelling), the norms that people have with respect to these behaviours (social norms), and the support that they perceive from others in carrying out a particular type of behaviour, e.g.

Table 3: Overview of the selected theoretical methods and practical strategies for used in the intervention.

Determinant	Method	Strategy
Attitude	Belief selection [39]	Through awareness exercises and discussions participants learn to identify current beliefs, and to strengthen positive beliefs and weaken negative beliefs. Moreover, new beliefs are introduced
	Modelling [40]	Participants are reinforced by the attitudes of other participants
Self-efficacy	Goal setting [41]	Participants formulate a long-term goal and weekly short-term goals. Through weekly action plans participants work on their formulated goals
	Modelling [40]	Participants are reinforced by the achievements of other participants
	Public commitment [42]	Participants discuss their action plans and formulated goals with other participants
	Feedback [43]	Participants receive feedback on their action plans, formulated goals and achievements from the trainer and other participants
Social influence	Enhance assertiveness [30]	Through awareness exercises, discussion, knowledge, skills and goal setting participants assertiveness against colleagues, supervisor and healthcare professionals is enhanced
	Modelling [40]	Participants are reinforced by the achievements of other participants
	Stimulate communication to mobilize social support [44]	Through information about communication and practical skills participants are stimulated to communicate about their complaints with colleagues, supervisor and healthcare professionals, and increase social support
	Provide opportunities for social comparison [45]	Participants can compare themselves with other participants (upward as well as downward comparison)
Knowledge	Information [30, 46]	Participants get information about subjects related to the topics in Table 4 (as well as in the group sessions, in the group sessions manual and on the eHealth)
	Active learning [47]	Participants are encouraged to perform exercises and to learn on basis of their action plans
	Discussion [47]	Participants discuss several topics of the group sessions and eHealth during the group sessions
	Consciousness raising	Participants get information of and feedback on causes, consequences and alternatives of their behaviour
	Self (re)evaluation [48]	Participants are stimulated to become aware of their behaviour in relation with risk factors for complaints
Skills	Guided practice [40]	Participants can look up exercises at the eHealth and can get feedback during the sessions
	Modelling [40]	Participants are reinforced by the achievements of other participants
	Skill training	Participants practice with communication skills during the sessions.
	Feedback [43]	Participants get feedback on their behaviour, skills and action plans from the trainer and participants
	Self-monitoring of behaviour [49]	Participants are stimulated to monitor and reflect on their behaviour

the support of the supervisor and colleagues at work [14]. Employees with CANS often do all the work by themselves, do not seek/accept support, and do not always communicate about their complaints; therefore, it is important that employees are willing to ask and accept (social) support.

- 3) Self-efficacy: how confident is the person about his/her ability to modify the behaviour that may cause and trigger CANS, such as perfectionist behaviour at work, or to be able to regularly take exercises to deal with the complaints. Self-efficacy refers to a person's perception of his/her capability to perform the type of behaviour [14]. The intervention aims to influence all three determinants of behaviour, but especially the attitude and self-efficacy at work. Interventions are known to be more effective when focusing on improving a participant's action planning activity, their self-efficacy and their self-regulatory capabilities, rather than focusing on intention-enhancing risk perceptions [32, 33].

Step 3: Select theory-based intervention methods and practical applications

Table 2 shows the method applied for each determinant that was selected for the development of the intervention. Table 3 describes how these methods were translated into practical strategies. In the original self-management program of Detaille et al. [9, 14] goal setting is an important method for increasing self-efficacy, and action planning is part of the ASE model [28]. Through goal setting (action plans) the participant can focus on working on their self-efficacy [14]. Goal setting leads to a better performance because individuals with explicit goals exert themselves to a greater extent and persevere in their tasks [34, 35]. Action planning is an important component of self-management interventions, with successful completion being associated with improved health and self-efficacy outcomes [36]. A goal should be formulated according to the SMART criteria (specific, measurable, attainable, realistic, and timely) and should be stated in terms of behaviour [14]. Each week, participants formulate one or more goals with regard to self-management behaviour, which they intend to accomplish during the following week. After formulating the plan, the participants has to state how confident they are that they will carry out the action plan [14]. If the level of confidence is below 7 (on a 1-10 scale), the participant is asked about challenges or problems, and suggestions are offered; thereafter, the participant may change his/her plan [36, 37]. The ASE model also indicates that barriers can influence the outcome of the action planning, and that these barriers should be identified and resolved [28]. During the next session the participants report whether or not they have accomplished their action plan, and give an account of the solving of any problems that might have arisen [14].

Step 4: Organize methods and applications into an intervention program

The product of step 4 resulted in the final program plan. Self-management at work at the individual level is targeted through the development of six weekly group sessions of 2.5 h each. An overview of the program is presented in Table 4. Compared with the original program [14]

Table 4: Topics of the group sessions and structure of the eHealth module.

Topics of the group sessions:	
<i>Session 1</i>	<ul style="list-style-type: none"> – Introduction – Dealing with a chronic disability – Living with CANS – Working with CANS – Work load and work capacity – What is self-management? – Introduction to the eHealth module
<i>Session 2</i>	<ul style="list-style-type: none"> – Discussion on the eHealth module – Core quadrants (qualities, pitfalls, challenges and allergies) – Time management
<i>Session 3</i>	<ul style="list-style-type: none"> – Dealing with pain and fatigue – Stress and stress management – (Muscle) relaxation exercises
<i>Session 4</i>	<ul style="list-style-type: none"> – Healthy lifestyle – Nutrition – Exercises and sports – Interactive part with movement scientist/physical therapist about exercises – Use of facilities
<i>Session 5</i>	<ul style="list-style-type: none"> – Communication skills – Working with others and asking for help
<i>Session 6</i>	<ul style="list-style-type: none"> – Dealing with negative emotions – Positive thinking – Making a mind map
Structure of the eHealth module:	
<i>Use of the eHealth</i>	
<i>Self-management</i>	
<i>CANS</i>	<ul style="list-style-type: none"> – Non-specific CANS – Specific CANS – Symptoms – Causes – Work load and capacity – Physical factors
	<ul style="list-style-type: none"> – Psychosocial and personal factors – Chronic pain – Central sensitization – Self-tests/screening tests – Prognosis
<i>Possible solutions</i>	<ul style="list-style-type: none"> – What can I do myself? – Workplace – Work stress and work style – Stress reduction
	<ul style="list-style-type: none"> – Physical activity and sports – Specific exercises – Facilities at work – Treatment
<i>Information about the group sessions</i>	
<i>Further reading</i>	
<i>Contact details</i>	

for employees with a chronic somatic disease, the developed program is slightly adapted to the (work) situation of employees with CANS. Two new topics are added to the training. Firstly, the core quadrant (qualities, pitfalls, challenges and allergies) [38] is added to gain insight into the participants' qualities and pitfalls.

Core quadrants focusses on what is right and is going well. Each core quality has its positive side and its negative side, which can be a persons' weak spot. Such a pitfall is frequently a source of conflict, irritation and tension to other people in that person's environment. This is particularly so if the pitfall turns out to be another person's allergy [38]. Secondly, a topic about time management is added because of the high level of (work) demands of employees with CANS. Moreover, the development of a mind map is added to the topic of 'making plans for the future', and an interactive topic about exercises with a movement scientist/physical therapist is also added [50]. All the original topics used by Detaille et al. [14] are retained in the self-management sessions. The topic on nutrition is shortened because, although it is related to a healthy lifestyle, it is less specifically related to CANS. Furthermore, the original program topics are adapted with specific examples related to the work situation of employees suffering from CANS, and the order of several topics and sessions is changed. As a result of the needs assessment, the self-management sessions are seen as the main focus of the intervention, with the support of the eHealth. The self-management sessions are complemented by an eHealth module accessible for the participants (via a personal login) for a period of one year. The content of the eHealth is presented in Table 4. The more general self-management themes (which often need explanation, group discussion and training) are addressed in the self-management sessions; the more specific CANS related themes are mainly addressed in the eHealth module, because the relevance of these themes can differ widely between participants. Participants can use this information in the sessions to fulfil their action plans. The self-management sessions and the eHealth module complement each other, forming an integrated program of self-management. The structure of the eHealth is linked with references to the topics in the self-management sessions; this stimulates the use of the eHealth and makes it easier to find the related topics on the eHealth module.

Step 5: Plan for adoption, implementation and sustainability of the program

In step 5 of the IM process, inclusion criteria for the participants were defined and a plan was made for the recruitment of participants for an evaluation study. Several actions can be taken to stimulate the participation of employees suffering from CANS within the participating organizations. During the process of developing the intervention, a steering committee of stakeholders was set up to facilitate short and long-term implementation of the intervention. The final program was tested among the first groups of participants. Trainers were recruited and recruitment materials were developed by NH, YH, JE, JBS and MN. All trainers received the correct training and

sufficient instructions to guide the course. The inclusion/exclusion criteria and recruitment plan are described in detail elsewhere [24].

The course manuals for the participants and trainers were adapted by NH and SD. The content of the eHealth module was developed by NH, SD, YH, JE, JBS and MN. The technical aspects of the eHealth module were developed in collaboration with an external party. Trainers were recruited from the staff of the HAN University of Applied Sciences and the Radboud university medical center. All trainers were trained by SD, the developer of the original program for workers with a chronic disease and also experienced in the development/implementation of self-management programs. Depending on the number of participants, sessions will be facilitated by one or two trainers. No major modifications were made after testing the program with the first group of participants.

Step 6: Generate an evaluation plan

The study protocol, including the evaluation plan, is described in detail elsewhere [24]. The design of the study, a recruitment plan and the promotion materials for participants were approved by the Medical Ethics Committee of the Radboud university medical center (registration number 2012/319). The RCT is registered with the Dutch Trial Register (www.trialregister.nl; registration number NTR3816). In short, the effect evaluation will consist of an RCT with a 12-month follow-up period. Data are collected at baseline and at 3, 6 and 12 months. The primary outcome measure will be the self-reported disability (in the previous week) of arm, shoulder and hand, measured with the Disabilities of the Arm, Shoulder and Hand questionnaire (DASH) [51]. Secondary outcome measures are related to absenteeism, presenteeism [52, 53], pain [54], self-efficacy (at work) [15, 55], fatigue [56], burnout features [57], work style [58], pace and amount of work [59], relations with colleagues/supervisors [59], need for recovery [59], participation and empowerment on the workplace [59], quality of life [60], self-reflection and insight [61], and employees' opinion about working with complaints [15], as well as to self-management at work, the use of healthcare interventions, participation in sport, and limitations experienced in work activities and work capacity. Power analysis [24] revealed a necessity of a sample size of 71 participants in each group, assuming a dropout rate of 20%. This implies that a total of 142 patients will be needed to detect a clinically relevant difference [62] in DASH scores with a power of 0.90 and an alpha of 0.05.

Moreover, a qualitative evaluation with about 30 participants will be conducted at the end of the self-management sessions. These participants will be interviewed to evaluate their reasons to participate, their expectations, benefits, future expectations, and experiences with the action plans, group sessions and eHealth module. Furthermore, participants will be asked for their ideas about how the intervention might be improved.

Discussion

This paper describes the developmental process, the content and planned evaluation of a theory and practice-based self-management intervention for employees in the Netherlands suffering from nonspecific CANS. IM is a helpful tool to screen existing interventions and tailor the intervention for a specific population [14, 63, 64]. Following the six steps of the IM protocol [20, 23], the original intervention developed by Detaille et al. [9, 14, 15] was adapted to fit the needs of the target population.

The overall outcome of the intervention was defined as 'Self-management behaviour at work' to improve the perceived disability of the participants and, for this, a matrix of behaviour change objectives and personal behaviour determinants was developed. The behaviour change objectives were related to the factors of the ASE Model [28]. The intervention aims to influence all three determinants of behaviour, but especially the attitude to and self-efficacy at work. Interventions are known to be more effective if they focus on improving a participant's action planning activity and their self-efficacy and self-regulatory capabilities, rather than focusing on intention-enhancing risk perceptions [32, 33]. In the study of Detaille et al. [9], the attitude towards self-management at work (enjoyment) improved after eight months ($p=0.03$) in the intervention group. Moreover, a qualitative evaluation of that study indicates that the intervention generally had a positive effect on the employees' working life and wellbeing, and that participants would recommend the program to others [15].

The IM process resulted in a self-management program for employees suffering from CANS, consisting of six group sessions and a complementary eHealth module. Because the use of the eHealth module may vary between participants, the group sessions also address (to some extent) all of the topics identified in the needs assessment. By adding an eHealth module we expect that higher educated employees will also benefit from the intervention; in the intervention of Detaille et al. [9] lower educated workers in the intervention group developed better physical health quality (SF-12) compared with the lower educated workers in the control group.

A possible strength of the developed intervention is the thorough adaptation and tailoring of an existing self-management intervention to fit the needs of employees with CANS. Moreover, two new topics were added to the training (the core quadrant and time management), and a mind map was developed and added to the topic 'making plans for the future'.

There is inconsistent evidence for the effects of self-management programs for patients with chronic musculoskeletal pain [50, 65, 66], and there is some evidence that group-delivered short programs (< 8 weeks) with a healthcare professional have the best potential [50]. Moreover, group

sessions can stimulate modelling and reinforcement of other participants, and participants can compare themselves with other participants. Also, discussion is stimulated and participants can learn from the experiences of other participants. Therefore, we expect that the developed program, consisting of six group sessions and with an additional interactive topic on exercises with a movement scientist/physical therapist, could be beneficial for employees with CANS.

In addition to the sessions, the eHealth was developed to provide more thorough tailoring of the intervention. It is probably possible to tailor the program for employees with other musculo-skeletal disorders, by adapting the eHealth and only slightly adapting the content of the group sessions. Another possible strength of the developed intervention is the use of the ASE Model [28], which was also used in the original intervention of Detaille et al. [14] and in other IM intervention developments [63], together with the use of methods and strategies for behaviour change (see Table 3), which emphasizes the theory-based character of the intervention. Also, the integration of expert opinion, not only regarding the needs of employees with CANS and the content of the intervention, but also concerning self-management and the development of the eHealth, can be seen as a strength of the design. Expert opinion is increasingly used in the development of self-management interventions [67, 68].

Although the group sessions will last only 6 weeks, the eHealth module is accessible for one year, allowing participants to review the topics and exercises of the program; this may stimulate participants to maintain their behavioural changes on the long term. Moreover, in the future, the eHealth module can be converted in an online self-management tool, or can be used as an information tool for employees with CANS. It is reported that online self-management programs can be useful and beneficial [69-71].

Another major strength is the diversity of the intervention topics, which is due to the combination of group sessions (with more generic themes), the eHealth (with more specific themes; Table 4), and the use of personal action plans. As mentioned, action planning is an effective component of self-management interventions [36] and participants have indicated that working with an action plan is both useful and effective [15]. Personalized action plans can be an important issue with regard to the multifactorial aetiology of CANS; in this way, all participants can work on their own goal. By dividing the topics between the group sessions (more general topics) and eHealth (more specific topics) and with the use of action plans we aimed to make the program both interesting and useful for each participant.

The fact that part of the intervention will be available via the computer, might be seen as a weakness of the intervention, especially among employees whose complaints might (partly) be caused by use of the computer. However, we tried to address this issue by not making use of the eHealth

module mandatory. Another possible weakness is that the vision of the employers and supervisors was not taken into account in the development of the intervention. Focus group sessions with employees revealed some issues with regard to their employers and supervisors. Therefore, as indicated by Detaille et al. [14], another point of discussion is whether a self-management program for the employee is sufficient to facilitate the workability of employees, or whether the physical and social working environment should also be the object of an intervention. We assume that not (only) the work environment, but rather also the personal characteristics of employees with CANS, are important when considering the causes of complaints and when dealing with complaints [16]. Self-management interventions focus primarily on encouraging participants to be involved with and in control of their own treatment, as well as improving their understanding of how their condition and treatment affect their lives [72]. Therefore the intervention focuses on empowerment of the participating employees.

Another limitation is that the intervention was developed to suit the participants' needs in different stages of behavioural change and that participants work on different behavioural goals. Therefore, the program is not tailored for participants according to a stage of behavioural change and one specific behavioural goal. In the development group there was some discussion about the inclusion of the subject nutrition in the intervention. This topic was part of the original self-management program [14] but seems to be less important with regard to employees with CANS. Eventually it was decided to address this topic only briefly, because a healthy lifestyle is important for everyone and especially for individuals suffering from stress and fatigue.

Conclusion

In this study, a self-management program developed by Detaille et al was adapted and tailored for employees with non-specific CANS. By modifying and adding elements, including an eHealth module, and by following the IM protocol, we systematically adapted the original program to suit the needs of the target group. This resulted in a theory and practice-based self-management program, including eHealth. This program is expected to benefit employees with non-specific CANS and its effectiveness will later be evaluated in a RCT.

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5

A self-management program for employees with complaints of the arm, neck or shoulder (CANS): study protocol for a randomised controlled trial.

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Abstract

Background: Complaints of the arm, neck or shoulder (CANS) have a multifactorial origin and cause considerable work problems, including decreased work productivity, sickness absence and, ultimately, job loss. There is a need for intervention programs for people with CANS. Self-management is an approach used in chronic disease care to improve self-efficacy and wellness behaviours to facilitate participants to make informed choices and carry them out. This study will evaluate the effectiveness of a self-management program (including eHealth) and compare it to usual care among employees with chronic CANS (lasting > 3 months).

Methods/design: This is a randomised controlled trial in which 142 participants will be recruited and randomised (with pre-stratification) to either the intervention group (IG) or control group (CG). The IG will participate in a self-management program consisting of six group sessions and an eHealth module. The CG is allowed to use all usual care available. The primary outcome of the study is the self-reported disability of arm, shoulder and hand, measured with the Disabilities of the Arm, Shoulder and Hand questionnaire (DASH). Secondary outcomes include: absenteeism, pain in the previous week, quality of life, catastrophizing pain, self-efficacy, work style, presenteeism, fatigue, the use of usual care and limitations experienced on the job. Data are collected at baseline and at 3, 6 and 12 months follow-up.

Discussion: Following the process of intervention mapping we developed a self-management program to suit and alleviate the problems and needs of employees with CANS. A strength of the study is that our intervention is specifically tailored to match the needs of employees with CANS. The study also has some potential weaknesses (e.g. use of co-interventions, combination of group sessions and eHealth, self-reporting of data and possible contamination, Hawthorne effect and recall or information bias) which are discussed.

Trial registration: The trial is registered with the Dutch Trial Register (www.trialregister.nl): NTR3816 (January 2013). The first participant was randomised in September 2012.

Background

Complaints of the arm, neck or shoulder (CANS) are common among people who work [1]. The reported point prevalence varies from 1.6-53% and the 12-month prevalence varies from 2.3-41% depending on the setting, definition, and classification used [2-4]. CANS is persistent; 77% of employees with CANS still have complaints after 6 months [5]. Also, about 19% of the patients report chronic complaints of which 58% report the use of healthcare, such as care given by the general practitioner, medical specialist and physical therapist [3]. At one Dutch university, 11% of the employees reported regular physical complaints due to working with the computer and 4% reported to have these complaints very often [6].

Although musculoskeletal disorders of the upper extremity and neck are common, there is no international consensus on related terminology [7]. Terms such as 'complaints of the arm, neck or shoulder', [8] 'work-related upper extremity musculoskeletal disorders' [9], 'musculoskeletal upper extremity disorders' [10], 'neck and upper extremity complaints' [5], 'work-related upper limb disorders' [11] and 'repetitive strain injuries' [12] are all frequently used. However, in these classifications a distinction is usually made between specific CANS (such as epicondylitis, carpal tunnel syndrome) and nonspecific CANS [8]. The most recent consensus statement in the Netherlands was published in 2007 [13]. This multidisciplinary consensus on terminology was reached among healthcare professionals and supports the diagnosis and classification of all CANS not caused by acute trauma or by any systemic disease [8]. Within these complaints, 23 disorders are classified specific, because they were judged as diagnosable disorders by experts. All other complaints are labelled nonspecific [8]. Nonspecific CANS is characterised by pain or tingling sensations located in the arms, shoulders, neck, or upper back without a clear pathophysiological substrate [14]. Many people suffering from CANS have complaints in more than one region [3, 5].

CANS causes major work problems, including presenteeism (decreased work productivity while at work), absenteeism (sickness absence), and, ultimately, job loss [1, 15]. In the Netherlands, CANS is responsible for about 15% of the total number of sick days [11]. The total yearly costs in the Netherlands of neck and upper limb symptoms due to decreased productivity, sick leave, chronic disability for work, and medical costs has been estimated in 2003 at 2.1 billion euros [7]. Thus, work-related neck and upper limb symptoms have both a medical and a substantial socio-economic impact [16]. The annual prevalence of sickness absence due to work-related upper-extremity complaints is reported to be 2-4% of the general workforce [17]. Sickness absenteeism and permanent disability are important components of decreased productivity, but they represent only a part of its total cost [1]. A considerable proportion of health-related productivity loss derives from presenteeism, i.e. decreased work performance while at work [1, 18, 19]. This is endorsed by Van den Heuvel et al. [19] who found that in 26% of the cases reporting CANS, productivity loss

was involved. Moreover, in 68% of all cases reporting productivity loss, this was due to decreased productivity at work, while the other 32% was due to sickness absence [19].

Although the exact aetiology of nonspecific CANS is unknown, it is reported to be of multifactorial origin [20-23]. Physical characteristics (i.e. wrong working posture, repetitive work), psychosocial characteristics (i.e. lack of social support from colleagues or superior), personal factors (i.e. an ineffective approach to stress management) of the individual worker as well as characteristics of their work environment (i.e. high job demands, lack of control), contribute to the development and persistence of complaints [5, 20-28]. The importance of each factor, and its individual contribution to the risk of provoking symptoms, varies among individuals and work environments [29].

Communication with supervisors to understand the needs and challenges of the employee is essential, and tailoring of an intervention to accommodate the employees' needs is important [30]. Work-related factors (i.e. high job strain) seem to be important determinants of perceived disability, especially among younger employees [1]. Favourable psychosocial work characteristics might prevent productivity loss in symptomatic employees with CANS [19]. Among office workers, an adverse work style increases the risk of having upper-extremity pain [29, 31]. Because work style consists of a combination of factors (e.g. working through pain, handling deadlines/pressure, handling stress and self-imposed workload) interventions could be developed to address each of these individually [29]. Pain intensity and its impact on work and sleep, psychosocial factors (i.e. lack of social support of colleagues or superior, work pressure), as well as physical factors at work (i.e. wrong working posture) should all be included as potential targets for interventions to improve the management of disability caused by CANS [1, 5, 32].

Despite the multifactorial origin of CANS, most intervention studies focused only on the physical components of the workplace [16]. There is limited evidence on the effectiveness of exercises when compared to massage; adding breaks during computer work; massage as add-on treatment to manual therapy, and manual therapy as add-on therapy to exercises [33]. There is conflicting evidence concerning the effectiveness of exercises over no treatment or as add-on treatment, and no differences were found between various kinds of exercises [33]. Also, there is conflicting evidence regarding the effectiveness of ergonomic interventions [9, 10, 33-36].

Nowadays, multi-component interventions that include both biomechanical and psychosocial components are recommended [9, 22, 37]. Bernaards et al. [38, 39] developed a work style intervention for computer workers, which focused on behavioural change with regard to body posture, workplace adjustment, breaks and coping with high work demands. This intervention was effective in improving recovery from neck/shoulder symptoms and reducing pain on the long-term (12

months) compared to usual care, whereas no effects were found after 6 months and in arm/wrist/hand pain [40].

There seems to be a need for intervention programs for people suffering from CANS [8, 31]. Among Dutch employees with sickness absence due to CANS, 24% believe that work is mainly the cause of their complaints and 30% stated that these complaints are partly caused by work [40]. Also, 19% of the Dutch employees stated that measures at work are needed in the area of CANS because these are either not, or insufficiently, available. Self-management is an approach increasingly used in chronic disease care to improve self-efficacy and wellness behaviours [41]. Barlow et al. [42] defined self-management as *“the ability to manage the symptoms, treatment, physical and psychosocial consequences, and lifestyle changes inherent in living with a chronic condition.”* Self-management programs aim to help participants make informed choices and then carry them out [43]. Key self-management skills include: problem solving, decision making, resource utilization, forming partnerships with healthcare providers and taking action [43]. Program participants are up-skilled in personalised goal setting and action care planning. Collaborative problem definition is based on their readiness to change and self-efficacy [44]. Self-management interventions focus primarily on encouraging patients to be involved with and in control of their own treatment, as well as improving their understanding of how their condition and treatment affect their lives [45]. As a result, self-management interventions reflect a change from a patient passively receiving care to a collaborative model in which the patient and provider share their knowledge and work together to achieve a goal of optimal self-management [45].

There is inconsistent evidence for the effects of self-management programs for patients with chronic musculoskeletal pain [46-48], and there is some evidence that group-delivered short programs (< 8 weeks) with a healthcare professional involved have the best potential [46]. A multi-component pain and stress self-management group intervention was found to have better effect than individually administered physical therapy in the treatment of persistent musculoskeletal tension-type neck pain regarding coping with pain, in terms of patients' self-reported pain control, self-efficacy, disability and catastrophizing pain, over the 20-week follow-up [49].

Many employees suffering from CANS still go to work despite the feeling that, in view of their health, they should have taken sick leave [19]. Thus, employees with CANS continue working, which often results in the persistence of their complaints. In a study of Van Eijsden et al. [20] nearly all employees suffering from CANS said that they were very precise persons, and incapable of dealing with heavy workload or tight deadlines. Moreover, employees explained that they had high work standards and would ignore the workload and onset of symptoms, despite knowing that these symptoms could become chronic in a few months [20]. Thus, it seems important that employees suffering from CANS make informed choices and carry them out so that they have the

ability to manage the symptoms, healthcare utilization, physical and psychosocial consequences, and lifestyle changes inherent to living with CANS. Self-management programs addressing physical characteristics, psychosocial characteristics and personal factors of the individual worker, as well as characteristics of their work environment, may be useful for employees suffering from CANS.

Detaille et al. [50, 51] developed a self-management program for employees in the Netherlands with a chronic disease. Following the process of intervention mapping [52, 53] we adapted their program to suit and alleviate the problems and needs of employees suffering from CANS.

Aim of the proposed study

This study will evaluate the effectiveness of a self-management program (including eHealth) compared to usual care, in employees suffering from chronic non-specific CANS (persisting > 3 months).

Methods/design

Organisation of the study

This is a randomised controlled trial with a follow-up of one year (Figure 1). The Medical Ethics Committee (METC) of the Radboud university medical centre (RUMC), located in Nijmegen, the Netherlands, approved the study design, protocols and procedures. Participation is voluntary and participants can withdraw at any moment without any consequences. All participants will sign informed consent. For the involved stakeholders the study is entitled: 'Self-management and employability of workers with complaints of arm, neck or shoulder; CANS sustainable under control'. For the potential participants the intervention is called 'Control CANS'.

Participants and recruitment

Participants will be recruited in two ways: 1) from employees of the RUMC, the HAN University of Applied Sciences (HAN UAS) and Sanquin (Blood bank), all located in Nijmegen, the Netherlands. These potential participants will be recruited by newsletters within the organisation and will be informed about the project by company physicians, occupational health coordinators and supervisors; and 2) recruitment of the general population in the area of Nijmegen. These potential participants will be recruited by calls in local newspapers and by contacting the Dutch patient group the '*RSI vereniging*' (Association for Repetitive Strain Injury).

Candidates willing to participate can contact the first author (NH) who will arrange a consultation with a physical therapist. Eligible candidates will receive an information letter about the project at

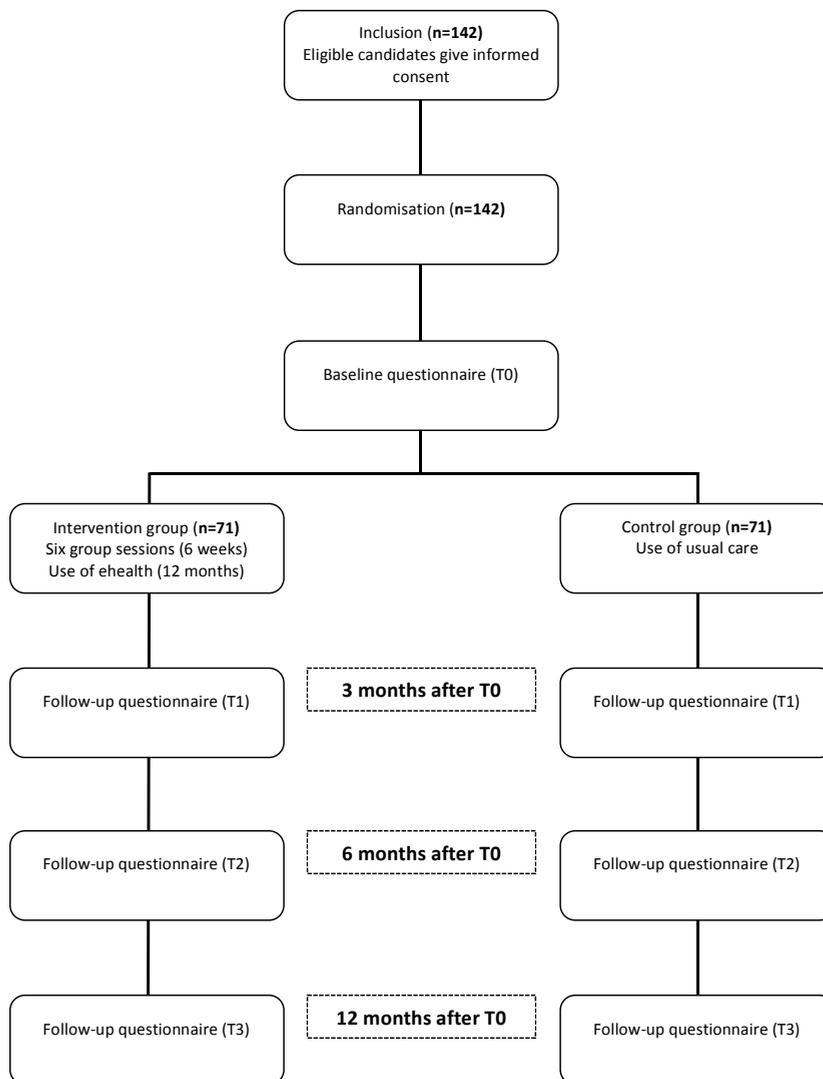


Figure 1: Flowchart showing the design of the trial.

Table 1: Eligibility criteria.

Inclusion criteria:	
1.	Participant is in his/her opinion limited in performing his/her work (related to CANS)
2.	Participant suffers from work-related complaints
3.	Complaints must have persisted for at least 12 weeks (either a continuous or intermittent course)
4.	Participant works for at least 12 hours a week
Exclusion criteria:	
1.	Red flags [36]*
2.	Complaints caused by a systemic disease [36]
3.	Complaints caused by traumatic injury [36]
4.	Suspicion of specific CANS [36]*
5.	Suspicion of mental pathology (> 4 points on subscale depression, measured with the Four-Dimensional Symptom Questionnaire) [54]

*An extended version of exclusion criteria 1 and 4 is provided in Appendix 1.

least 7 days before this consultation; this letter includes the information as approved by the METC as well as the informed consent letter. The physical therapist will provide additional information about the implications of participation. After this, the physical therapist will check the eligibility of the employee based on the inclusion and exclusion criteria (Table 1) by history taking and screening of the employee (including filling out the Four-Dimensional Symptom Questionnaire [4DSQ] [54]). An extended version of exclusion criteria 1 and 4 is provided in Appendix 1. If considered necessary, the physical therapist will perform a brief physical examination to rule out any exclusion criterion. During this consultation each participant will be asked to sign informed consent. Furthermore, randomisation will be performed. All data in the final publication of the trial, including the flow diagram of the progress of participants through the phases of the trial, will be reported according to the CONSORT 2010 statement [55].

Randomisation

Randomisation to either the intervention group (IG) or control group (CG) will be performed at the patient level. Each participant is assigned to either the IG or CG by randomisation with pre-stratification for the three participating companies and for participants from the general population (i.e. four groups: RUMC, HAN UAS, Sanquin, and the general population). The allocation sequence is computer generated [<http://www.randomization.com/>]. A researcher not involved in assigning participants to their groups will prepare concealed, consecutively numbered, sealed, opaque envelopes. Every envelope will contain a paper indicating the treatment allocation. Participants will receive their envelope during the consultation with the physical therapist who is not aware of the randomisation sequence. Participants can open the envelope whilst with the physical therapist; subsequently, the physical therapist will inform the first author (NH) about the treatment allocation.

Procedures

Participants allocated to the IG will receive information (from NH) about the next series of the self-management program after randomization. At the start of the program they also will receive the login code for the program website. Both the IG and CG will receive their baseline questionnaire (T₀) in the week before the start of the self-management program of the IG. The other questionnaires will be provided at 3 months (T₁), 6 months (T₂) and 12 months (T₃) after T₀. All questionnaires will be provided digitally on a secured website.

Interventions

Development

The self-management program described below was compiled based on the self-management program developed by Detaille et al. [50, 51]. Based on a recent multidisciplinary guideline for non-specific CANS [36], relevant literature, focus group sessions with employees with CANS, and relevant experts, and following the process of intervention mapping [52, 53], we adapted the program developed by Detaille et al. [50, 51] to suit and alleviate the problems/needs of employees suffering from CANS. Intervention mapping is a tool for the planning and development of health promotion interventions [56]. It maps the path from recognition of a need or problem to the identification of a solution and describes the process of health promotion program development in six steps: 1) needs assessment, 2) definition of proximal program objectives based on scientific analyses of health problems and problem causing factors, 3) selection of theory-based intervention methods and practical strategies to change (determinants of) health-related behaviours, 4) production of the program components and production, 5) anticipation of program adoption, implementation and sustainability, and 6) anticipation of process and effect evaluation [53, 56]. Intervention mapping is more an iterative rather than a linear process; program planners move back and forth between tasks and steps [56]. Each step in the process is based on previous steps, and inattention to a particular step may lead to mistakes and inadequate decisions [56]. The complementary eHealth was also developed based on the recent multidisciplinary guideline for non-specific CANS [36], relevant literature, focus group sessions with employees suffering from CANS, and relevant experts.

Group sessions and eHealth

The program will consist of 6 weekly group sessions of 2.5 hours each with 4-12 participants per group. The meetings are supervised by one or two trainers (depending on the group size). The first session will start with an introduction to the program and to the participants. Each subsequent session will start with summary reflection on the action plans made in the previous session. After this, the relevant topics will be discussed (Table 2). In one session an expert will give a presentation and will answer questions from the participants about exercises. At the end of each session

participants will be asked to set targets (Specific, Measurable, Acceptable, Realistic, Time-bound [SMART] and formulated in terms of behaviour) and action plans will be made.

The group sessions are complemented by an eHealth module. On a secured website the topics of the group training are discussed. Also, additional information is available on self-management and on specific topics of CANS, such as aetiological factors (physical, psychological and social

Table 2: Topics of the group sessions and eHealth module.

Topics of the group sessions:	
<i>Session 1</i>	<ul style="list-style-type: none"> – Introduction – Dealing with a chronic disability – Living with CANS – Working with CANS – Work load and work capacity – What is self-management? – Introduction to the eHealth module
<i>Session 2</i>	<ul style="list-style-type: none"> – Discussion on the eHealth module – Core qualities – Time management
<i>Session 3</i>	<ul style="list-style-type: none"> – Dealing with pain and fatigue – Stress and stress management – (Muscle) relaxation exercises
<i>Session 4</i>	<ul style="list-style-type: none"> – Healthy lifestyle – Nutrition – Exercises and sports – Use of facilities
<i>Session 5</i>	<ul style="list-style-type: none"> – Communication skills – Working with others and asking for help
<i>Session 6</i>	<ul style="list-style-type: none"> – Dealing with negative emotions – Positive thinking – Making a mind map
Topics of the eHealth module:	
Topic:	Content:
<i>Use of eHealth</i>	Manual of the eHealth module
<i>Self-management</i>	Introduction to self-management
<i>CANS</i>	Non-specific CANS, specific CANS, symptoms, causes (workload and capacity, physical factors, psychosocial and personal factors, chronic pain, sensitization, self-tests and screening tests), prognosis
<i>Possible solutions</i>	What can I do? (workplace, work pressure and work style, reduction of stress, sports and specific exercises), facilities within organisation, treatments
<i>About the group sessions</i>	Topics of the group sessions and manual
<i>Further reading</i>	Additional information and references to websites

(work) factors), prognostic factors, lifestyle factors, and other modifiable factors (Table 2). The eHealth is available for the IG up to 12 months after To (i.e. up to T3).

Control group

The CG can use all usual care and information available within the organisation of the participant. They are also allowed to use all care available outside of the organisation.

Baseline characterization of participants

Evaluation of baseline characteristics provides insight into the generalisability of the study, the success of the randomisation and any potential confounding factors. Measures regarding the baseline characteristics of the participants are provided in Table 3.

Table 3: *Baseline characteristics of participants collected at T0.*

-	Gender
-	Age (years)
-	Weight, height
-	Family situation
-	Level of education
-	Years of work experience
-	Nature of employment
-	Number of working days and hours
-	Complaints related to CANS
-	Dominant hand
-	Duration of complaints
-	Hours of computer work per day
-	Assessment of repetitive work
-	Alteration / variation / variety at work
-	Working with elevated arms
-	Working with rotated head

5

Outcome assessment and data collection

Primary outcome

The primary outcome measure will be the self-reported disability (in the previous week) of arm, shoulder and hand, measured with the Disabilities of the Arm, Shoulder and Hand questionnaire (DASH) [57]. The validity, test-retest reliability and responsiveness of the DASH have been investigated extensively [57]. There is also preliminary evidence to support the use of DASH to measure upper extremity symptoms and disability in patients with neck pain. We will use the Dutch language version of the DASH (DASH-DLV) which is proven a reliable and valid instrument for assessing disability and symptoms in Dutch patients with a variety of unilateral upper limb

disorders [58]. The DASH will be used at baseline (T₀), and at three (T₁), six (T₂) and 12 months (T₃) follow-up.

Secondary outcomes

Absenteeism will be measured by asking the participants the number of days they had been off work for all illnesses, as well as specifically for CANS, during the past three months (T₁ and T₂) or six months (T₃). Presenteeism will be measured with the Stanford Presenteeism Scale (SPS-6) which has shown high internal consistency and good validity [59]. The Dutch version of the SPS-6 has shown good reliability [60] and the structural and discriminative validity of the Dutch version of the SPS-6 are also endorsed [60]. Presenteeism will also be measured with the Work Limitations Questionnaire which has demonstrated high reliability and validity [61].

Pain in the previous week will be measured with the Numeric Pain Rating Scale (NPRS, 0-10). Numeric pain scales are established as reliable and valid [62-64]. The NPRS showed good test-retest reliability and responsiveness in patients with shoulder pain [65] and fair to moderate test-retest reliability in patients with mechanical neck pain [66]. Pain catastrophizing will be measured with the Pain Catastrophizing Scale (PCS) (Dutch language version) originally developed by Sullivan et al. [67] The validity of the PCS has been confirmed [68, 69] and the PCS showed sufficient test-retest stability [70].

Self-efficacy will be measured with the Dutch Adaptation of the General Self-Efficacy Scale [71]. The General Self-Efficacy Scale is a 10-item psychometric scale designed to assess optimistic self-beliefs to cope with a variety of difficult demands in life [<http://userpage.fu-berlin.de/health/self-scal.htm>]. The self-efficacy at work scale, developed by Detaille et al. [51], will be used to measure self-efficacy at work. The self-efficacy at work scale has shown high internal consistency (alpha 0.8) [51].

Fatigue will be measured with the Checklist Individual Strength which has shown good reliability and validity [72]. Burnout features will be measured with the Utrecht Burnout Scale (UBOS) [73], which is an adapted version of the Maslach Burnout Inventory [74]. The validity of the UBOS has been confirmed [75].

Work style will be measured with the Workstyle Short Form which has demonstrated acceptable psychometric properties [76]. Pace and amount of work, relations with colleagues/supervisors, need for recovery, and participation and empowerment on the workplace, will be measured by subscales of the Questionnaire on experiencing and assessing stress at work (VBBA; a questionnaire on experiencing / assessing stress at work) which is frequently used in the Netherlands to

measure employees' experience and evaluation of their work in the organisation; the VBBA has shown to be a valid and reliable questionnaire [77].

Quality of life will be measured with the Dutch language version of the SF-12v2 [78]. The reliability and validity of the SF-12 have been confirmed [78]. Self-reflection and insight are measured with the Self-Reflection and Insight Scale which is a valid and reliable measure of self-reflection and insight [79].

Participants will also be inquired with self-developed questionnaires about the use of healthcare interventions (treatments, workplace adaptations and conversations with supervisor) during the intervention and follow-up period, participation in sport (intensity and frequency), limitations experienced in work related activities (limitations experienced in the previous two weeks, numeric rating scale (NRS), 0-10), work capacity (NRS, 0-10), working with complaints (opinion about working with complaints and number of working days working with complaints) and about self-management skills at work [51] (opinion about self-management skills at work, six point Likert scale).

Process evaluation

A process evaluation will be performed to examine experiences of the participants with the intervention program. The process evaluation will be carried out using both quantitative and qualitative techniques. The experiences of the participants in the IG will be examined with a short questionnaire conducted at T3. Also, about 30 participants will be interviewed about their experiences with the program within 2-4 weeks after finishing the group sessions. The information obtained from these interviews can provide valuable information about the participants' experiences with the program and can be used in treatment (programs) for employees with CANS.

Sample size

The sample size calculation is based on the primary outcome of this study, the DASH. We assume that a difference in the score of 10 points on the DASH at T3 is a clinically relevant difference [80]. We used a standard deviation (SD) of 16.65 (based on the mean SD used by Bron et al. [80], Gummesson et al. [81], and van Eijsden-Besseling et al [82]). Power analysis revealed a sample size of 71 participants in each group, assuming a dropout rate of 20%. This implies that a total of 142 patients will be needed. The difference in score on the DASH can be detected with a power of 0.90 and an alpha of 0.05.

Blinding

Participants, trainers and researchers cannot be blinded for the allocated treatment after randomization. However, all participants fill in the digital questionnaires at their home or at work,

implying that the influence of researchers is ruled out. The data will be collected by the developer of the digital questionnaire, which will provide anonymous data to the researcher. Therefore, the analysis of the data by the researcher will be blind.

Co-interventions

Participants of the IG are allowed to attend additional treatments (co-interventions). Information on all co-interventions received by participants in both the IG and the CG group will be collected by questionnaires at T₃.

Statistical analyses

Demographics will be presented in means and SD or median and interquartile ranges per group. All outcomes of the questionnaires will be compared at baseline and at follow-up measurements. All analyses will be performed according to the intention-to-treat principle.

Longitudinal regression analysis will be performed to evaluate the effects of the intervention. For every outcome, the follow-up times (T₁, T₂, T₃) will be defined as dependent variable whereas the difference in baseline values (T₀) of the two groups will be defined as independent variable. Correction of confounders will be applied, if necessary.

To assess whether protocol deviations have caused bias, the results of the intention-to-treat analyses will be compared to per-protocol analyses. All data of the measurements used in this study will be provided digitally in an external system. All analyses will be performed with IBM SPSS Statistics 20.

Ethics

This study protocol is approved by the Medical Ethics Committee of RUMC (2012/319) and registered in the Dutch Trial Register (NTR3816) [<http://www.trialregister.nl>]. Potential participants from outside the 3 participating organisations will receive a travel allowance of 0.19 eurocents per kilometre for attending the appointment with the physical therapist.

Discussion

We present a study which aims to evaluate the effectiveness of a self-management program (including eHealth) and compare this with usual care in employees suffering from chronic non-specific CANS (persisting > 3 months) using an RCT design.

Based on a recent multidisciplinary guideline [36], relevant literature, focus group sessions with employees suffering from CANS, and relevant experts, we adapted a self-management program for employees with a chronic disease in the Netherlands developed by Detaille et al. [50] to suit and alleviate the problems and needs of employees with CANS. The strength of this intervention is that the program is specifically tailored to the needs of employees with CANS. Focus group sessions with employees identified the needs of participants related to disease-specific information, exercises, muscle relaxation, working with pain, work and social environment, and personal factors (including work style).

To meet these needs we will combine the adapted self-management program with an additional eHealth component, which provides the participants with valuable information related to CANS. Participants are also up-skilled in personalised goal setting and action planning, and collaborative problem definition is based on their readiness to change and their self-efficacy. By making action plans, we expect participants to take actions to manage their symptoms, treatment, physical and psychosocial consequences, and lifestyle changes inherent to living with CANS. Strengths of the study include the RCT design and the use of pre-stratification, which excludes the chance of possible confounding by indication.

The study also has some potential weaknesses. One of them is the differential use of co-interventions in the groups. At T3 we will monitor the use of co-interventions in both groups, so that we can use this information when drawing our conclusions. We will also ask the IG whether the intervention has contributed to the use of co-interventions. There is a small risk of contamination because (in theory) it is possible that two direct colleagues will participate, albeit allocated to different groups; however, we consider this a small chance, since the three organisations involved have large numbers of employees (200-9000 employees). Another potential weakness is that the questionnaires used in this study will be provided digitally. Although questionnaires will be provided only 4 times during the entire study, for employees with CANS doing computer work this might represent an extra load. However, since the questionnaires can be completed whilst taking breaks, we believe that participants are likely to fill in all the questionnaires.

We adapted our intervention based on the needs of employees of two participating organisations (HAN UAS and RUMC). Based on the literature, we assume that their experiences and needs are largely the same as that of employees working in other institutes or companies. Moreover, we also adapted our self-management program based on focus group sessions with experts and on the literature. Therefore, we expect the program to be suitable for the general population of employees suffering from CANS. We realise that our program will demand some time and effort from the participants and that employees usually have little time to spare. Therefore, potential participants must be sufficiently motivated.

Although one strength of the study might be the combination of a self-management program and eHealth, this also implies that if the intervention is effective we do not know to what extent each component has contributed to these effects. Therefore, in the quantitative evaluation at T3 as well as in the qualitative evaluation of the program (in-depth interviews), we will ask participants about their experiences and the usefulness of both components.

The internal validity of this RCT might be affected by the fact that blinding of the participants is not possible. A potential source of bias is the difference in the amount of attention patients receive, also called the Hawthorne effect [83]. In our study, patients in the IG will participate in the group sessions, which might lead to an overestimation of the effect of the intervention program. Although in this study the CG is allowed to all use usual care, which might lower the difference in attention between IG and CG, effects of the Hawthorne affect cannot be ruled out since participants are not blinded.

A final limitation might be that all data are self-reported. Therefore, as far as possible, we will use validated questionnaires. No objective data will be collected concerning absenteeism. There is ongoing discussion as to whether self-reported data on absenteeism are reliable, although recent evidence showed a high level of similarity between self-reported data and data from, e.g., a national insurance authority, and that the use of self-reported data is justified in research [84]. There is also a possibility of recall or information bias. However, because this study is designed as an RCT we expect recall bias to occur to the same extent in both study groups.

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Appendix 1: Extended version of exclusion criteria 1 and 4 [36]

Red Flags:

- General slump
- Unintentional weight loss
- Fever, night sweats
- Non-mechanic pain
- Neuropathic pain
- Neurological symptoms (muscle weakness, isolated atrophy, radicular failure symptoms)
- Signs of inflammation
- History of malignancy
- Dyspnoea, chest pain

Suspicion of specific CANS:

- Radicular symptoms (severe radiating pain)
- Shoulder pain with general loss of both active and passive movement (Capsulitis Adhaesiva)
- Loss of muscle strength
- Symptoms of nerve stimulation
- Local pain combined with swelling or redness
- Difficulties to bending (pain) or stretching of a finger or thumb
- Typical palmar nodules, especially in the 4th and 5th finger, flexion contracture at the level of the MCP and PIP joints (Morbus Dupuytren)
- Persistent joint pain that increases with stress on joints, age > 44 years, mild transient morning stiffness and benign thickening especially in PIP joint (Bouchard's nodes) and DIP joints (nodules of Heberden) (osteoarthritis).

6 |

Development and measurement properties of the Dutch version of the Stanford Presenteeism Scale (SPS-6)

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Abstract

Objective: To develop a Dutch version of the Stanford Presenteeism Scale (SPS-6) and examine the reliability and discriminant, discriminative and structural validity of the Dutch SPS-6 (DSPS-6).

Methods: The original SPS-6 (English-language) was translated and adapted to the Dutch culture. Thirty participants filled in the DSPS-6 at baseline (T₀) and after 5 days (T₁). Internal consistency (Cronbach's alpha), test-retest reliability (Spearman's correlation coefficient, Spearman's rho), item-to-total correlations, discriminant validity (association with job stress and job satisfaction), discriminative validity (patients reporting a (work) disability compared with those indicating that they had no disability; Spearman's rho, t-tests), structural validity (Varimax rotation with Kaiser Normalization) and floor and ceiling effects were examined.

Results: Cronbach's alpha for the DSPS-6 was 0.89. Test-retest Spearman's rho was 0.82 ($p < 0.01$). Item-to-total correlations ranged from 0.60 to 0.82. Subjects reporting a work disability had significantly lower DSPS scores (discriminative validity). Spearman's rho for the DSPS-6 score and job satisfaction were 0.38 ($p = 0.05$; at T₀) and 0.27 (at T₁), respectively. Spearman's rho for the association between the DSPS-6 and job stress were -0.52 ($p = 0.01$; at T₀) and -0.42 ($p = 0.05$; at T₁), respectively (discriminant validity). The two factors derived from the principal components analysis account for 77.5% of the variance of responses (structural validity). A ceiling effect was present.

Conclusions: The DSPS-6 showed good reliability and structural validity. The discriminative validity of the DSPS-6 is partly supported. The concept of presenteeism is not sufficiently distinct from the constructs of job stress and job satisfaction (discriminant validity). The results of the present study show that the adaptation of the SPS-6 into Dutch was successful. Further research on the reliability, validity and responsiveness of the DSPS-6 in a larger group of participants is recommended.

Introduction

Absenteeism refers to an employee's time away from work due to illness or disability [1]. However, even when employees are physically present on the job, they may experience decreased productivity and below-normal work quality—a concept known as presenteeism [2, 3]. The definition of presenteeism varies between different authors [4]. One definition of presenteeism is: being present at work, but being limited in some aspects of job performance by a health problem [2, 3, 5-9]. This definition meets best the construct measured by the Stanford Presenteeism Scale (SPS-6), a measurement tool to assess presenteeism. Currently, there is no gold standard for presenteeism [2]. Presenteeism is often a hidden cost for employers [5]. It includes time not spent on job tasks and decreased quality of work [10]. Koopman et al. [11] identified two dimensions of presenteeism: work process (avoiding distractions), and work outcome (completing work). Lost productivity time as result of common pain conditions among workers in the United States costs an estimated \$ 61.2 billion per year [12]. Presenteeism has been estimated to account for 77% of this lost productivity time whilst absenteeism has been estimated to account for 23% [12].

Several self-report instruments have been developed to measure presenteeism across various types of jobs and organisations [1, 13, 14]. Some common tools with good psychometric properties include the Work Limitations Questionnaire (WLQ)[15], the Work Productivity and Activity Impairment Questionnaire (WPAI) [16] and the Stanford Presenteeism Scale (SPS-32) [6, 11]. These measurement tools assess presenteeism based on self-evaluation of perceived impairments; employees are asked to report how much their illness hinders them in performing common mental, physical and interpersonal tasks, and in meeting job demands [17].

In 2002, Koopman et al. developed an abbreviated version of the SPS-32, i.e. the SPS-6 [11]. Their aim was to encapsulate the cognitive, emotional, and behavioral aspects of worker concentration into a practical and concise measurement tool with excellent psychometric properties [11]. As the SPS-6 showed excellent psychometric properties and was validated in an American working population, it might be a useful assessment tool in research on work and productivity [11]. The SPS-6 also showed high internal consistency (Cronbach's alpha, 0.80), good construct, concurrent and discriminant validity and, due to its brevity, it is easy to administer. An employee with high presenteeism (i.e. one with a low score on the SPS-6) is physically present on the work floor but experiences decreased productivity and below normal work quality due to an illness or other constraint [18]. This decreased productivity is not constant over time but varies depending on the aetiology and physiology of that particular illness [19]. This is generally a dynamic process with a different impact from day to day due to, e.g., acute flare-ups and exacerbations [11]. Koopman et al. [11] stated that because presenteeism is variable and therefore unstable over time, individuals completing the SPS-6 instrument will not show consistent results over time. For this reason Koop-

man et al. [11] did not evaluate the test-retest reliability of the SPS-6. There is preliminary evidence that some workplace health promotion programs positively affect presenteeism [3, 17]. Thus, although presenteeism may vary in one person, it might be important to measure the effects of presenteeism in groups, for example before and after a health intervention.

Currently, no Dutch language version of the SPS-6 exists. Therefore, the aim of this study was to develop a Dutch-language version of the SPS-6 and adapt it to the Dutch culture. Because measuring presenteeism over time can be useful in both clinical and research areas, the second aim was to examine the reliability (in terms of test-retest reliability, item-to-total correlation and internal consistency) and the discriminant, discriminative and structural validity of the Dutch version of the SPS-6 (DSPS-6) in a population with musculoskeletal health problems.

Materials and methods

Overview of the study design

This study was carried out in two phases:

1. The first phase involved translation of the SPS-6 into Dutch and its cultural adaptation.
2. The second phase involved a study to assess the test-retest reliability [20], item-to-total correlation [21], internal consistency [20], and different aspects of the validity, in terms of discriminant validity [20], discriminative validity [20], and structural validity [20], of the Dutch version of the SPS-6.

Phase 1: Translation and cultural adaptation

We contacted the developers of the SPS-6 [11]. Because the SPS-6 is published and available in the public domain, there were no restrictions on the use and translation of the questionnaire.

First, three forward translations of the SPS-6 were made from English into Dutch. If required, the questions also underwent cultural adaptation. The three translators had different backgrounds and profiles, i.e. sociology (SD), physical therapy (NH) and health management (LD) [22] and only one was familiar with the construct of the SPS-6. The three translations were compared with each other to determine potential discordance. A reconciliation meeting was conducted with the translators and an independent researcher to obtain a consensus version. Then, working from the consensus version and totally blind to the original version, three other translators (LVI, DA, AJ) independently translated the questionnaire back into English; the mother tongue of these three translators is English. They were not aware of the concepts explored and had no medical background. Then, all six translators and two independent researchers reviewed all translations,

reached a consensus on each discrepancy, and produced the final version of the DSPS-6 (Appendix 1).

Phase 2: Test-retest reliability, internal consistency, item-to-total reliability, discriminative validity, discriminant validity, and structural validity of the DSPS-6

Participants

Participants were recruited in a Dutch practice for physical therapy. Patients were assessed for their eligibility to participate in the study by the treating therapists. Patients were included if they: 1) were treated for musculoskeletal problems; 2) had paid work; and 3) were working at the moment of inclusion (no 100% absenteeism allowed). Patients were told that we had translated a questionnaire and wanted to test if the questionnaire was applicable in a patient population. Patients fulfilling the inclusion criteria were asked to fill out the questionnaire at baseline (T₀) and five days later (T₁). According to Dutch legislation no approval from a medical ethic committee was required. Each participant was asked for informed consent prior to inclusion and informed that participation was voluntary and that the individual had the right to withdraw consent or to discontinue participation at any time without penalty and that the individuals' privacy would be maintained. The research protocol fulfilled the criteria of the Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects.

Measurements

All included individuals received a consecutive number from the physical therapist. At T₀ and T₁ the individuals were invited by email to fill out an electronic anonymous questionnaire. Researchers were blinded to the individuals' characteristics.

Demographics Five items assessed demographic characteristics: age, gender, employment status (fulltime/part-time), absenteeism, and duration of complaints.

Presenteeism The DSPS-6 consists of six items (Figure 1). All items are scored on a 5-point Likert scale. Item numbers 2, 5 and 6 are scored as follows: 'strongly disagree' = 1; 'somewhat disagree' = 2; 'uncertain' = 3; 'somewhat agree' = 4; and 'strongly agree' = 5. Item numbers 1, 3 and 4 are scored as follows: 'strongly disagree' = 5; 'somewhat disagree' = 4; 'uncertain' = 3; 'somewhat agree' = 2; and 'strongly agree' = 1. The DSPS-6 score is the sum of the values of the scale. A score was not calculated if items were missing. Scores can range from 6 to 30 with a higher DSPS-6 score indicating a lower level of presenteeism; i.e. a greater ability to concentrate on and accomplish work despite health problem(s) [11].

Work stress and satisfaction Each participant was asked: "How would you rate the stress of your current job?" Possible answers were: extremely low (1), low (2), moderate (3), high (4) and extremely high (5). Each participant was also asked: "Overall, how satisfied are you with your job?"

Stanford Presenteeism Scale⁺ (SPS-6)

Directions: Please describe your work experiences **in the past month**. These experiences may be affected by many environmental as well as personal factors, and may change from time to time. For each of the following statements, please check one of the following responses to show your agreement or disagreement with this statement in describing *your* work experiences **in the past month**.

Please use the following scale:

... I strongly disagree with the statement
 ... I somewhat disagree with the statement
 ... I am uncertain about my agreement with the statement
 ... I somewhat agree with the statement
 ... I strongly agree with the statement

	Strongly disagree	Somewhat disagree	Uncertain	Somewhat agree	Strongly agree
1. Because of my (health problem)*, the stresses of my job were much harder to handle.	()	()	()	()	()
2. Despite having my (health problem)*, I was able to finish hard tasks in my work.	()	()	()	()	()
3. My (health problem)* distracted me from taking pleasure in my work.	()	()	()	()	()
4. I felt hopeless about finishing certain work tasks, due to my (health problem)*.	()	()	()	()	()
5. At work, I was able to focus on achieving my goals despite my (health problem)*.	()	()	()	()	()
6. Despite having my (health problem)*, I felt energetic enough to complete all my work.	()	()	()	()	()

** Note that the words 'back pain,' 'cardiovascular problem,' 'illness,' 'stomach problem,' or other similar descriptors can be substituted for the words 'health problem' in any of these items.*

⁺ The Stanford Presenteeism Scale (SPS-6; 2001 version) is jointly owned by Merck & Co., Inc., and Stanford University School of Medicine.

Figure 1: Original SPS-6, developed by Koopman et al. [11].

Possible answers were: completely dissatisfied (1), moderately dissatisfied (2), neither satisfied nor dissatisfied (3), moderately satisfied (4) and completely satisfied (5).

Disability status The disability status of each participant was assessed through one question with three response categories: answer 1, a work disability (i.e. if they any limitations during work due to their health problem was experienced; answer 2, a non-work disability (i.e. if any limitations or participation restrictions in daily life was experienced, but not during work, due to their health problem; or answer 3, no disability (no experienced limitations or participation restrictions at all).

Statistical analysis

The demographic data of the individuals were described by means and standard deviations (SD). At To the mean (SD) DSPS-6 score, hours of absenteeism, working hours (fulltime/part-time), duration of complaints, work stress, work satisfaction and disabilities were assessed.

Floor and ceiling effects were considered present if $\geq 15\%$ of the responders achieved the lowest or highest possible total score, respectively [23]. Internal consistency of the DSPS-6 was assessed with Cronbach's alpha. Internal consistency is considered as acceptable (>0.7), good (>0.8) or excellent (>0.9) [24]. We also calculated item-to-total correlation, an estimate of the correlation between the question score and the overall score of the scale [21]. We considered item-to-total correlations of ≥ 0.3 for individual scale items as good [21, 25, 26].

At T1 the same measurements were made again (with the exception of the demographics). The test-retest reliability of the DSPS-6 was estimated by Spearman's correlation coefficient (Spearman's rho). The test-retest reliability of work stress, work satisfaction and disability was also assessed.

Discriminative validity [20] was assessed by *t* tests, comparing the mean DSPS-6 score obtained by patients reporting work disability, to those indicating having no disability and by patients reporting a non-work disability compared with those indicating that they had no disability. We also compared the mean DSPS-6 score of patients reporting a work disability to patients with a non-work disability. Finally, we compared the mean DSPS-6 score obtained by patients reporting a work disability or non-work disability with those indicating having no disability, according to Koopman et al. [11]. We assumed that the total DSPS-6 score of patients with a (work) disability is lower than of patients with no disability.

Discriminant validity [20] was assessed by evaluating the relationship between the DSPS-6 score with scores on measures of job satisfaction and job stress [11], by computing Spearman's rho. Job satisfaction and job stress are expected to be related to the DSPS-6 score, but only slightly (Spear-

man's rho < 0.30) [11, 27, 28]; in this way it is possible to distinguish between the constructs of presenteeism and job satisfaction and job stress.

The DSPS-6 structure (structural validity, as a part of construct validity [20]) was examined by classic factor analysis using the Varimax rotation with Kaiser Normalization, according to Koopman et al. [11]. We assumed that the two underlying dimensions of presenteeism (avoiding distractions and completing work) were tapped by the DSPS-6.

We interpreted Spearman's rho as weak (<0.3), moderate (0.3-0.5), or strong (>0.5) conform the classification of Cohen [27]. All statistical analyses were performed using SPSS Statistics, version 20. The level of significance was set at 0.05.

Results

Participants

Of the 38 patients willing to participate in the study, 34 filled in the first questionnaire (response rate 89.5%) and 30 filled in the second questionnaire. Thus there was a dropout rate of 11.8%, i.e. people not responding to the second invitation to fill out the questionnaire. Of the 30 participants (15 men, 15 women) the mean age was 46.2 (range 22-69) years. Table 1 summarises the demographic and clinical characteristics of the participants.

Measurements

At the first completion of the questionnaire, the mean score for the DSPS-6 was 22.3 (SD 7.2), range 6-30. A ceiling effect (no presenteeism) was present, i.e. 23.3% (n=7) scored 30 on the DSPS-6. Table 1 presents scores for work stress, work satisfaction and disability status. There was also a ceiling effect present for job satisfaction on T0 (46.7%, n=14) and T1 (36.7%, n=11).

Internal consistency, test- retest reliability and item-to-total correlation

Cronbach's alpha for the DSPS-6 was 0.89. On test-retest, Spearman's rho was 0.82 ($p < 0.01$). Spearman's rho for the individual questions and item-to-total correlation are summarised in Table 2. Spearman's rho for work satisfaction, work stress and reported disability were 0.80 ($p < 0.01$), 0.65 ($p < 0.01$) and 0.72 ($p < 0.01$), respectively.

Discriminative validity

The mean DSPS-6 score obtained by individuals reporting a work disability, was significantly lower (mean 16.9; SD 6.9) compared to the mean score of individuals reporting a non-work disability (mean 24.6; SD 6.3; $p = 0.009$) and compared to individuals reporting no disability (mean 25.8; SD

Table 1: Baseline characteristics of the patient group (n=30).

Variables	Values
Mean age in years (SD / range)	46.2 (12.99 / 22-69)
Male, n (%)	15 (50)
Female, n (%)	15 (50)
Hours absenteeism (last week), n (mean / SD / range)	17 (8.2 / 13.17 / 1-41)
Employment status	
Part-time, n (%)	19 (63.3)
Fulltime, n (%)	11 (36.7)
Duration of complaints, n (%)	
1 – 4 weeks	3 (10)
4 – 12 weeks	8 (26.7)
12 weeks – 6 months	4 (13.3)
6 – 12 months	6 (20.0)
> 1 year	9 (30)
Disability, n (%)	
Work-related	10 (33,3)
Non-work-related	14 (46,7)
None	6 (20)
Work stress, n (%)	
Extremely low	0 (0)
Low	3 (10)
Moderate	14 (46.7)
High	13 (43.3)
Extremely high	0 (0)
Work satisfaction	
Dissatisfied	1 (3.3)
Moderately dissatisfied	2 (6.7)
Neither satisfied nor dissatisfied	5 (16.7)
Moderately satisfied	8 (26.7)
Completely satisfied	14 (46.7)

Table 2: Spearman's correlation coefficients (Spearman's ρ) between survey 1 and 2 of the DSPS-6 and item-to-total correlation on survey 1.

Question	Spearman's ρ on survey 1 and 2	Item-to-total
Because of my health problem, the stresses of my job were much harder to handle.	0.78**	0.67
Despite having my health problem, I was able to finish hard tasks in my work.	0.24	0.63
My (health problem)* distracted me from taking pleasure in my work.	0.64**	0.60
I felt hopeless about finishing certain work tasks, due to my (health problem).	0.90**	0.82
At work, I was able to focus on achieving my goals despite my (health problem).	0.61**	0.80
Despite having my (health problem), I felt energetic enough to complete all my work.	0.87**	0.78

DSPS-6 = Dutch Stanford Presenteeism Scale; ** $p < 0.01$

4.8; $p = 0.015$). The mean DSPS-score obtained by individuals reporting a non-work disability did not differ significantly compared to the mean score of individuals reporting no disability ($p = 0.658$). There was no significant difference between the mean DSPS-6 score of individuals reporting a work or non-work disability (mean 21.4; SD 7.5) and individuals reporting no disability ($p = 0.182$).

Discriminant validity

At T₀, the Spearman's rho for the DSPS-6 score on the one hand, and job satisfaction and job stress on the other hand, were 0.38 ($p = 0.05$) and -0.52 ($p = 0.01$), respectively. At T₁, the Spearman's rho for the DSPS-6 score and job satisfaction and job stress were 0.27 (not significant) and -0.42 ($p = 0.05$), respectively.

Structural validity

Table 3 shows the results of the classic factor analysis using the Varimax rotation with Kaiser Normalization on the SPS-6 completed by the study participants. The two factors derived from the principal components analysis account for 77.5% of the variance of responses, with the first factor accounting for 63.1% of variance and the second accounting for an additional 14.4% of variance. All three of the positively worded items in the SPS-6 loaded strongly on this first factor, which we, according to Koopman et al. [11], labelled as 'completing work'. All three of the SPS-6 negatively worded (reverse scored) items loaded weakly on the first factor but strongly on the second factor, which we, according to Koopman et al. [11], labelled as 'avoiding distraction'.

Table 3: Factor Loadings of the DSPS-6 items using the Varimax rotation procedure.

Item	Factor 1: Completing Work	Factor 2: Avoiding distraction
Because of my health problem, the stresses of my job were much harder to handle.	0.87	
I felt hopeless about finishing certain work tasks, due to my (health problem).	0.85	0.37
My (health problem)* distracted me from taking pleasure in my work.	0.73	
Despite having my health problem, I was able to finish hard tasks in my work.		0.89
At work, I was able to focus on achieving my goals despite my (health problem).	0.37	0.85
Despite having my (health problem), I felt energetic enough to complete all my work.	0.55	0.65

DSPS-6 = Dutch Stanford Presenteeism Scale

Discussion

We developed a Dutch version of the SPS-6, the DSPS-6. Investigation of the DSPS-6 showed good test-retest reliability, internal consistency, and item-to-total correlation. This study also provides support for the discriminative validity and structural validity of the DSPS-6.

Cross-cultural adaptation is not merely the process of translating the outcome measure to another language, it also involves a series of adjustments to ensure that the translated scale is semantically equivalent to the original one. This is done to maintain the content validity of the scale [22]. The good internal consistency and structural validity of the original SPS-6 [11] are supported. We were not able to find support for the significant lower mean SPS-6 score of individuals reporting a work or non-work disability compared to individuals reporting no disability. The discriminative validity is partly supported. The results of the present study show that the adaptation of the SPS-6 into Dutch was successful.

The definition of presenteeism varies between different authors [4]. Recently, Johns [4] preferred to use the definition 'attending work while ill' because this definition is used by most scholars occupational medicine, and excludes the motives for presenteeism as well as possible consequences of presenteeism [4]. Because the SPS-6 assesses whether an employee is physically present on the work floor but experiences decreased productivity and below normal work quality due to an illness or other constraint, indicating presenteeism, we decided to use the commonly applied definition of presenteeism: 'being present at work, but being limited in some aspects of job performance by a health problem' [2, 3, 5-9]. This definition indicates a decreased on-the-job

performance caused by the attendance at work while heaving a health problem. Koopman et al. [11] defined decreased productivity and below normal work quality as *decreased* presenteeism because they wanted to frame the term in a positive sense. Based on our choice to define presenteeism as 'decreased on-the-job performance', a lower DSPS-6 score indicates a higher degree of presenteeism (i.e. more pronounced decreased on-the-job performance).

Both physical health and mental health problems (such as depression/anxiety) are important contributors to a less-than-optimal work performance [3]. Merrill et al. [3] found that the work-related environmental factors 'requiring too much of one's employees' and 'not having sufficient technological support and resources' had the greatest influence on less-than-optimal work performance. Other work-related environmental factors contributing to a less-than-optimal work performance include inadequate training, and challenging relationships with supervisors and co-workers [3]. Personal problems, stress and financial concerns were also primary contributors to a less-than-optimal work performance [3].

There were no problems with filling out the questionnaire. The mean score on the DSPS-6 was 22.3 (SD 7.2), which is comparable with the mean score in the original study on the SPS-6, i.e. 22.9 (SD 4.0). Other authors found means of 17.8 (SD 5.2) [29] and 13.3 (SD 5.2) [25]. These latter studies included individuals from rheumatology clinics and from an outpatient arthritis treatment program; these latter patients probably had a more severe disability (related to rheumatoid arthritis and osteoarthritis) compared with our individuals with musculoskeletal problems, leading to a higher degree of presenteeism (i.e. a lower score on the DSPS-6).

Our population was recruited from patients (with musculoskeletal problems) in a practice for physical therapy. This population is not representative for the general Dutch working population and no individuals without physical problems were included. In our study 63.3% of the individuals were part-time employed. In the study of Koopman et al. [11] only 1.8% of the individuals were part-time employed. Because we obviously used a different population as Koopman et al. [11], we cannot draw conclusions about the general working population. This has to be kept in mind when comparing the results of this study with other studies assessing the SPS-6.

Our population differed from the general Dutch population visiting a physical therapist for duration of complaints (complaints: < 1 week, 9.9%; 1 week – 1 month, 31.2%; 1-3 months, 24.7%; 3-6 months, 9.9%; 6-12 months, 6.5%; > 12 months 17.8%) [30]. In our study 63.3% of the participants suffered from chronic complaints (> 3 months) whereas 34.2% of the general patient population in the Netherlands suffered from chronic complaints. We did not assess the type of referral of the participants. In the Netherlands, 41.5% of the patients is self-referred, whereas 43.9% and 14.6% are referred by their medical physician or general practitioner, respectively [30].

A ceiling effect was present in our study; 23.3% of the participants scored the maximum of 30 on the DSPS-6 (indicating no presenteeism). If a high percentage of people score at the top of a scale it is impossible to detect an improvement in health for that group; however, if individuals do not show indicators of presenteeism, improvement is not an intervention goal and no intervention is needed. In our study we included patients out of a practice for physical therapy. In two other studies, 1.7% and 13.5% of the participants, respectively, had the highest possible score on the SPS-6 [25, 29]. These latter studies included individuals from rheumatology clinics and from an outpatient arthritis treatment program with a higher degree of presenteeism (i.e. a lower score on the DSPS-6); therefore, it is plausible that in these studies the ceiling effect was less pronounced.

Test-retest reliability and internal consistency are considered to be two common measures of reliability [31]. Internal consistency is an estimate of the scale's homogeneity or the degree to which a set of items in an instrument measures the same trait [32]. With a Cronbach's alpha of 0.88 the DSPS-6 showed good internal consistency. The original SPS-6 also showed good internal consistency (Cronbach's alpha 0.80) [11]. Others reported an acceptable internal consistency with Cronbach's alpha of 0.71 [25] and 0.76 [29], respectively.

The item-to-total correlation was good. This is in contradiction with a study on the original SPS-6, reporting item-to-total correlations ranging from 0.11 to 0.56 [25]. This latter study included individuals from rheumatology clinics and from an outpatient arthritis treatment program, but did not report the item-to-total correlation per item. However, it is unlikely that this influenced the results because this is not likely to change the item-to-total correlation. It is possible that our accurate translation resulted in a better item-to-total correlation.

Test-retest reliability is measured by asking the participants to fill out the questionnaire on two different occasions [33]. No other study has examined the test-retest reliability of the SPS-6, although one study examined the test-retest reliability of the Japanese version of the SPS-13 (also based on the SPS-32) [34]. Spearman's rho of two modules of the SPS-13 (work impairment score and work output score) were 0.79 ($p < 0.001$) and 0.83 ($p < 0.001$), respectively, which is comparable with the Spearman's rho found in this study for the DSPS-6 (0.82, $p < 0.01$).

The time interval between the two tests should not be too short (to avoid biasing results with a memory effect); on the other hand, the interval should not be so long that the measured variables are likely to have changed [35]. Therefore test-retest reliability was measured by comparing the results of the measure separated by a time interval of five days. We considered this period to be long enough to forget the answers of the first test, but short enough to avoid health problems seriously increasing or decreasing. Spearman's rho was 0.82 ($p < 0.01$), indicating a strong correlation and good test-retest reliability. Spearman's rho for items 1, 3, 4, 5 and 6 were strong. There was a

weak correlation between T_0 and T_1 on item 2 of the DSPS-6. Looking at the raw data, 5 individuals scored this item very differently on T_0 compared with T_1 . Deleting these five individuals would raise the Pearson's rho for this item to 0.65 ($p=0.01$). We were unable to identify possible causes of the poor correlation on this question. Item 2 asks the individual to describe their work experiences in the past month, so it seems strange that only this item has a poor correlation. Even if the respondent had filled in his experiences of the last week, it is unlikely that the individual's health problem would have changed substantially in five days. More feasible is that the (hard) work tasks of the individuals may have varied and this might have influenced the scoring of individuals. For the additional items on work satisfaction, work stress and reported disability, Spearman's rho were strong.

Koopman et al. [11] investigated the validity of the SPS-6. Factor analysis indicated that the SPS-6 captured both dimensions of presenteeism that the authors intended to assess, including a focus on work process (avoiding distractions) and work outcome (completing work). Our factor analyses on the DSPS-6 provides support for the factor analyses conducted by Koopman et al. [11]. This analysis provides evidence for the structural validity of the SPS-6 [11]. It is consistent with the underlying construct: the employee's ability to focus on work without being distracted by health problems [11]. The results show good concurrent validity for the self-reported measures of productivity in general [11]. Total scores on the SPS-32 and SPS-6, as investigated by Koopman et al. [11], were strongly correlated (Spearman's rho 0.89, $P < 0.001$), suggesting that the SPS-6 assesses what is covered by the SPS-32 [11].

Criterion validity is the degree to which the scores of a health-related patient-reported outcomes instrument are an adequate reflection of a gold standard [20]. Currently, there is no gold standard for presenteeism [2]. Koopman et al. [11] assessed criterion validity by comparing presenteeism scores with a specific and measurable criterion, such as the presence of a physical disability. However, this is debatable, because we assume that comparing presenteeism scores with a specific and measurable criterion in this case refers to discriminative validity of known group validity [20, 28]. Discriminative validity is a part of construct validity, more specifically hypothesis testing [20]. The mean DSPS-6 score obtained by individuals reporting a work disability was significantly lower (mean 16.9) compared to individuals reporting a non-work disability (mean 24.6) and compared with individuals reporting no disability (mean 25.8). We found no significant difference between the mean DSPS-6 score of individuals reporting a work or non-work disability (mean 21.4) compared of those of individuals reporting no disability. In the study of Koopman et al. [11] the mean SPS-6 score obtained by employees reporting a work or non-work disability was significantly lower (mean 21.0; SD 3.9) compared with that of employees who reported no disability (mean 23.5; SD 3.8; $p = 0.001$). Although the mean score is comparable to those of Koopman et al. [11], we did not find a lower SPS-6 score for individuals reporting a work or non-work disability. The

DSPS-6 distinguishes between individuals with musculoskeletal problems associated with work and individuals with musculoskeletal problems not associated with work. Koopman et al. [11] originally examined the SPS-6 among employees regardless of their health problem, thereby also including individuals without (treatment for) health problems. In the present study we did not include individuals without health problems. If we had included healthy people, it might have been possible to detect significant differences between individuals reporting a non-work disability compared with individuals reporting no disability.

Discriminant validity is also a part of construct validity, more specifically hypothesis testing [20]. In our study the DSPS-6 score showed significantly moderate and strong correlation with job satisfaction (Pearson's $\rho = 0.38$) and job stress (Pearson's $\rho = -0.52$), respectively, on T₀. On T₁ both showed a weak and moderate correlation, respectively (Pearson's $\rho = 0.27$; and Pearson's $\rho = -0.42$, respectively). In the study of Koopman et al. [11] the original SPS-6 showed a weak correlation with stress on the job (Pearson's $\rho = -0.22$; $p < 0.01$) and with job satisfaction (Pearson's $\rho = 0.15$; $p < 0.05$). Although it is reasonable that some degree of relationship would exist [11], this study indicates that, in the DSPS-6, contrary to the SPS-6, the concept of presenteeism is not sufficiently distinct from the constructs of job stress and job satisfaction. Our stronger correlations are probably influenced by the fact that we included a different population than Koopman et al. [11] (i.e. patients with musculoskeletal problems versus employees regardless of their health problem) and by a ceiling effect present in the scores of the DSPS-6 and job satisfaction. Also, the study of Koopman et al. [11] was carried out in 2001. It is possible that, given the economic crisis in the Netherlands in 2012, employees are more satisfied with their job compared to 2001. In our sample, a higher score on the DSPS-6 (indicating a lower level of presenteeism) correlated negatively with job stress. Possibly, employees experience job stress due to their decreased productivity and below-normal work quality because of their symptoms or job stress is one of the causes of their musculoskeletal problem, both indicating a more pronounced relationship between the total SPS-6 score and job stress.

We only included 30 patients. This sample size is considered sufficient for translation and cultural adaptation of questionnaires [22]. It is highly recommended that, after the translation and adaptation process, the investigators ensure that the new version of the instrument has demonstrated the measurement properties needed for the intended application [22]. Every new developed instrument should retain both the item-level characteristics such as item-to-scale correlations and internal consistency; and the score-level characteristics of reliability, construct validity, and responsiveness [22]. It is possible to work some of these tests of reliability and validity into the pretesting process although often larger sample sizes are needed [22, 28]. Therefore, this study is only the first step in research on the reliability, validity and responsiveness of the DSPS-6. We rec-

ommend further research on the reliability, validity and responsiveness of the DSPS-6 in a larger group of participants with musculoskeletal problems, and also in a general working population.

The results of this study show that the DSPS-6 has a good test-retest reliability, internal consistency and item-to-test reliability. This study also provides support for the structural validity and partly for the discriminative validity of the DSPS-6. Discriminant validity is not sufficient supported. The good internal consistency and structural and discriminative validity of the original SPS-6[11] are supported. The results of the present study show that the adaptation of the SPS-6 into Dutch was successful. The DSPS-6 can be used to measure presenteeism in employees with musculoskeletal health problems, but further research on the reliability, validity and responsiveness of the DSPS-6 is recommended.

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Appendix 1: Dutch version of the SPS-6 (DSPS-6)

Stanford Presenteem Scale* (SPS-6) Dutch Version (DSPS-6)

Aanwijzingen: Beschrijft u alstublieft uw werk ervaringen in de afgelopen maand. Deze ervaringen kunnen beïnvloed worden door vele omgevingsfactoren en door persoonlijke factoren, en kunnen daardoor van tijd tot tijd veranderen. Geef u voor elke van de volgende stellingen aan in hoeverre u het eens of oneens bent met de stelling, in de mate dat deze uw werk ervaringen in de afgelopen maand weergeeft.

Gebruik alstublieft de volgende schaal:

- ... Ik ben het helemaal oneens met de stelling
 ... Ik ben het enigszins oneens met de stelling
 ... Ik ben het eens noch oneens met de stelling
 ... Ik ben het enigszins eens met de stelling
 ... Ik ben het helemaal eens met de stelling

	Helemaal mee oneens	Enigszins oneens	Eens noch oneens	Mee eens	Helemaal mee eens
1. Vanwege mijn (gezondheidsprobleem) *, kon ik de druk op mijn werk veel moeilijker hanteren.	()	()	()	()	()
2. Ondanks mijn (gezondheidsprobleem) *, is het mij gelukt moeilijke taken af te ronden op het werk.	()	()	()	()	()
3. Mijn (gezondheidsprobleem) * zorgde ervoor dat ik minder plezier had in mijn werk.	()	()	()	()	()
4. Ik voelde mij hopeloos over het afmaken van bepaalde taken door (mijn gezondheidsprobleem) *.	()	()	()	()	()
5. Op het werk was ik, ondanks mijn (gezondheidsprobleem) *, in staat om mij te focussen op het bereiken van mijn doelen.	()	()	()	()	()
6. Ondanks mijn (gezondheidsprobleem) *, voelde ik me energiek genoeg om al mijn werkzaamheden af te ronden.	()	()	()	()	()

* Merk op dat woorden zoals 'rugpijn', 'cardiovasculair probleem', 'ziekte', 'maagprobleem', of vergelijkbare beschrijvingen het woord 'gezondheidsprobleem' kunnen vervangen in alle items.

* The Stanford Presenteem Scale (SPS-6; 2001 version) is jointly owned by Merck & Co., Inc., and Stanford University School of Medicine.
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7

Effect evaluation of a self-management program for employees with complaints of the arm, neck or shoulder: a randomised controlled trial

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Abstract

Objective: To evaluate the effectiveness of a self-management intervention (including an eHealth module), compared with usual care, in employees with chronic non-specific complaints of the arm, neck or shoulder (CANS) (persisting > 3 months).

Methods: Participants were randomised into the self-management group (SG) or usual care group (UCG). The SG participated in six self-management sessions and could use an eHealth module; the UCG could use all available usual care. The primary outcome of the study was score on the Disabilities of the Arm, Shoulder and Hand questionnaire (DASH). Secondary outcomes included: absenteeism, pain in the previous week, quality of life, pain catastrophising, self-efficacy, work style, presenteeism, fatigue, and limitations experienced during work. Data were analysed using generalized estimating equations (GEE) linear regression and Mann-Whitney U tests, and were collected at baseline, 3 month, 6 month, and 12 month follow-up.

Results: On the general module of the DASH, no significant difference between SG and the UCG was detected. On most of the other outcome measures, there were no significant between-group differences. In the DASH work module the between-group effect was -3.82 (95% CI -7.46 to -0.19, $p=0.04$). For limitations experienced in job-related activities the between-group effect was -1.01 (95% CI -1.97 to -0.04, $p=0.04$). The mean hours of sport activities in the last three months, measured at 12 months, was 1.00 hour (95% CI -1.90 to -0.12, $p=0.03$) less in the SG compared with the UCG.

Conclusions: The self-management intervention improved the participants' perceived disability during work. Since no significant between-group differences were found on most outcome measures, the results of this study should be interpreted with caution.

Trial registration number: Dutch Trial Registration number NTR 3816.

Background

Complaints of the arm, neck or shoulder (CANS) are common among employees. The reported point prevalence varies from 1.6-53% and the 12-month prevalence varies from 2.3 to 41% depending on the setting, definition, and classification used [1-3]. Nearly 19% of the patients report chronic complaints of which 58% report the use of healthcare, such as the care given by the general practitioner, medical specialist and physical therapist [2, 4].

CANS include all complaints in the arm, neck or shoulder region, not caused by a trauma or systemic disease [4]. In CANS, a distinction can be made between specific CANS (23 specific diagnosable disorders) and non-specific CANS [5]. Non-specific CANS can cause substantial loss of productivity at work [6]. The most important factors associated with this loss of productivity are related to pain and its impact on work and sleep, as well as to the psychological aspects of pain and work [6]. Thus, CANS may cause activity limitations and restrictions in work participation (presenteeism, absenteeism and job loss) [6, 7]. In 2012, CANS were responsible for 11.2% of the total absenteeism in the Netherlands[8].

Although the exact aetiology of non-specific CANS remains unknown, it is presumed to have a multifactorial origin [9-13]. The factors related to CANS are generally divided into three main categories: 1) work-related physical factors, 2) work-related psychosocial factors, and 3) personal factors. The importance of each factor, and its individual contribution to the risk of provoking symptoms, varies among individuals and work environments [14].

There seems to be a need for effective intervention programs for people suffering from CANS [15, 16]. A recent Cochrane review on conservative interventions for treating work-related CANS [17] did find no consistent evidence for significant effects of exercises, ergonomic interventions, behavioural interventions and some other interventions on pain, recovery, disability or sick leave [17].

Self-management is an approach increasingly used in chronic disease care to improve self-efficacy and wellness behaviours [18]. Barlow et al. [19] defined self-management as *"the ability to manage the symptoms, treatment, physical and psychosocial consequences, and lifestyle changes inherent in living with a chronic condition."* Because of the multifactorial origin of CANS, self-management programs addressing physical characteristics, psychosocial characteristics and personal factors of the individual worker, as well as characteristics of their work environment, may be useful for employees with CANS [20].

Detaille et al. [21-23] developed a generic self-management program for employees in the Netherlands with a chronic somatic disease. Following the process of intervention mapping [24, 25] and based on a recent Dutch multidisciplinary guideline for non-specific CANS [26] and focus group interviews with employees [27] and experts [28], we adapted the original program to suit the needs of employees with CANS, and to alleviate the problems and needs of employees with CANS. The developed intervention included an eHealth module to provide the opportunity to participants to find additional resources which, together with the personal action plans made in the group sessions, would make it possible to tailor the program to the needs of the individual participant. The overall goal of the intervention was defined as 'self-management behaviour at work' with the aim to alleviate the perceived disability of the participants [29], which was operationalized as: 1) to be able to cope with pain, fatigue, and work limitations, 2) to be aware of and adequately cope with stress factors at work; and 3) to be able to communicate effectively about CANS with one's supervisor and colleagues [29].

The aim of this study is to evaluate the effectiveness of the self-management intervention, compared with usual care, in employees with chronic non-specific CANS (persisting > 3 months).

Methods

Study design and sample

The study was a randomised controlled trial (RCT) with a follow-up of one year comparing the self-management intervention to usual care. Data were collected at baseline, 3 months, 6 months, and 12 months follow-up. The Medical Ethics Committee (METC) of the Radboud university medical center (RUMC) in Nijmegen, The Netherlands, approved the study design, protocols and procedures (number 2012/319). The trial was registered in the Dutch Trial Register (NTR3816, <http://www.trialregister.nl>).

Participation was voluntary and participants could withdraw at any moment without any consequences. The methods used in this study were extensively described elsewhere [20].

Participants were recruited from employees of the RUMC, the HAN University of Applied Sciences (HAN UAS), and Sanquin Blood Supply (SBS), all located in Nijmegen, the Netherlands, and from the general population (in the area of Nijmegen). Potential participants were recruited by newsletters and websites within the organisations and were informed about the project by company physicians, occupational health coordinators, and supervisors. Participants from the general population were recruited by calls in local newspapers and by contacting the Dutch patient organisation the '*RSI vereniging*' (Patient Association for Repetitive Strain Injury).

Candidates willing to participate could contact the first author (NH) who arranged a consultation with a research physical therapist. If potential participants obviously did not meet the eligibility criteria, no consultation was arranged. Potential participants from outside the three participating organisations received a travel allowance of 0.19 eurocents per kilometer for attending the appointment with the physical therapist. Eligible candidates received an information letter about the project at least seven days before this consultation. The physical therapists (FK and SM) were experts in musculoskeletal disorders and provided additional information about the implications of participation. During the consultation, the physical therapist checked the eligibility of the employee based on the inclusion and exclusion criteria, which were based on a multidisciplinary guideline on non-specific CANS [26] (see Appendix 1 for a shortened version; the extensive version is described elsewhere [20]), by history taking and screening of the employee (including filling out the Four-Dimensional Symptom Questionnaire [4DSQ] [30]). If considered necessary, the physical therapist performed a brief physical examination to rule out any exclusion criterion, including a suspicion of specific CANS [26]. During the consultation each participant was asked to sign an informed consent.

Treatment allocation and procedures

Participants were assigned to either the self-management group (SG) or usual care group (UCG) by randomisation with pre-stratification for the three participating companies and for participants from the general population (four groups). The allocation sequence was computer generated [<http://www.randomization.com/>] with a block size of four. A researcher not involved in assigning participants to their groups prepared concealed, consecutively numbered, sealed, opaque envelopes. Every envelope contained a paper indicating the treatment allocation. Participants received their randomization envelope at the end of the consultation with the physical therapist, who was not aware of the randomization sequence. Participants could open the envelope whilst they were with the physical therapist; subsequently, the physical therapist informed the first author (NH) about the treatment allocation. Participants allocated to the SG received information (from NH) about the next series of the self-management program after randomisation. At the start of the program they also received the login code for the eHealth module. The UCG participants were informed that they were allowed to use all usual care available.

Blinding

Participants, trainers and researchers cannot be blinded for the allocated treatment after randomisation. However, all participants filled in the digital questionnaires at their home or at work, implying that the influence of researchers is ruled out. The data were collected by the developer of the digital questionnaire, who then provided the anonymous data to the researcher.

Interventions

Self-management group

The development of the self-management intervention has been described elsewhere [29]. The intervention consisted of six weekly group sessions of 2.5 hours each, with 4-12 participants per group. The group sessions were held in the daytime and in the evening. Employees from HAN UAS, RUMC and SBS were able to follow the sessions during working hours.

The meetings were moderated by a moderator (AN, EN, IB, NN, SD). The first session started with an introduction to the program and of the participants. Each subsequent session started with summary reflection on the action plans made in the previous session. After this, the relevant topics were discussed (appendix 2). At the end of each session participants were asked to set targets (Specific, Measurable, Acceptable, Realistic, Time-bound [SMART] and formulated in terms of behaviour), and action plans were made.

The group sessions were complemented by an eHealth module. Participants were able to log in on a secured website on which the topics of the group training were discussed. Also, additional information was available on self-management and on specific topics of CANS (Appendix 2). The eHealth was available for the SG up to 12 months after the start of the group sessions). Participants in the SG were allowed to attend all available additional treatments (co-interventions). Information on all co-interventions received by participants in both the SG and the UCG group were collected by questionnaires at 12 months.

Usual care group

The UCG could use all usual care and information available within the organisation of the participant. They were also allowed to use all care available outside the organisation.

Outcome measures and data collection

Both the SG and the UCG received the baseline questionnaire after randomisation in the week before the start of the self-management program of the SG. The other questionnaires were provided at 3 months, 6 months and 12 months after the baseline questionnaire. Given the length of the questionnaire, not all secondary outcome measures were measured at all follow-up moments (these questionnaires are marked with an asterisk [*]). All questionnaires were provided digitally on a secured website. In case participants preferred a paper questionnaire, a paper version was provided.

Characteristics of the participants were collected at baseline together with the first questionnaire. The outcome measures, including clinometric characteristics of the measurement instruments

used, were extensively discussed elsewhere [20]. In short, the primary outcome measure was the self-reported disability (in the previous week) of the arm, shoulder and hand, measured with the Dutch version of the Disabilities of the Arm, Shoulder and Hand questionnaire (DASH) [31, 32]. Secondary outcomes were absenteeism, presenteeism (Dutch version of the Stanford Presenteeism Scale [SPS-6] [33, 34] and the Work Limitations Questionnaire [35]), pain in the previous week (Numeric Pain Rating Scale, NPRS, 0-10), pain catastrophising (Pain Catastrophizing Scale, PCS, Dutch language version) [36], self-efficacy (Dutch Adaptation of the General Self-Efficacy Scale) [37], self-efficacy at work (self-efficacy at work scale) [22], fatigue (Checklist Individual Strength) [38], burnout (Utrecht Burnout Scale, UBOS) [39], work style (Workstyle Short Form) [40], pace and amount of work, relations with colleagues/supervisors, need for recovery, and participation and autonomy at work (questionnaire on experiencing and assessing stress at work (Dutch: VBBA) [41], quality of life (SF-12v2) [42], and self-reflection and insight (Self-Reflection and Insight Scale) [43]. Participants also had to respond to questionnaires developed by the authors, about the use of healthcare interventions*, workplace adaptations*, conversations with colleagues* and supervisor*, participation in sport*, limitations experienced in work related activities* (limitations experienced in the previous two weeks, numeric rating scale (NRS), 0-10), work capacity* (NRS, 0-10), and about attitude towards self-management* [22] (seven point Likert scale).

Statistical analyses

Our initial sample size calculation was based on the primary outcome of this study, the DASH [31] and was presented in our study protocol [20]. This sample size calculation was based on an independent sample Student t-test and revealed a sample size of 71 participants in each group, assuming a dropout rate of 20%, and assuming an effect of 10 points on the DASH over the entire follow-up period for it to be clinically important [44]; we also used a standard deviation (SD) of 16.65 that we had used in the previous sample size calculation was based on an independent sample Student t-test. However, most data were analysed using generalized estimating equations (GEE) with an exchangeable correlation structure. GEE is a longitudinal data analysis technique, that is suitable to investigate the course over time of the outcome variable and to compare this overall effect between study arms [45]. The earlier sample size calculation was not appropriate when using GEE. Therefore, using the same assumptions as used in the initial sample size calculation, we also calculated the necessary sample size for the GEE analysis assuming a within-subject correlation coefficient [46] of 0.4. This renewed power analysis revealed a sample size of 42 participants in each group, which implied that a total of 84 participants were needed to detect a difference in score on the DASH with a power of 0.90 and an alpha of 0.05.

Both the SG and the UCG were checked for baseline differences demographic characteristics. All analyses were performed according to the intention-to-treat principle. Normality of the data was checked and verified by histograms, Normal Probability Plots and Shapiro-Wilk tests [47]. Since

data on absenteeism were not normally distributed, Mann-Whitney U tests were performed on the cumulative means of all three follow-up measurements and no correction for baseline values was applied.

Between-group differences of all outcomes only measured at baseline and 12 months were analysed using linear regression. Between-group differences of all outcomes measured at baseline, three, six, and 12 months were analysed using GEE. Since GEE can adequately handle missing values (<20%), no imputation technique was needed [46].

Each outcome variable was analysed as a dependent variable using the study group as an independent variable adjusted for the baseline measurement of each questionnaire. Correction for confounding was only applied if the regression coefficient of the intervention variable changed by more than 10% when the potential confounding variable was added to the model [46]. Results were considered significant if $p < 0.05$. Data on the use of usual care, workplace adaptations, and conversations about complaints with supervisor and colleagues were presented as descriptive data. Additional to the intention-to-treat analysis, a per-protocol analysis was performed with all participants of the SG who had participated in four or more self-management sessions so as to evaluate the effects of the intervention unaffected by protocol deviations or non-adherence [48]. All analyses were performed with IBM SPSS Statistics V.20.

Results

Participants for the intervention were recruited from September 2012 until January 2014, and the self-management sessions were held between October 2012 and March 2014. A total of 243 employees were interested in participating and received information about the trial. A total of 129 participants were assessed for eligibility during the intake, of which 123 were randomly allocated to either the SG ($n = 66$) or UCG ($n = 57$). Forty-four participants were employees from the RUMC, 12 participants were employees from HAN UAS, and 2 participants were employee from SBS; whilst the remaining 65 participants were recruited from the general population. Figure 1 shows the participant flow through the phases of the trial. The baseline characteristics of the participants are presented in Table 1. None of the characteristics at baseline differed significantly between SG and UCG.

Figure 1 shows the drop-out of participants in both groups during the study and the questionnaires available for analysis on every follow-up time point. In total, 9 of the 66 participants allocated to the SG, did not start or discontinued their attendance at the self-management sessions. Two of these participants did continue the use of the eHealth module. Of the 64 participants

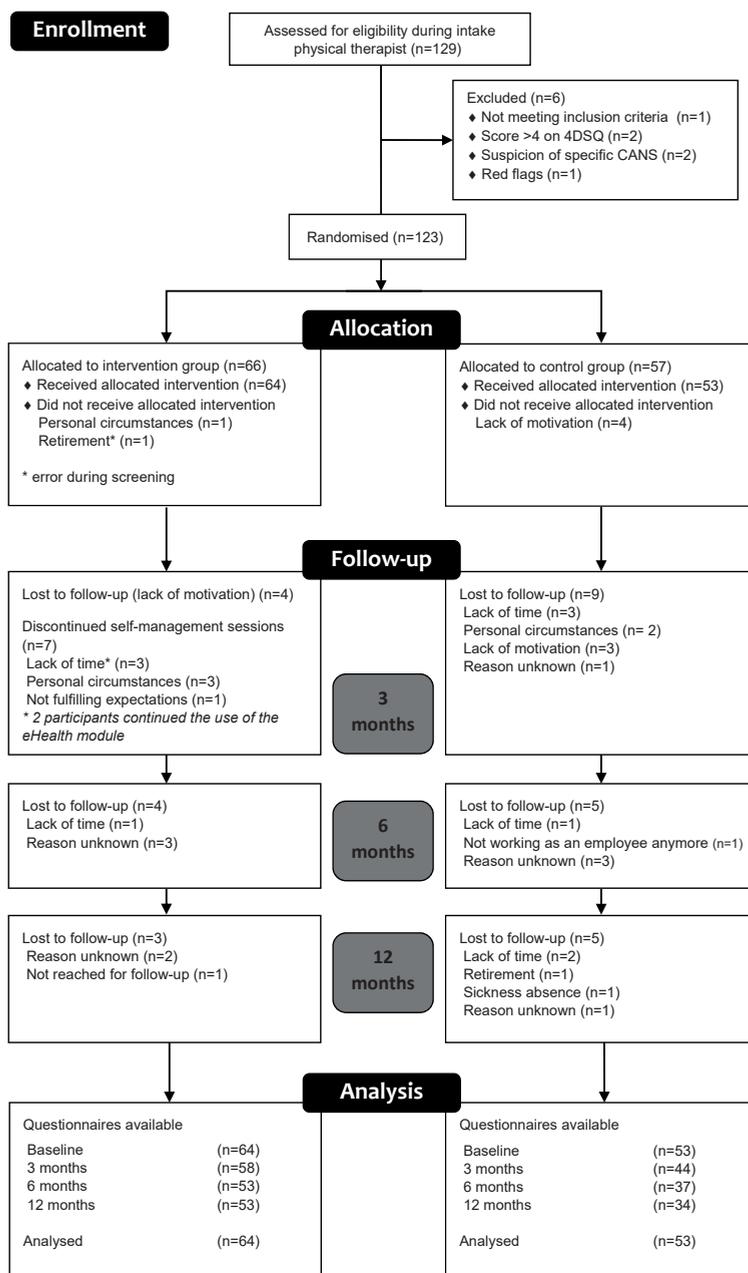


Figure 1: Flow chart of participants through the Trial (enrollment, allocation, follow-up, and analysis).

Table 1: Baseline characteristics of the study population.

Characteristic	Intervention group (n=64)	Usual care group (n=53)
Age, mean (SD) in years	44.98 (11.15)	47.69 (10.50)
Gender, n (%)		
Male	11 (17.2)	17 (32.1)
Female	53 (82.8)	36 (67.9)
Education level, n (%)		
Lower general secondary education / preparatory secondary vocational education / senior secondary vocational education / prevocational secondary education	28 (43.8)	21 (39.6)
Higher professional education	21 (32.8)	18 (34.0)
Academic higher education	15 (23.4)	14 (26.4)
Employment status, n (%)		
Employee with or expecting tenured employment	44 (68.8)	43 (81.2)
Employee with temporary employment	12 (18.8)	6 (11.3)
Freelancer	8 (12.5)	6 (7.5)
Years of employment with current employer		
0 - 2 years	16 (25.0)	11 (20.8)
2 - 5 years	11 (17.2)	5 (9.4)
> 5 years	37 (47.9)	37 (69.8)
Number of working hours per week		
12 - 19	8 (12.5)	2 (3.8)
20-32	27 (42.2)	22 (41.5)
> 33	29 (45.4)	29 (53.2)
Managerial position, n (%)	8 (12.5)	10 (18.9)
Complaints (region) in past 4 weeks, n (%)		
Neck, shoulder(s), upper arm(s)	13 (20.3)	19 (35.8)
Elbow, under arm(s), wrist(s), hand(s)	2 (3.1)	1 (1.9)
Both	49 (76.6)	33 (62.3)
Duration of complaints, n (%)		
< 12 weeks*	0	0
12-52 weeks	30 (46.9)	29 (54.7)
1-2 years	17 (26.6)	8 (15.1)
2-5 years	10 (15.6)	6 (11.3)
> 5-10 years	7 (11.0)	10 (18.3)
Performing exercises last month, n (%)		
Never	16 (25.0)	15 (28.3)
1-2 times per week	27 (26.9)	12 (22.7)
3-5 times per week	20 (31.6)	15 (28.3)

Table 1: Baseline characteristics of the study population. (continued)

Characteristic	Intervention group (n=64)	Usual care group (n=53)
> 5 times per week	11 (17.2)	11 (20.8)
Mean hours of work with PC per day, n (SD)	5.5 (2.9)	6.4 (1.9)
Repetitive work, n (%)	43 (67.2)	43 (81.1)
> 8 minutes work with head rotation > 2 degrees, n (%)	35 (54.7)	26 (49.1)
Sufficient alternation in work, n (%)		
Never	6 (9.4)	2 (3.8)
Sometimes	31 (48.4)	32 (60.4)
Often / always	27 (42.2)	19 (35.9)
Adapted workplace	15 (23.8)	19 (37.3)

* exclusion criterion

PC= personal computer

Table 2: Use of the eHealth module by the intervention group, measured at 12 months (n=53).

Question	N (%)
How often have you used the eHealth module during the first 3 months of the intervention?	
Daily	0
5-6 times per week	0
3-4 times per week	3 (5.7)
1-2 times per week	12 (22.6)
Once per 2 weeks	10 (18.9)
Monthly	11 (20.7)
Never	17 (32.1)
How often have you used the eHealth module after the first 3 months of the intervention?	
Daily	0
5-6 times per week	0
3-4 times per week	2 (3.8)
1-2 times per week	1 (1.9)
Once per 2 weeks	5 (9.4)
Monthly	10 (18.9)
Never	35 (66.0)

who started the self-management sessions, 59 persons (92.2%) participated in four or more of the sessions. They participated on average in 5.34 (SD 1.37) of the six self-management sessions. The use of the eHealth by the SG is presented in Table 2.

Effectiveness of the intervention program

The results of the GEE analysis showed that on the general module of the DASH, no significant difference between SG and the UCG was detected. Most of the other outcome measures also showed no significant differences between the groups (see Table 3). In the DASH work module

Table 3: Effects of the intervention on the outcome measures.

Outcome	Baseline	3 months	6 months	12 months	B overall	95% CI	P values
DASH							
SG	22.28	17.76	14.04	14.32	-1.75 ²	-3.85 to 0.34	0.10
UCG	22.27	19.55	17.39	15.05			
DASH work							
SG	28.77	19.56	15.69	12.88	-3.82	-7.46 to -0.19	0.04
UCG	30.22	22.24	20.83	17.61			
Days absent from work past month*							
SG	1.63	4.21	2.45	3.42	-	-	0.56
UCG	3.70	4.02	7.84	7.27			
Days absent from work past month due to CANS*							
SG	0.81	0.74	0.38	1.08	-	-	0.29
UCG	3.64	2.62	3.51	5.27			
SPS-6							
SG	22.23	22.96	23.30	23.71	0.12 ^{1,2}	-0.81 to 1.05	0.80
UCG	22.12	22.93	22.30	23.27			
Work Limitations Questionnaire							
SG	7.15	7.56	7.53	6.09	0.07 ²	-0.70 to 0.84	0.86
UCG	7.73	7.66	7.03	7.53			
NPRS last week							
SG	4.80	4.21	3.96	4.19	-0.13	-0.48 to 0.27	0.47
UCG	4.76	4.30	4.16	3.56			
PCS							
SG	10.42	10.37	9.09	9.25	0.47	-0.83 to 1.78	0.48
UCG	13.25	10.56	12.30	9.03			
General Self-Efficacy Scale #							
SG	31.16	31.60	32.53	32.91	0.12	-0.63 to 0.88	0.75
UCG	32.58	32.81	32.95	33.85			
Self-efficacy at work scale #							
SG	8.62	15.07	11.53	13.58	2.32	-0.49 to 5.14	0.11
UCG	6.17	9.59	9.22	9.39			
Checklist Individual Strength							
SG	81.05	80.10	81.36	82.69	-1.19 ¹	-2.55 to 0.17	0.09
UCG	79.89	82.61	82.27	81.82			
Utrecht Burnout Scale							
U scale SG	2.40	2.48	2.40	2.34	0.05	-0.14 to 0.26	0.61
U scale UCG	2.32	2.29	2.30	2.38			
D scale SG	1.46	1.66	1.72	1.51	0.05 ^{1,2}	-0.14 to 0.25	0.58
D scale UCG	1.59	1.63	1.65	1.96			
C scale SG	2.09	4.14	4.10	4.03	0.08 ²	-0.09 to 0.25	0.37
C scale UCG	4.23	4.17	4.00	4.16			
Workstyle Short Form							

Table 3: Effects of the intervention on the outcome measures. (continued)

Outcome	Baseline	3 months	6 months	12 months	B overall	95% CI	P values
SG	33.05	28.96	27.02	27.64	-1.28 ²	-4.16 to 1.59	0.38
UCG	33.85	31.81	33.27	30.61			
Pace and amount of work							
SG	27.72	27.90	26.56	37.73	0.22 ^{1,2}	0.31 to 0.75	0.41
UCG	29.08	26.01	25.04	42.86			
Relations with colleagues							
SG	24.07	25.67	22.65	20.44	-1.37	-3.99 to 1.24	0.30
UCG	22.85	25.75	24.72	23.09			
Relations with supervisors							
SG	22.22	25.09	22.71	23.65	-1.45 ^{1,2}	-4.33 to 1.42	0.32
UCG	22.38	23.90	24.82	25.82			
Participation in work							
SG	53.51	52.44	49.21	50.48	-0.49 ²	-3.21 to 2.24	0.73
UCG	50.44	50.29	52.59	49.75			
Autonomy at work							
SG	38.92	38.14	35.79	36.71	-0.35 ^{1,2}	-2.34 to 1.63	0.73
UCG	36.69	26.58	38.25	36.71			
Need for recovery							
SG	51.98	47.18	46.99	45.28	-4.95 ^{1,2}	-10.62 to 0.71	0.09
UCG	44.29	51.51	51.35	49.20			
Attitude towards self-management #							
Importancy SG	26.67	-	-	25.66	-0.43 ¹	-3.68 to 2.82	0.79
Importancy UCG	26.29	-	-	25.32			
Enjoyment SG	23.06	-	-	23.20	0.10 ²	-3.70 to 3.91	0.96
Enjoyment UCG	23.80	-	-	24.09			
SF-12v2 #							
PCSc SG	45.65	47.45	48.36	47.30	1.17 ¹	-0.18 to 2.53	0.09
PCSc UCG	44.51	45.07	45.52	47.46			
MCSsc SG	48.44	45.45	43.60	43.87	-0.62 ²	-2.23 to 0.99	0.45
MCSsc UCG	47.85	47.19	44.67	42.14			
Self-Reflection and Insight Scale #							
SG	86.48	87.43	86.32	87.79	-0.20 ^{1,2}	-2.05 to 1.64	0.83
UCG	83.96	85.12	85.92	86.44			
Limitations experienced in work related activities							
SG	3.53	-	-	2.13	-1.01	-1.97 to -0.04	0.04
UCG	3.95	-	-	3.06			
Work capacity							
SG	7.30	-	-	7.56	-0.038	-0.89 to 0.81	0.93
UCG	6.69	-	-	7.26			
Performing sports / physical activities / exercises #							

Table 3: Effects of the intervention on the outcome measures. (continued)

Outcome	Baseline	3 months	6 months	12 months	B overall	95% CI	P values
Number of days/week > 30 minutes physical activity SG	3.56	-	-	4.46	0.07 ^{1,2}	-0.81 to 0.68	0.86
Number of days/week > 30 minutes physical activity UCG	3.49	-	-	4.26			
Number of days/week > 20 minutes intensive physical activity SG	1.17	-	-	2.02	0.02 ^{1,2}	-0.70 to 0.73	0.96
Number of days/week > 20 minutes intensive physical activity UCG	1.30	-	-	1.85			
Number of days/week performing exercises SG	2.08	-	-	2.79	0.47 ^{1,2}	-0.45 to 1.39	0.32
Number of days/week performing exercises UCG	2.09	-	-	2.15			
Hours/ week performing sport activities in last 3 months SG	2.85	-	-	2.38	- 1.00 ³	-1.90 to -0.12	0.03
Hours/ week performing sport activities in last 3 months UCG	2.81	-	-	3.32			

B= overall treatment effect of the SG compared to the UCG, adjusted for baseline values and possible confounders: (1) adjusted for duration of complaints, (2) adjusted for gender; and (3) adjusted for age. All lower scores represent a better outcome, except for scores marked with #.

*= Data with regard to absenteeism were questioned on baseline, T1 and T2 with regard to the previous 3 months and on T3 with regard to the previous 6 months and were analyzed using Mann-Whitney U tests.

Abbreviations:

**Bold typeface: the significant differences are given between SG compared to UCG, adjusted for baseline values and possible confounders

DASH= Disabilities of the Arm, Shoulder and Hand questionnaire, NPRS= Numeric Pain Rating Scale, MCSc= Mental Component Scale, PCS= Pain Catastrophizing Scale, PCSc= Physical Component Scale, SG= Self-management group, SPS-6= Stanford Presenteeism Scale, UCG= usual care group.

the between-group effect was -3.82 (95% CI -7.46 to -0.19, $p=0.04$), indicating that the SG had a 3.83 lower average score compared to the UCG. For the question about the limitations experienced in job-related activities the between-group effect measured at 12 months was -1.01 (95% CI -1.97 to -0.04, $p=0.04$). The mean hours of sport activities in the last three months (measured at 12 months) was 1.00 hour (95% CI -1.90 to -0.12, $p=0.03$) less in the SG compared with the UCG. Per-protocol analysis showed similar results compared with the intention-to-treat analysis for all outcome measures (data not shown).

Use of co-interventions, workplace adaptations and conversations about complaints

Data with regard to the use of co-interventions are presented in Appendix 3. Generally, co-interventions were used slightly more in the UCG; however, the differences were generally small. It was only in the use of physical therapy that the overall mean use differed considerably (SG: 4.04 vs UCG: 8.77 sessions). The SG had a slightly higher frequency of consultations with the orthopaedic surgeon and psychologist compared with the UCG.

Data on the implementation of workplace adaptations and conversations about the complaints with supervisor and colleagues, including the frequency and the outcome of the conversations (see appendix 3), show that they were generally used by the same percentage of participants in both groups. Only on self-adaptation of the workplace, SG showed a higher percentage of participants compared with the UCG (60.4% vs 32.8%). Moreover, the percentage of participants who communicated about their complaints with colleagues was higher in the SG compared to the UCG (25% vs 5.3%) and they also had a (mean) higher frequency of conversations (6.23 vs 1.50).

Discussion

Effectiveness of the intervention program

This is the first study evaluating the effectiveness of a self-management program (including an eHealth module) for employees with non-specific CANS. On most outcome measures no significant differences between the groups were found; therefore, the results of this study should be interpreted with caution. In the DASH work module both groups showed clinically important improvements, with the SG showing significantly more improvement compared with the UCG ($p=0.04$). However, the difference between the SG and the UCG was not clinically important. The limitations experienced in work-related activities in the SG decreased significantly compared with the UCG at 12 months ($p=0.04$), which confirmed that the self-management program improved the work-related capacity of participants in the SG. However, on the Work Limitations Questionnaire, as well as the SPS-6 (both also evaluating disability during work), no significant changes between groups were found. We think this is due to the fact that these two questionnaires consist

of questions related to very specific activities (e.g., in the past 2 weeks, how much of the time were you able to lift, carry, or move objects at work weighing more than 10 lbs, without difficulty caused by physical health or emotional problems?) which may not have been relevant for the individual employee with CANS in our population; however, the DASH work module and the question on the limitations experienced in work-related activities address more general work limitations (e.g., doing your work as well as you would like), so probably the employee is better able to score on this questionnaire with their own specific limitations in mind.

Although no significant difference occurred in for need for recovery, the mean values of the SG decreased, while the values of the UCG increased. The overall between-group effect was -4.95 (95% CI -10.62 to 0.71 , $p=0.09$), which could indicate that the intervention had an effect on dealing and coping with the complaints. The descriptive data on the frequency of conversations with colleagues about their condition, show that they were more frequently applied by participants in the SG compared with the UCG, while the data with regard to conversations with supervisors showed no major difference. The higher percentage of participants performing self-adaptation of their workplace in the SG, compared with the UCG, indicates that the SG was more actively involved in the adaptation of their workplace. The UCG showed a significantly higher number of mean hours performing sport activities in the previous three months compared with the SG (measured at three months follow-up).

Comparison with other studies

Contrary to the study of Detaille et al. [23], in investigating the effectiveness of a generic self-management program in workers with a chronic somatic disease, we found no significant changes in the level of attitude towards self-management at work (enjoyment scale) and the physical health scale of the SF-12 between the groups, although the physical health of the intervention group (Physical Component Scale SF-12) improved more compared with the control group ($p=0.09$). In our study, the baseline values of the attitude towards self-management were already higher compared with the values of the study population of Detaille et al. at baseline and at the follow-up time points, possibly indicating a ceiling effect.

Another intervention [49, 50] targeted on behavioural change with regard to physical activity and/or work style, in which computer users participated in six monthly group sessions at the work place, and obtained tailored advice, was effective in improving recovery from neck/shoulder symptoms and reducing pain (with regard to the previous four weeks) at 12 months compared with usual care [50]. Since we found no significant change in the reported pain in the previous week, the differences in content and design of the two interventions, as well as the characteristics of the study population, might have played a role.

Strengths and limitations of the study

Strengths of the study include the RCT design and the use of pre-stratification with regard to the participating institutions and employees from the general population. Another strength is the follow-up period over 12 months. Participants were recruited from different organisations and from the general population. Moreover, participants had various jobs and duration of complaints, which contribute to the generalisation of the results. The start time points of the different SGs groups were distributed over more than one year, thereby eliminating possible seasonal variance. Since the additional per-protocol analysis showed similar results compared with the intention-to-treat analysis, we can conclude that protocol deviations or non-adherence did not influence the results of the intention-to-treat analysis [48]. Another strength of the study is the combination of a self-management program and eHealth module, which could enhance the exposure to the intervention and enhance tailoring of the intervention. Therefore, the effects found in this study are the result of the combined interventions.

This study also has some limitations. The lack of use of the eHealth is a limitation of this study. It can be concluded that the eHealth was not a valuable addition for all participants and that individual preferences may have also played a role. Contrary to our expectations, it seems that the addition of an eHealth module to the self-management sessions did not result in more pronounced results, since the use of the eHealth module decreased between three and 12 months follow-up.

This study also has other potential limitations. First, participants, moderators and researchers could not be blinded for the allocated treatment after randomisation. However, because all participants filled in the anonymous digital questionnaires at home or at their place of work, the influence of researchers is ruled out [20]. Participants were generally highly educated and a majority were working in the healthcare setting, which could have influenced the results. In the study of Daille et al. [23] lower educated workers scored better on the physical component scale of the SF-12 in the intervention group compared with the control group. In the present study, most data on the use of co-interventions, workplace adaptations and conversations about complaints were based on small numbers of participants using co-interventions or workplace adaptations, therefore, no statistical analyses were performed.

Drop-out in both groups of our study differed directly after randomisation, that is, before the baseline measurement. Also, during the follow-up period, participants in both groups dropped-out (SG, n=11, UCG, n=19), which could have led to selection bias. The baseline values of the DASH of the participants in this study were generally low, considering the range of the DASH (0-100), which is comparable with another study [51]. Therefore, a floor effect could be present and a clinically important improvement of 10 points is less likely to be achievable. Also, a major section of the participants in our study had a longer duration of complaints. Persons with complaints

with a longer duration often have a stable functional disability score, and are less likely to exhibit dramatic changes after treatment [52], which could also partly explain the small improvements on most outcome measures.

The natural course of complaints could have played a role in the improved outcomes measured in both the SG and the UCG. Moreover, effects could be influenced by regressive fallacy, in which people with a chronic disease search for interventions when they are feeling at their worst [23]. Another potential cause of bias is the Hawthorne effect [53], that is, the difference in the amount of attention participants receive, which could lead to an overestimation of the effect in the SG and, to a lesser extent, in the UCG. Also, since the UCG was aware of the existence of a self-management program and filled in the questionnaires, it is possible that the UCG became more conscious of the self-management behaviour, and they might have adopted such behaviour more often and in this case changed their behaviour with regard to sport activities. This may have led to improvements on some of the outcome measures [23].

In this study, we had some difficulties in recruiting sufficient participants. This was partly due to the fact that participating in the intervention would cost time and not all supervisors of potential participants were willing to cooperate. A major cause of participants refusing to participate was the chance of being randomised to the UCG. During the study, we also had to deal with a high number of drop-outs, especially in the UCG (about 40% drop-out). People were not willing to take the time to fill in (all) the questionnaires, which could have led to selection bias.

We used a follow-up period of 12 months. One study investigating the effectiveness of a job maintenance training program for employees with a chronic disease only found only a significant improvement in self-efficacy after 24 months follow-up [54]. Therefore, it is possible, that for some outcome measures a longer follow-up period might be needed.

A final limitation might be that all data were self-reported and there was a possibility of recall or information bias. However, as this study is designed as an RCT we expect recall bias to occur to the same extent in both study groups [20], except for the questions with regard to the use of the eHealth which were only collected in the SG.

Implications for practice and future research

In future interventions, it seems necessary to enhance the use of the eHealth module. The cost-effectiveness of the intervention could also be investigated. As mentioned before, Detaille et al. [23] found that lower educated workers scored better on the physical component scale of the SF-12 in their intervention and participants in our study were generally highly educated. Therefore, the effectiveness of the intervention in employees with a lower educational level should be further

investigated. Moreover, parts of the intervention might also be effective in other disorders or can be used in usual care provided to employees with CANS. In future studies, researchers should try to prevent drop-out from the UCG and, if possible, more objective outcome measures should be used, for instance for absenteeism and for the use of the eHealth module. Also, a longer follow-up could be used to evaluate whether the results are more pronounced in the long run.

Conclusions

In this study, no significantly or clinically important differences between SG and UCG were present on most outcome measures. This should be kept in mind when interpreting the results of this study. However, this study indicated that participants in a self-management intervention, including group sessions and an eHealth module, showed clinically important improvements in the DASH work module, with the SG showing a significantly better (but not clinically important) improvement compared with the UCG. Moreover, the limitations experienced in work-related activities in the SG significantly improved compared with the UCG. It can be concluded that the self-management intervention improved the participants' perceived disability during work and contributed to the improvement of self-management behaviour at work.

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Appendix 1: Shortened version of the eligibility criteria [20].

Inclusion criteria:	
1.	Participant is in his/her opinion limited in performing his/her work (related to CANS)
2.	Participant suffers from work-related complaints
3.	Complaints must have persisted for at least 12 weeks (either a continuous or intermittent course)
4.	Participant works for at least 12 hours a week
Exclusion criteria:	
1.	Red flags [26]
2.	Complaints caused by a systemic disease [26]
3.	Complaints caused by traumatic injury [26]
4.	Suspicion of specific CANS [26]
5.	Suspicion of mental pathology (> 4 points on subscale depression, measured with the Four-Dimensional Symptom Questionnaire) [30]

Appendix 2: Topics of the group sessions and eHealth module [20].

Topics of the group sessions:	
<i>Session 1</i>	<ul style="list-style-type: none"> – Introduction – Dealing with a chronic disability – Living with CANS – Working with CANS – Work load and work capacity – What is self-management? – Introduction to the eHealth module
<i>Session 2</i>	<ul style="list-style-type: none"> – Discussion on the eHealth module – Core qualities – Time management
<i>Session 3</i>	<ul style="list-style-type: none"> – Dealing with pain and fatigue – Stress and stress management – (Muscle) relaxation exercises
<i>Session 4</i>	<ul style="list-style-type: none"> – Healthy lifestyle – Nutrition – Exercises and sports – Use of facilities
<i>Session 5</i>	<ul style="list-style-type: none"> – Communication skills – Working with others and asking for help
<i>Session 6</i>	<ul style="list-style-type: none"> – Dealing with negative emotions – Positive thinking – Making a mind map

Appendix 2: Topics of the group sessions and eHealth module [20]. (continued)

Topics of the eHealth module:	
Topic:	Content:
<i>Use of eHealth</i>	Manual of the eHealth module
<i>Self-management</i>	Introduction to self-management
<i>CANS</i>	Non-specific CANS, specific CANS, symptoms, causes (workload and capacity, physical factors, psychosocial and personal factors, chronic pain, sensitization, self-tests and screening tests), prognosis
<i>Possible solutions</i>	What can I do? (workplace, work pressure and work style, reduction of stress, sports and specific exercises), facilities within organisation, treatments
<i>About the group sessions</i>	Topics of the group sessions and manual
<i>Further reading</i>	Additional information and references to websites

Appendix 3: Use of co-interventions for complaints in previous 3 months measured at 3 and 12 months and implementation of workplace adaptations and conversations about complaints in the past year measured at 12 months.

Sort of usual care	Baseline, n (%)	12 months, n (%)	Past year, n (%)*	Mean number of visits**	Overall mean number of visits***
General practitioner					
SG	15 (23.44)	7 (13.21)	18 (34.0)	2.26	0.77
UCG	12 (22.64)	6 (17.65)	13 (38.2)	2.54	0.97
Occupational health physician					
SG	5 (7.81)	2 (3.77)	9 (17.3)	2.90	0.49
UCG	2 (3.77)	1 (2.94)	4 (11.8)	5.00	0.59
Orthopaedic surgeon					
SG	2 (3.12)	4 (7.55)	5 (10.0)	2.67	0.25
UCG	1 (1.89)	0	1 (3.1)	5.00	0.15
Psychologist					
SG	3 (4.69)	5 (9.43)	6 (12.0)	10.57	1.20
UCG	1 (1.89)	1 (2.94)	4 (12.1)	6.33	0.74
Physical therapist					
SG	28 (23.75)	14 (26.41)	24 (46.2)	8.92	4.04
UCG	18 (33.96)	8 (25.53)	14 (42.4)	21.31	8.77
Manual therapist					
SG	8 (12.5)	2 (3.77)	9 (18.0)	5.00	0.85
UCG	6	2 (5.88)	4 (12.9)	9.25	1.09
Occupational therapist					

Appendix 3: Use of co-interventions for complaints in previous 3 months measured at 3 and 12 months and implementation of workplace adaptations and conversations about complaints in the past year measured at 12 months. (continued)

Sort of usual care	Baseline, n (%)	12 months, n (%)	Past year, n (%)*	Mean number of visits**	Overall mean number of visits***
SG	1 (1.56)	0	1 (2.0)	2.00	0.04
UCG	1 (1.89)	1 (2.94)	2 (6.3)	4.00	0.06
Other					
SG	2 (3.12)	9 (16.98)	10 (19.6)	4.10	0.77
UCG	15 (28.30)	6 (17.65)	5 (15.6)	7.20	1.06
Conversation about complaints	N (%)*	Mean number of Sort of conversations**		Adaptation	N (%)
Conversation with supervisor		Workplace investigation			
SG	17 (32.7)	3.71	SG	6 (11.5)	
UCG	13 (38.2)	2.27	UCG	5 (8.8)	
Outcome conversation		Self-adapted workplace			
Satisfactory SG	12 (48.0)		SG	32 (60.4)	
Satisfactory UCG	8 (57.1)		UCG	11 (32.4)	
Useful SG	16 (66.7)		Adapted workplace (professional)		
Useful UCG	7 (50.0)		SG	9 (17.0)	
Annoying SG	6 (24.0)		UCG	4 (11.8)	
Annoying UCG	5 (35.7)				
Led to actions SG	6 (25)				
Led to actions UCG	8 (57.1)				
Conversation with colleagues about complaints****					
SG	13 (25.0)	6.23			
UCG	3 (5.3)	1.50			
Outcome conversation					
Satisfactory SG	10 (58.8)				
Satisfactory UCG	1 (25.0)				
Useful SG	9 (13.8)				
Useful UCG	2 (50.0)				
Annoying SG	1 (6.7)				
Annoying UCG	1 (25.0)				
Led to actions SG	3 (17.6)				
Led to actions UCG	3 (100)				

SG= self-management group, UCG= usual care group *=Use in the past year measured at 12 months, **= Mean use in the past year measured at 12 months of participants who used co-interventions/conversation about complaints ***= Mean use in the past year calculated for the total group (SG n= 53, UCG n= 34), ****= In the last 4 weeks.

8

Experiences of participants in a self-management program for employees with complaints of the arm, neck or shoulder (CANS): a process evaluation

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Abstract

Purpose: To investigate the experiences of participants of a self-management program for employees with complaints of the arm, neck or shoulder (CANS). The program consisted of six group sessions and an eHealth module.

Methods: Of the first 32 consecutive participants of the intervention group participating in a randomized controlled trial 31 were interviewed after their last group session. Semi-structured interviews were guided by an interview guide and audio-recorded. Data were analysed using thematic analysis, and the emerging themes were discussed. All participants in the intervention group were asked about their experiences with a questionnaire at three (n= 59) and 12 months (n= 53) follow-up.

Results: Most participants liked the diversity of the program and benefitted from the interaction with other peers. The eHealth module, although not used by everyone, was generally experienced as positive, especially the section with the physical exercises. Participants obtained more insight in their complaints and increased awareness, which contributed to the acceptance of and coping with the complaints. There was also criticism about the content of the program and the lack of a follow-up session. The results of the questionnaires showed a high satisfaction of the participants.

Conclusions: In general, the intervention fitted the needs of employees with CANS. Participants obtained more knowledge and insight in their complaints, as well as increased awareness, all of which contributed to a behavioural change and better coping. Many participants made changes at work and in their leisure time, whereas some felt that continuing their behaviour would be a challenge.

Introduction

Chronic musculoskeletal pain is a worldwide health problem resulting in negative effects on an individual's wellbeing, as well as costs to society [1]. Most common musculoskeletal problems include osteoarthritis, rheumatoid arthritis, and spine-related neck and back problems [1-3]. Work-related musculoskeletal disorders (WRMDs) are a substantial problem in the workplace, leading to human suffering, lost time due to sickness absence, and lower work productivity [4]. WRMDs are frequently underreported at the workplace as many employees attempt to continue to work despite having complaints [5, 6]. Complaints of the arm, neck or shoulder (CANS) [7], also known as work-related musculoskeletal upper extremity disorders (WRUEDs) [8], are a major part of WRMDs [9]. Moreover, CANS is persistent [10] and 58% of the people suffering from chronic complaints, such as CANS, report the use of healthcare e.g. care given by the general practitioner, medical specialist and physical therapist [11]. CANS has a multifactorial origin [12-15], including physical characteristics, psychosocial characteristics, personal factors, and environmental factors [10, 12-20]. The importance of each factor, and its individual contribution to the risk of provoking symptoms, vary among individuals and work environments [21].

Employees with WRMDs, including CANS, are faced with the challenge to deal with their complaints on a daily basis in both their private and working life [22, 23]. Employees with CANS are generally not fully aware of the possibilities to influence their symptoms and their own role in triggering and coping with their complaints and they are often approaching their individual limits [22, 24]. Moreover, employees with WRMDs in general, and CANS in particular, need to become aware of the causes of their complaints and have to realize that they need to take action [22-24]. Although many employees with CANS try different therapies and self-treatments in order to reduce their complaints, they often still suffer from complaints [22, 23].

A recent Cochrane review on conservative interventions for treating work-related CANS, found that exercise, ergonomic intervention, or behavioural intervention generally had no consistent effects on the outcome measures (e.g. pain, recovery, disability), compared to no treatment, other treatment, or placebo treatment [25]. Thus, there seems to be a need for effective intervention programs for people with CANS [7, 25, 26]. Given the multifactorial (bio-psychosocial) origin of CANS, multi-component personal tailored interventions that include both biomechanical and psychosocial components are recommended [8, 14, 27].

Because of the worldwide burden of chronic conditions, including chronic pain, promoting and improving the way patients self-manage their conditions is recognized as important [28]. Moreover, in chronic musculoskeletal pain, psychological approaches, exercise and activity are beneficial, whereas patient education on its own has minimal or no effect, and data on mind-body

therapies (such as relaxation) are not consistent [28]. Self-management programs may combine some or all of these approaches and give participants more influence in choosing a personal approach, but there is inconsistent evidence for the effects of self-management programs for patients with chronic musculoskeletal pain [1, 28, 29].

Following the intervention mapping protocol [30] we adapted an existing generic self-management program for employees with a chronic somatic disease developed by Detaille et al. [31, 32] and added an eHealth module for use in employees with CANS [33]. The effectiveness of the adapted intervention for employees with CANS was examined in a Randomized Controlled Trial (RCT) [34, 35]. On the DASH work module, the intervention groups as well as the control group, showed clinical relevant improvements, however, the intervention group showed a significant better improvement compared to the control group usual care ($p=0.04$) over a 12 month period. Moreover, the limitations experienced in work related activities in the intervention group decreased significantly compared to the control group ($p=0.04$) 12 months after the start of the intervention, which confirmed that the self-management program improved the perceived disability during work of participants in the intervention group over a long term. The control group showed a significant higher mean hours performing sport activities in the previous three months compared to the intervention group, measured at 12 months, indicating that they changed their behaviour with regard to sport activities. None of the other measured outcomes differed significantly between both groups [35].

Together with the RCT, a process evaluation with the participants in the intervention group was planned to investigate whether the developed self-management program and program topics fitted the needs of employees with CANS. This article presents the results of this process valuation and focuses on the experiences of participants with the self-management program. The results of this study can be used for future adaptation and implementation of the intervention and in the development of other interventions for patients with CANS or other musculoskeletal disorders.

Methods

Participants

From the participants in the intervention group of the RCT, the first consecutive participants were invited by the first author (NH) for a semi-structured interview. Participants were included until saturation was reached. The point of saturation was defined as the point at which no new codes were added during three consecutive interviews during data analysis.

Furthermore, all participants in the intervention group of the RCT were asked about their experiences with the intervention in the three and 12 months follow-up questionnaires.

All participants gave written informed consent to participate in the study and to allow audio-recording of the sessions. The Medical Ethics Committee of the Radboud university medical center (located in Nijmegen, the Netherlands) approved the study design, protocols and procedures (registration number 2012/319).

Table 1: Topics of the group sessions and eHealth module.

Topics of the group sessions:	
<i>Session 1</i>	<ul style="list-style-type: none"> – Introduction – Dealing with a chronic disability – Living with CANS – Working with CANS – Work load and work capacity – What is self-management? – Introduction to the eHealth module
<i>Session 2</i>	<ul style="list-style-type: none"> – Discussion on the eHealth module – Core qualities – Time management
<i>Session 3</i>	<ul style="list-style-type: none"> – Dealing with pain and fatigue – Stress and stress management – (Muscle) relaxation exercises
<i>Session 4</i>	<ul style="list-style-type: none"> – Healthy lifestyle – Nutrition – Exercises and sports – Use of facilities
<i>Session 5</i>	<ul style="list-style-type: none"> – Communication skills – Working with others and asking for help
<i>Session 6</i>	<ul style="list-style-type: none"> – Dealing with negative emotions – Positive thinking – Making a mind map
Topics of the eHealth module:	
Topic:	Content:
<i>Use of eHealth</i>	Manual of the eHealth module
<i>Self-management</i>	Introduction to self-management
<i>CANS</i>	Non-specific CANS, specific CANS, symptoms, causes (workload and capacity, physical factors, psychosocial and personal factors, chronic pain, sensitization, self-tests and screening tests), prognosis
<i>Possible solutions</i>	What can I do? (workplace, work pressure and work style, reduction of stress, sports and specific exercises), facilities within organisation, treatments
<i>About the group sessions</i>	Topics of the group sessions and manual
<i>Further reading</i>	Additional information and references to websites

Self-management intervention

The self-management intervention for employees with CANS consisted of six group sessions of 2.5 hours each and an eHealth module. The eHealth module was available for one year. The development and the content of the self-management intervention are described elsewhere [33, 34]. The group sessions consisted of 5-10 participants and were led by a moderator (AN, EN, IB, NN, SD). An overview of the content of the program is presented in Table 1. Action plans were made during the sessions. Action planning is an important component of self-management interventions, with successful completion being associated with improved health and self-efficacy outcomes [36].

Data collection

Characteristics of all participants were collected before the start of the self-management sessions. Participants were interviewed by the first author (NH), generally in the first three weeks after the last group session. All semi-structured interviews were guided by an interview guide (Appendix 1). The interview guide was developed by the authors and focused on the participants' reasons to participate, expectations, benefits, future expectations, and experiences with the action plans, group sessions and eHealth module. Furthermore, participants were asked about how the intervention could be improved. All interviews were audio-recorded. All participants in the intervention group received a digital questionnaire about their experiences with the self-management program at three and 12 months follow-up. This questionnaire was offered together with the questionnaires with regard to the outcome measures of the quantitative evaluation.

Data analysis

The audio-recordings were fully transcribed by an assistant (LD). Member checks were performed by emailing the transcription of the interview to the participant. Participants were asked to check the transcription for errors and misinterpretations. If no response to the first email was received from participants within 10 days, a reminder was sent by email. Two authors (NH, SD), trained in qualitative research methods, performed the data analysis. Data were analysed per self-management group, after which data saturation was checked. Data were analysed using theoretical thematic analysis, a method for identifying, analysing and reporting themes within data [37]. Analysing was performed by taking the following steps: 1) familiarizing with the data, 2) generating initial codes, 3) searching for themes, 5) defining and naming themes, and producing the report [37]. The first three transcriptions were analysed by both authors; thereafter, the codes that emerged from the data were compared and discussed until consensus was reached. The subsequent interviews were analysed by one author (NH) and randomly checked by the second author (SD). The themes expressing the perceived effects of the intervention are presented according to factors of the I-Change model (2.0) [38]. The I-Change model builds on the Attitude – Social influence – Efficacy (ASE) Model [39] (comparable to the theory of planned behaviour [40-42]) and integrates ideas from several social cognitive models [38]. The I-Change model as-

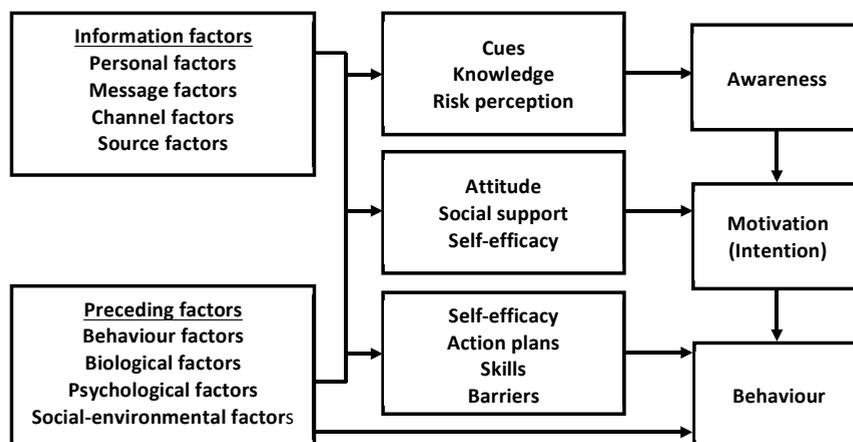


Figure 1: The I-Change model (2.0) [38].

sumes that the behavioural change process can be distinguished in three phases: 1) Awareness, 2) Motivation and 3) Action [43] (Figure 1).

The Atlas.ti (version 7.1.8) program was used for analysis. During data analysis, the emerging themes were discussed by two authors (NH, SD). The supporting quotes related to each theme were discussed by all authors.

The results of the quantitative evaluation of the experiences of all participants in the intervention group at three and 12 months were displayed as the number of participants and percentage for every response option and were analysed using IBM SPSS Statistics 20.

Results

Participants

The participants of the first six self-management groups, consisting of 32 participants in total, were asked to participate in this study. Four of these 32 participants did not complete the self-management sessions. Three of the four did continue the use of the eHealth and were willing to participate in this study, and one refused (total $n=31$). The mean age of the participants was 46.1 (27-61) years. The mean duration of complaints was 19.9 (12-650) weeks and 16 participants (51.6%) received treatment for their complaints in the previous three months. The demographic profile of each participant is presented in Table 2. The mean age of the total intervention group at baseline ($n=64$) was 45 (SD 11) years. In the quantitative evaluation at three and 12 months, 58 (92%) and 53

Table 2: Demographic profile of the study population of the semi-structured interviews.

Participant ID number	Gender	Age (years)	Education level	Profession	Hours of work per week	Hours on PC per day	Region of complaints							Duration of complaints (weeks)	Disability score on work (0-10)
							N	S	U1	E	U2	W	H		
1	female	48	HPE	Information specialist	33-40	8	+	+	+	+	+	+	+	24	7
2	female	50	HPE	Administrative assistant	20-32	3	+	+	+	+	+	+	+	36	3
3	female	56	SSVE	Administrative assistant	20-32	6	+	+	+	+	+	+	+	60	0
4	female	41	HPE	Counsellor education	20-32	7	+	+	+	+	+	+	+	12	5
5	female	58	PSE/UPE	Administrative assistant	20-32	8	+	+	+	+	+	+	+	13	2
6	female	52	HPE	Senior analyst in vitro fertilization	20-32	1	+	+	+	+	+	+	+	52	1
7	female	48	SSVE	Employee processing blood bank	20-32	4	+	+	+	+	+	+	+	200	9
8	female	35	SSVE	Staff planner	20-32	8	+	+	+	+	+	+	+	234	4
9	male	54	PSE/UPE	Application management ICT	33-40	8	+	+	+	+	+	+	+	650	0
10	female	50	SSVE	Neonatal intensive care nurse	20-32	2	+	+	+	+	+	+	+	24	5
11	female	40	SSVE	Receptionist, service desk employee	20-32	8	+	+	+	+	+	+	+	100	5
12	female	54	SSVE	Senior secretary complaints mediation	20-32	8	+	+	+	+	+	+	+	16	5
13	female	56	PSCE	Nursing- and nutrition assistant	20-32	1	+	+	+	+	+	+	+	30	4
14	female	61	PSE/UPE	Assistant medical donor registration	33-40	?	+	+	+	+	+	+	+	20	4
15	male	29	HPE	Dental hygienist	20-32	12	+	+	+	+	+	+	+	26	4
16	female	47	AHE	Research grant advisor	33-40	8	+	+	+	+	+	+	+	69	3
17	female	30	AHE	PhD student	>40	8	+	+	+	+	+	+	+	150	5
18	female	53	PSE/UPE	Secretary	20-32	8	+	+	+	+	+	+	+	60	3
19	female	60	HPE	Administrative assistant	20-32	?	+	+	+	+	+	+	+	12	0

Table 2: Demographic profile of the study population of the semi-structured interviews. (continued)

Participant ID number	Gender	Age (years)	Education level	Profession	Hours of work per week	Hours on PC per day	Region of complaints						Duration of complaints (weeks)	Disability score on work (0-10)	
							N	S	U1	E	U2	W			H
20	female	39	AHE	Paediatrician	>40	0	+	+	+	+	+	+	+	20	8
21	male	43	PSCE	Comptroller supervision gambling	33-40	2	+	+	+	+	+	+	+	30	0
22	female	56	HPE	Painter (artist)	33-40	?	+	+	+	+	+	+	+	12	3
23	female	52	SSVE	Analyst biochemical laboratory	33-40	7	+	+	+	+	+	+	+	16	2
24	female	28	AHE	Desk editor at local broadcasting	12-19	9	+	+	+	+	+	+	+	208	4
25	male	50	HPE	Warranty analyst	33-40	8	+	+	+	+	+	+	+	20	1
26	female	56	HPE	Photography, journalist, writing	20-32	5	+	+	+	+	+	+	+	520	3
27	female	29	AHE	PhD student	33-40	8	+	+	+	+	+	+	+	32	4
28	female	27	AHE	Text writing, journalist	20-32	?	+	+	+	+	+	+	+	168	4
29	male	28	AHE	PhD student	>40	9	+	+	+	+	+	+	+	208	7
30	female	56	PSE/UPE	Secretary	33-40	6	+	+	+	+	+	+	+	624	7
31	female	44	HPE	Assistant general practitioner, singer	12-19	2	+	+	+	+	+	+	+	72	5

PSCe = Preparatory secondary vocational education, SSVE = Senior secondary vocational education, PSE/UPE = Prevocational secondary education / University preparatory education, HPE = Higher professional education, AHE = Academic higher education, N = Neck, S = Shoulder, U1 = upper arm, E = Elbow, U2 = Under arm, W = Wrist, H = Hand

(82%) participants respectively, filled in the questionnaire with regard to their experiences with the program.

Data analysis

In total 31 participants were interviewed, after which data saturation was reached. Interviews lasted 10-23 min (excluding the introduction time). All participants were reached for the member check. Seven participants had some small remarks, all of which were processed in the transcription. Both authors performing data analysis agreed on the codes that emerged. The themes emerging during data analysis are described below. The results of the questionnaires filled in at three and 12 months are presented after the results of the semi-structured interviews.

Getting in contact and reasons for participation

The way of getting in contact with the program varied between participants. Most participants received the information leaflet for participating in the RCT or saw the posters hanging in their organization or found information on the internet about the RCT. Others were informed by an Occupational Health and Safety employee or physician or by their manager, while others read the announcement in a local newspaper or on the website of a Dutch patient association. The complaints and, more specifically, the aggravation of symptoms during work and influencing work outcomes, were the main reason for employees to participate in the program. Some participants were afraid they would become absent from work or would be unable to perform activities or participate in things they like in the future, as one participant stated:

Because my complaints were getting worse - and I couldn't control them anymore. It happened to me, and I wasn't able to influence the complaints. I was afraid that I would become absent from work or wouldn't be able to do the things I like anymore.

(participant 22)

A number of participants had already tried several therapies in the past (including physical therapy) but without satisfactory results. Moreover, some participants were unable to discover the main cause of their complaints, which means that they persisted. One participant stated that if one is not aware of the possible causes, it is a long way to recovery.

Experiences with the program

In general, participants were very satisfied with the program. Participants benefitted from the program, as indicated by the following participant:

I'm very positive about the program. It was very useful. Eventually, it's all about that you have to do it yourself. Now I have so many skills, and a lot of information that I can use in future. (participant 3)

Some participants indicated that their symptoms decreased during the program or that they were better manageable, as one participant said:

I'm happy that I participated. My complaints are not totally gone, but I can control them better. (participant 20)

Others had a short-lasting decrease in complaints or did not mention a decrease in symptoms during the program. One participant (participant 13) said that, after a period of fatigue after work, she now had more energy left at the end of the day. In general, the diversity and wide scope of the program was seen as a strong point of the program. The intervention felt like a 'package', which was experienced as a major positive point.

Expectations of participants

Some of the participants did not have any clear expectations. Others were simply curious and had an open mind. Some of them wanted to participate without expectations about the possible benefits from the program. They thought that the program would be at least some partly interesting or beneficial for them. A number of participants had no high expectations because they already knew a lot about CANS, but they wanted to use the program as an incentive to take action again and to gain insight in their own situation again. Most participants did not expect a ready-to-use solution. The aspect of raising awareness and how to translate this awareness into action, was an expectation of several participants. However, two participants did expect some immediate results after the intervention, and most indicated that they did not expect to get rid of their complaints. Some participants expected to be able to exchange experiences with others in the sessions. Other expectations were to acquire skills and tools on how to cope and deal with their symptoms and to define one's own limits. Especially tools for long-term self-management of the complaints were expected.

Meeting the expectations. The program met the expectations of most of the participants and sometimes even exceeded the expectations. Participants learned new things and the program provided a valuable perspective. Moreover, the program created awareness and facilitated the exchange of experiences with other participants. The content and examples of the self-management meetings were mostly recognizable for the participants. One person stated:

For me it exceeded my expectations. There are many more factors involved than just a wrong posture. (...) Now I am far more aware of the causes of CANS, for example if I have stress, that this aggravates the complaints. That kind of factor is also involved. Of course, posture is important, but so are all those other factors. It's given me more than I could expect. (participant 3)

Not meeting the expectations. A substantial part of the participants expected the program to focus more on the physical component. Moreover, part of the participants expected involvement of a physical therapist, e.g. performing a thorough physical examination and had expected more information about physical components, especially with regard to posture and physical activity. Others expected exercises for their complaints in the self-management sessions and were disappointed. One participant stated:

The program did not meet my expectations at all. It was very psychologically orientated. For me, it could have been more focused on the physical aspects of the complaints.
(participant 6)

Most participants who expected a more physical approach, recognized the value of the biopsychosocial approach of the program. One of the participants who expected more involvement of a physical therapist stated:

I expected a more conventional physical therapy approach. But, looking back, I think the balance in the program was very good. (...) The approach is very broad. I agree with the fact that all those factors have an influence on the complaints. (participant 4)

Other participants who had a more physically orientated expectation of the program, agreed and were very satisfied that the program was very diverse, discussing both physical and psychosocial aspects. One lady (participant 5) also said that she had expected the program to be more focused on the physical aspects of CANS; however, she became aware that a physical approach was not what she needed because she had already tried many physically-orientated therapies or adaptations. A few participants indicated that the program only partly met their expectations because they were already very experienced in dealing with their complaints and did not hear many new things. But, mainly because of the mutual social support and learning from each other, the program was still experienced as being valuable for them.

eHealth module

Participants generally found that the eHealth module was well constructed with good information and references to other sources. Participants could find their way on the website, although one participant said that she found it difficult to navigate. The eHealth module was very accessible. One participant said:

Yes, I really liked the eHealth. Firstly, you're searching, with these kinds of complaints (...) for all types of reliable information. Secondly, I really found the exercises beneficial, I perform them regularly. I really like them. Also, clearly explained. Those two kind of things I liked most about the eHealth module. (participant 20)

Participants liked the background information on the eHealth module. These additions, compared to the sessions, were stated to be of value, e.g. the topic about workplace solutions and investigation. Most participants that did not use the eHealth module extensively had plans to look at it in the future, or if their complaints became worse. Many participants only looked a few times; generally, half of the participants did not use the eHealth module extensively. Mostly, this was because they had limited time or did not think that it was interesting for them. Others said that they did not want to spend more time behind their computer or they found that it did not add much to the sessions.

eHealth module: exercises

The exercises of the eHealth module were generally very useful for almost all users of the eHealth module and were rated very positively. Some participants said that the exercises were well filmed and explained, they facilitated taking action. One participant would also have liked to have a printable version of the exercises, some participants used the eHealth module only for the exercises. Some participants indicated that the exercises were the tools that they most benefitted from, as one participant said:

I looked at all the exercises in the eHealth module the first day. They're really useful and easy to perform. I try to perform them regularly. Now I know I can do these exercises by myself, this was the support I needed. (participant 27)

Combination of self-management sessions and eHealth

A number of participants felt that the eHealth module and the sessions partly covered the same topics. One participant stated:

There's a lot of overlap. But not that the one or the other wasn't necessary. Together it was good, you could say. (participant 28)

Others found that the eHealth module and the sessions complemented each other and they experienced the eHealth module as a good addition. Participants merely indicated that they benefitted from the sessions and the eHealth module. One participant said:

I found them to be very different. The sessions were about the psychological part, stress reduction, making action plans, standing up for yourself, so yes, I found them really different. But I benefitted from both, especially from the exercises. (participant 31)

One participant (participant 25) found the sessions (which came with a paper manual covering the topics of the sessions) more effective. As this participant was usually sitting the whole day behind the computer at work, he found it easier and better to take the manual, together with his own notes from the sessions. This is in contrast to another participant (participant 26) who said that she preferred the eHealth module because a manual is something she just browsed through and the eHealth module is available everywhere at every moment.

Group sessions: moderator and group size

Almost all participants liked their group size (5-6 participants per group). The small size made interaction easy and participants felt safe. There was a pleasant atmosphere. One participant (participant 22) preferred a slightly larger group, because it could have been more interesting, but she realized that this would also cost more time. In this group, sometimes (due to drop-out and illness) there were only four participants. Another person (participant 23) in this group said that six participants would perhaps have been ideal.

All participants who mentioned the moderator were positive about the moderator. Participants liked the professional and personal attitude of the moderators; they were able to personalize the content of the sessions and created a personal atmosphere. Some participants mentioned that some topics were discussed too extensively by the moderator.

Group sessions: human movement scientist/physical therapist

Many participants mentioned that the session with the human movement scientist/physical therapist was very valuable and interesting. Participants liked to receive information about the function of the muscles, and the influences of exercises and training. Some participants had expected more personalized advice and exercises, although they confirmed that it was possible to ask personal questions. Some had expected that in this session exercises would also have

been performed. Others mentioned that this session with the therapist could have been more extensive. One participant said:

I really liked that session, he also performed some relaxation exercises with us. That physical part - for me that could have been discussed more extensively. (participant 26)

Perceived effects of the intervention

Awareness

Most participants stated that they experienced an increased awareness during the intervention, which was experienced as very valuable. Several participants stated that this increase in awareness was the most important effect of the program. One participant (participant 2) said that she already had a high level of awareness, but the recurrence and endorsement were very valuable. Another participant said:

I became more aware that I have to do something about my complaints myself. It's not something that will heal itself. You really have to be actively involved. It will be something of great importance in the rest of my life. That I always have to remember that I should chill out. I'm more aware now of the situations which produce stress for me. So I try to handle them. (participant 15)

For some participants the intervention was a confirmation of the thoughts they already had, which strengthened them in their beliefs. One participant said:

I really benefitted from the program. What have I learned? Mainly awareness. Awareness of the chronic character of the complaint, that it can come back time to time. More insight in the causes of the complaints. Insight in things I can do to deal with and to decrease my complaint. But, awareness is the most important for me. (participant 20)

Participants understood and recognized themselves and their group members as a special type of person, who feels very responsible and who are at increased risk to develop CANS. Some participants also became aware about some personal characteristics, for example perfectionism. The awareness that the complaints could be related to their own behaviour stimulated participants to listen to their body signals and pay attention to the role of work stress and their own work style and to the need of taking action.

Knowledge and insight. Participants mentioned that the program provided knowledge about their complaints and insight in their complaints. One participant said:

I used to think repetitive strain injury is about a wrong chair or keyboard, that kind of thing. But it's much broader, it's also your own attitude - that was very recognizable for me. (participant 18)

Some of the participants gained more insight into the factors that provoked or aggravated their complaints. They realized that many factors, e.g. stress, may contribute to the origin and persistence of their problems. Some already knew that all these factors were involved, whereas for others this was a new insight. The information about central sensitization was valuable for some participants, it contributed to the insight in their complaints and the process of acceptance. However, there was also some resistance against the principle of central sensitization, mainly because of the complicated concept and the interpretation of some participants that their complaints were not real.

Motivation to change

Attitude. Some participants said that they changed their attitude towards their complaints. For example, one participant (participant 2) said that she changed the way of looking at her complaints because she realized that she was not the only one with complaints, and there are always people with worse symptoms. Another participant (participant 4) stated that the most important change was the way she looked at the pain; she no longer looked at it as a sign of tissue damage. Other participants did not change the way they look at their complaints. One participant said that she did not change her attitude towards her complaints because she saw similarities between the intervention and a previous intervention for her chronic fatigue syndrome.

A number of participants were not aware of the fact that their complaints are perhaps chronic and that it is important to cope with the problems at work and in daily life. Although it was perceived as difficult to accept that the complaints may never disappear completely, for most participants it was good to realize that the complaints were perhaps chronic and that they should learn to cope with these problems. Participants recognized this, agreed with it, and it opened their eyes. One participant who found it difficult to accept that her complaints were chronic said:

It was very painful to realize that the complaints could be chronic and will not go away. I found that very difficult. Perhaps you would think that, after so many years of complaints, I should already know that. But it was confrontational and it required a mind-set to accept it and make a plan how to deal with it. (participant 30)

Acceptance of and coping with the complaints were frequently mentioned as an effect of the intervention and resulted in a changed attitude towards their complaints. One participant said:

During the sessions I came to some sort of acceptance; I have to cope with my complaints. And I just need to try to keep it manageable. That is what the course has accomplished.
(participant 10)

Social support. Almost all participants liked the interaction between participants. Participants could learn from each other and felt supported. Exchange of experiences was rated very positively. One participant said:

It was very useful to hear the experiences of the others and get a lot of information. At certain times you feel alone with your complaints, although you know that many people suffer from CANS. I benefitted from the recognition of the complaints by other participants and to hear how others deal with the complaints. (participant 18)

Participants liked the fact that they were different from each other; in this way, they could hear different stories and advice and could better place their own problems in perspective. On the other hand, the interaction and telling each other their own stories during the sessions took a lot of time and was not valuable for every participant. Because of the personal stories, some participants said they were happy that they were not in the same group as their immediate colleagues. In general, participants felt very secure and safe in the group.

Behaviour

Participants became more aware that they should learn to cope with the complaints and changed their behaviour. They were motivated to really take action. Participants mentioned that they changed their behaviour, e.g. at work, at home, and with regard to sport activities. Participants said that they were more aware and adapted their lifestyle and performed exercises. One participant said:

I have changed totally. (...) I have just walked outside. Before the intervention, I did not do that. (...) Also awareness for taking breaks. Just go outside, walk to a colleague or drink a cup of coffee. That's what I'm doing. And taking the stairs instead of the elevator. I also did not do that before. (participant 5)

However, there were also participants who mentioned that they knew beforehand that it would be difficult to change their behaviour and habits. One can easily fall back in old habits, also at work. One participant (participant 16) said she felt a real behavioural change.

For all participants the program stimulated them to take action. The threshold of taking action was lowered during the program and the participants also stimulated each other.

*You are being confronted with the facts again. And you're more actively involved. (...)
You've made your action plan, which you try to realize every day.* (participant 14)

Skills. Many of the participants have become more active in daily life and performed sport activities, including Pilates, yoga, fitness, or swimming. One participant (participant 4) said that she had not yet succeeded in playing tennis again, partly due to her fear of getting more pain. Moreover, many participants performed exercises at home and some felt stimulated to search for care for their complaints, e.g. physical therapy. Participants said that they were also stimulated to be more physically active in general, e.g. by cycling to their work, or taking the stairs instead of the elevator, or walking during their breaks.

Also, many participants indicated that they had changed their work style and realized that they should take breaks, which they did now. However, some participants still found it difficult to take breaks:

If I want to take breaks, I really have to schedule them in my agenda. Still I don't always take breaks. But when I look back I think, that half an hour doesn't really matter.
(participant 23)

Part of the participants were more aware of their own limits and set those limits after participating in the program. Others indicated that they were more able to let things go, as the following quote indicates:

*I especially benefitted, I'm the kind of person that never said 'no' – always 'yes I'll do it'.
But I don't do that anymore. That resulted in less stress. I can now better delegate tasks.*
(participant 8)

Sometimes also small things in the workplace were changed, such as switching off pop-up emails, or using another type of mouse. Those small things can also make a difference, one participant stated (participant 23). Others adapted their workplace or requested a workplace investigation. One participant underwent psychological treatment, as it seemed to her that other factors might also be involved.

A number of participants said that they communicated more. For instance, if they were irritated by something, they now mentioned it. One participant said:

What I do now is that I make things negotiable. I didn't do that in the past, I kept it all to myself. (participant 25)

Also at home, several participants made some modifications and adapted their behaviour. Sometimes they also involved their partner and they changed their lifestyle together. Some participants felt more relaxed and, for example, divided household chores between two days (participant 7). One participant also became aware of the fact that there are more things in life than work, as she said:

(...) I also have to do things I like, and not just things I need to do. That's something I became aware of again. I do have some leisure time, but I also make obligations for myself. That's something I had to stop with. (participant 13)

Action plans. In general, participants experienced the action plans they had to make and carry out during the sessions as a helpful tool in taking action. The action plans were seen as an incentive to take action. Explicating the planned behaviour was seen as a useful pathway to making changes. Some of the participants already made some kind of action plans themselves. One participant (participant 28) said that it was stimulating that the moderator also made her own action plans. In general, participants were aware of the fact that continuing their changed behaviour is the next step to success.

Participants were also aware of the importance of making concrete, manageable, and SMART action plans. During the process, this was getting better and better. Most participants did not experience any problems with the execution of their action plans. However, some participants did, mainly caused by limited time or prioritization of other things first, such as their family life. Discipline is seen as being very important. One participant said:

Mainly self-discipline. (...) There were some things I intended to do, which at first were not done or were done later. But eventually I got some things on the rails. So it worked well. (participant 9)

One participant (participant 17) found the execution of her action plans related to behaviour outside the work (i.e. performing sports activities) more easy to apply compared to action plans at her work (i.e. taking breaks, performing exercises at work). Participants felt motivated and sometimes participants even felt obliged to perform their action plans because of the social influence of the group.

Self-efficacy. Almost all participants are looking to the future with confidence, although several of them stated that it is important to continue working at their complaints in order to control them. Some participants mentioned that the last session, in which the future was discussed and a mind map was made, was valuable and interesting. Some participants said that they believed that their complaints will go away in the future, while others think that some symptoms will persist. Some participants with a physically challenging job had some questions with regard to their future, although one of them explicitly said that she intended to stay actively involved in handling her complaints, which was endorsed by other participants. One of them stated:

It's not something that comes to an end after six sessions. It's something you have to continue working at. (participant 8)

Part of the participants indicated that they think it will not be easy to continue their behaviour, which is also endorsed by a participant who was not very confident about the future:

No, and that sounds very negative. And that's not how I want to see it. But I hope I will think about the course and benefit from it, especially if my complaints become worse. I think I can benefit from it for a long time, but I have the feeling that I'll fall back in old patterns quickly - unfortunately. (participant 11)

Participants think that the eHealth module may be of value in the future, as one participant said:

There are still many things on the eHealth, and exercises I can have a look at. We only discussed that all briefly. (...) That's something I can look at myself. I think it provides a good reference. (participant 3)

Barriers. Participants mentioned some barriers for changing their behaviour. For example, one participant (participant 7) said that especially at work, it was not always easy to change her behaviour, because it also depends on environmental factors, such as the availability of colleagues. Moreover, participants could not always make their own day schedule, as this also depends on environmental factors, which cannot always be influenced.

Most action plans were related to personal factors, but a number of participants made action plans which were also related to environmental factors, although not all environmental factors were manageable. For example, one participant (participant 1), who experienced difficulties with the air conditioning at her workplace did not succeed in finding a solution for this problem. However, in general, participants experienced cooperation from their supervisor to realize their action plans. Some participants mentioned difficulties with realizing their action plans, because

their work was influenced by environmental factors, such as the illness of colleagues or too many patients, and the fact that some things happened unexpectedly. To continue performing the changed behaviour and to continue using action plans were indicated as important, but not always easy.

Reasons for drop-out

The three interviewed drop-outs of the self-management sessions participated in 1-3 sessions. One participant (participant 26) said that she stopped because of limited time, especially the time she needed for the session combined with the travelling time. She mentioned explicitly that her drop-out had nothing to do with the content of the sessions. Another participant also mentioned limited time as a reason for dropping-out, but she also said:

I participated in the first session, the next session I was on holiday, the third I was ill, then I thought, this will not work. I had already missed too much. I also thought, I have a background in health sciences, maybe the topics in the sessions are not that relevant for me. (participant 27)

Although participants who missed one or more sessions were given the opportunity to follow the missed session(s) in another group, this particular participant chose to continue using only the eHealth module and was happy that she could use that for a year. Moreover, she said that perhaps a more extensive eHealth program, without the sessions, would have been better for her. Another drop-out had a totally different reason:

I was embarrassed about myself, that I did not have the discipline and take the responsibility to change the things that were needed. If I really want to do this right, I have to change a lot; perform sport activities, (...) get more rest, take more breaks at work and perform exercises, sit less behind the computer at home... (...) This also discouraged me. (participant 26)

Practical recommendations

Participants gave practical recommendations for the improvement of the program. In one group participants performed some exercises during the sessions, because they felt they had to sit too long. Moreover, there were participants who would prefer to see more attention for the physical part of the complaints in the sessions including more exercises. One participant said that for her the sessions could have been more compatible with the text of the manual. Some participants would like a shorter duration of the sessions in weeks, or more clustered on less days, while others wanted more sessions, for example eight weeks.

Several participants said that they would like a follow-up session after some weeks or months, or even some follow-up sessions every six months. One participant said that an online community might be valuable. A follow-up could serve as a stimulus to retain the changed behaviour. Some groups did make a follow-up appointment with the groups themselves. One participant said:

I can imagine that (...) it could be beneficial to have a refresher session once in a given period of time. (...) In our group we made an appointment in March to hear from each other how it's going. Also to encourage each other. (participant 9)

The topic in the sessions about nutrition was mentioned several times as being redundant, although some participants found this a useful, non-obvious, topic. The topic about communication (with regard to the employer) was once mentioned as redundant.

With regard to the eHealth module one participant said that more pictures would have been helpful. Another recommendation was a page with the details of the sessions. One participant would have preferred a total e-version of the intervention. Also, use of the eHealth during the sessions, quicker loading of the movies of the exercises and a more modern look were mentioned.

Table 3: Experiences of participants in the intervention group.

Questions / statements (3 months), n=58	N	(%)
The content of the self-management sessions was generally useful for me		
Totally agree	23	39.7
Somewhat agree	22	37.9
Neither agree nor disagree	6	10.3
Somewhat disagree	2	3.4
Totally disagree	5	8.6
The moderators were capable of moderating the self-management training		
Totally agree	36	62.1
Somewhat agree	15	25.9
Neither agree nor disagree	3	5.2
Somewhat disagree	2	3.4
Totally disagree	2	3.4
Questions / statements (12 months), n=53	N	(%)
Has the intervention played a role in your considerations to visit a physician for your complaints?		
Yes, to a large extent	2	3.8
Yes, to some extent	9	17.0
No	42	79.2
Has the intervention played a role in your considerations to visit a therapist for your complaints?		
Yes, to a large extent	4	7.5
Yes, to some extent	18	34.0
No	31	58.5

Table 3: Experiences of participants in the intervention group. (continued)

Questions / statements (12 months), n=53	N	(%)
Has the intervention played a role in your considerations to ask for an ergonomic workplace investigation for your complaints?		
Yes, to a large extent	3	5.7
Yes, to some extent	11	20.8
No	39	73.6
Has the intervention played a role in your considerations to (let) adapt your workplace?		
Yes, to a large extent	6	11.3
Yes, to some extent	16	30.2
No	31	58.5
The intervention met my needs.		
Totally agree	10	18.9
Somewhat agree	26	49.1
Neither agree nor disagree	10	18.9
Somewhat disagree	6	11.3
Totally disagree	1	1.9
The intervention met my expectations.		
Totally agree	8	15.1
Somewhat agree	27	50.9
Neither agree nor disagree	9	17.0
Somewhat disagree	9	17.0
Totally disagree	0	0
The intervention played a major role in reducing my complaints.		
Totally agree	7	13.2
Somewhat agree	21	39.6
Neither agree nor disagree	12	22.6
Somewhat disagree	9	17.0
Totally disagree	4	7.5
I would recommend the intervention to colleagues with CANS.		
Totally agree	20	37.7
Somewhat agree	20	37.7
Neither agree nor disagree	8	15.1
Somewhat disagree	3	5.7
Totally disagree	2	3.8
I am capable of what I have learned in the intervention to apply in practice.		
Totally agree	9	17.0
Somewhat agree	35	66.0
Neither agree nor disagree	6	11.3
Somewhat disagree	3	5.7
Totally disagree	0	0
The eHealth module was a good addition to the self-management sessions.		
Totally agree	10	18.9
Somewhat agree	22	41.5
Neither agree nor disagree	16	30.2
Somewhat disagree	1	1.9
Totally disagree	4	7.5

Table 3: Experiences of participants in the intervention group. (continued)

Questions / statements (12 months), n=53	N	(%)
The information provided in the eHealth module was generally useful for me.		
Totally agree	10	18.9
Somewhat agree	25	47.2
Neither agree nor disagree	11	20.8
Somewhat disagree	3	5.7
Totally disagree	4	7.5
Experienced support of participants in the intervention group at 3 months (n=53)	Median	Range
Statement (7 point Likert scale)		
1= Very much opposition		
7= A lot of support		
To participate in the intervention I experienced from my supervisor	5	2-7
To participate in the intervention I experienced from my colleagues	5	2-7
To participate in the intervention I experienced from my family and friends	6	2-7
In achieving my personal goals, I experienced within my organization	5	2-7
In achieving my personal goals, I experienced from my supervisor	4	1-7
In achieving my personal goals, I experienced from my colleagues	4	1-7

Process evaluation based on questionnaires at three and 12 months

Participants were generally positive about the content of the self-management sessions and the capability of the moderators (measured at three months, see Table 3). For part of the participants the intervention played a role in their considerations of visiting a physician or therapist or in their considerations to ask for an ergonomic workplace investigation (see Table 3), although for most participants this was not the case. Table 3 presents the results of the experiences with and opinions about program, measured at 12 months. The intervention seemed to meet the needs and expectations of most participants. Moreover, a major part of the participants would recommend the intervention to colleagues and were capable to apply what they had learned in the intervention into practice. More than half of the participants (somewhat) agreed that the eHealth module was a good and useful addition to the sessions (see Table 3). The experienced support of participants in the intervention group was generally high.

Discussion

In this study, semi-structured interviews and questionnaires were used to investigate the experiences of participants of a self-management program combined with an eHealth module, for employees with CANS. The program was developed using intervention mapping, which is a stepwise approach for theory and evidence-based development and implementation of interventions [30]. The results of this study provide insight as to whether the program fitted the needs of employees with CANS, in the success factors of the program, and in factors which might need adaptation.

In general, the interviews revealed that participants were satisfied with the program and with the diversity and wide scope of the program, covering many important topics, although it was obvious that a number of participants would have preferred more attention for physical diagnosis and intervention. In almost all participants a behavioural change was facilitated. Many participants made changes at work and in their leisure time, but some also felt that continuing their changed behaviour would be a challenge. The perceived effects of the intervention are related to the phases of I-Change Model (2.0, i.e. awareness, motivation and action) [38]. The intervention was developed using the ASE Model [39]. Awareness raising was experienced as a major effect of the program by many participants, which was also mentioned after self-management programs for employees with a chronic somatic disease [44] and for heart failure patients [45]. Participants in this study obtained knowledge and insight in their complaints which, together with the increased awareness, contributed to the acceptance of and coping with the complaints. Participants were motivated and sometimes changed their attitude towards their complaints. Moreover, participants mentioned that acceptance of the complaints and coping with the complaints was increased, and that the social support of the group members was valuable; this was also reported after other self-management programs [44-46]. Having access to other participants' experiences can result in an increased insight [46]. The eHealth module (especially the exercises) was generally experienced as positive; participants liked and performed the exercises although half of the participants did not use the eHealth module extensively, which was confirmed by the quantitative evaluation showing that at three months and at six months follow-up 32.1% and 66 % of the participants, respectively, indicated that they had never used the eHealth in the previous follow-up period [35].

The results of the semi-structured interviews are supported by the results of questionnaires filled in at three and 12 months. From the data presented in Table 3, it can be concluded that the intervention generally met the needs and expectations of the participants in the intervention group and that participants were generally very satisfied with the program. The high satisfaction of the participants was also present in a study assessing the effects of a self-management program for people with a chronic compensable work-related musculoskeletal disorder seeking to return to work [47].

The content of the sessions was generally useful and participants were positive about the capabilities of the moderators. Moreover, participants would recommend the intervention to their colleagues and indicated that they are capable of applying what they have learned in the intervention in practice. Moreover, most of the participants found the eHealth module a good addition to the sessions and found the information provided in the eHealth module useful. Furthermore, participants felt supported in participating in the intervention and in achieving their goals.

In the interviews, almost all participants said they indeed changed their behaviour, although part of them indicated that they still needed to continue working at their complaints in order to control them. A behavioural change was also mentioned after a self-management program for employees with a chronic somatic disease, in which the action plans contributed to most effects [44]. After following that program, almost all participants had a high self-efficacy with regard to coping with their complaints in the future [44]. Since the perceived effects of the intervention generally met the factors of the I-Change model (2.0), it appears that the factors considered important for behavioural change were at least partly addressed by the intervention.

This study has several strengths. The use of an interview guide, member checking, and consensus coding of two authors ensured the validity of the results. This study provides a qualitative evaluation of 31 participants of a self-management intervention for employees with CANS, which can add valuable information to the results of the quantitative evaluation. Moreover, the results can be used to adapt the program preceding large-scale implementation of the intervention. Moreover, the results of the semi-structured interviews were accompanied and supported by a quantitative evaluation at three and six months follow-up. Combining qualitative and quantitative research methods is common in social science [44] and qualitative evaluation of intervention programs is often performed [44, 48-53]. The use of qualitative methods can make an important contribution to the results of RCTs evaluating complex health service interventions [54, 55]. As far as we know, this is the first qualitative evaluation of a self-management program for employees with CANS. The three participants (of the 32 participants in the interviews) who dropped-out from the self-management sessions, did continue to use the eHealth module, stayed within the RCT and participated in this qualitative evaluation. This provided valuable information about the reason for dropping-out from the sessions.

Most participants said that the sessions and eHealth module complemented each other, as was intended; however, it became clear that some participants preferred the sessions while others preferred the eHealth module. Given the variation in participant preferences, it seems that the combination of sessions and the eHealth module is a strength of the program. With regard to the implementation: perhaps the sessions can be more tailored to the needs of the group (e.g., more physical activity in the sessions), which was not possible in this intervention, i.e. because of the RCT it was necessary for the moderators to strictly follow the training protocol. Perhaps in the future, a computer-tailored online program might better address these different needs of participants, and an online community might be used for the social interaction of participants. Eventually, the program can also be developed for a broader group of participants, e.g. for employees with work-related musculoskeletal disorders; this could be investigated in future research. A recent review showed that eHealth in somatic diseases is effective/cost-effective or the evidence is at least promising [56].

This study also has limitations. Participants were only interviewed about (the expectations of) the program after the sessions and not before the program. Therefore, the participants' expectations of the program may have been influenced by their experiences during their participation in the sessions. Moreover, the themes that emerged during the thematic analysis were influenced by the question guide of the semi-structured interviews.

Most participants worked in a hospital or educational setting and were generally higher educated. Although we found no major differences between the experiences of participants working in different environments, it is possible that the experiences of employees with CANS may vary between different work environments. The interviews were held shortly after the last session and, although participants mentioned changes in their awareness, attitude and behaviour, it remains unclear whether behavioural change on the long term was achieved. This process evaluation only included the participants' perspective. Including the perspectives of other stakeholders (colleagues, supervisors, and moderators) could have been valuable.

There was also some criticism regarding aspects of the intervention itself. A number of the participants had expected a more physical approach during the intake and sessions, although the information leaflet of the program mentioned the content of the self-management program. Most participants who had expected a more physically-oriented program, recognized the value of the psycho-social orientated approach. The need of such an approach is also endorsed by earlier focus group interviews with experts on self-management for employees with CANS [24] and by other research indicating that CANS interventions should not be restricted to ergonomic improvements, but should be accompanied by improvement of the job design from a psychological and social perspective [57].

Some participants would like to see more physical activity in the sessions, even though they were satisfied with the session with the human movement scientist/physical therapist. Moreover, topics about nutrition and communication were mentioned as redundant by some participants. The lack of a follow-up session is also a limitation of the intervention, as many participants indicated that some kind of follow-up would be valuable for them. Therefore, a follow-up session should be included in the program in the future.

Furthermore, we found out that the eHealth module was not used extensively by the participants. Some parts of the eHealth module were used more than other, for example the part of the physical exercises. As mentioned before, these results are also supported by the results of the quantitative evaluation, in which 32.1 % of the participants indicated that they had never used the eHealth module in the first three months of the intervention [35]. Given the fact that 76.9% did use the eHealth module, it can be concluded that the eHealth was not valuable or usable for

all of the participants. In a study of Lockhart et al., [45] investigating a self-management study in heart failure patients, most participants did not use the workbook or DVD as an integral part of the program. In contrast, in our study the manual was used by all participants, as it was an integral part of the sessions. Perhaps, in our study, not all participants were aware of the topics on the eHealth module, this because in the interviews the physical aspects of the complaints sometimes were mentioned as missing topics, but indeed were discussed in the eHealth module. Apparently, some people might need some facilitation or support in using all the course materials in order to achieve self-management behaviour. Therefore, it is advisable to make a better referral to (the more physically orientated modules) of the eHealth in the sessions or, for example, to include some physical aspects in every session, as was also done in a self-management program for people with chronic pain [46]. Moreover, it seems advisable to make the eHealth available for a period longer than one year, and more pictures on the eHealth was also recommended by some participants.

In conclusion, participants of a self-management program, consisting of self-management sessions and an eHealth module, were satisfied with the program and most participants experienced benefits from the program. The results of the semi-structured interviews were supported by the quantitative evaluation which also showed a high satisfaction of the participants. The program fitted the needs of employees with CANS. Some practical recommendations were given by the participants, which include more attention to the physical part of the complaints in the sessions and at least one follow-up session. In future, participants must be stimulated during the sessions to make better use of the eHealth module. The experiences and recommendations can be used in the adaptation and further implementation of the developed self-management program for employees with CANS and in the development of other interventions for patients with CANS or self-management programs for other musculoskeletal disorders.

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Appendix 1: Interview guide

1. Can you tell your personal reason to participate in the self-management program?
2. What were your expectations of the self-management program?
3. Fulfilled the self-management program your expectations? Why (not)?
4. Can you tell how you have benefitted from the self-management program?
5. Has the way you are looking at your complaints changed during the self-management program?
6. Do you have the confidence that you can deal with your complaints in the future? Why (not)?
7. Have you experienced any difficulties with performing the weekly action plans?
8. Do you think that the self-management sessions and the eHealth module were complementary to each other? Why (not)?
9. Did you miss any topics in the self-management program, or were there any superfluous topics?
10. Do you have any recommendations for us to improve the self-management sessions?
11. Do you have any recommendations for us to improve the eHealth module?

9 |

General discussion

Introduction

Currently, much attention is paid to what patients are able to do themselves with regard to lifestyle modification and therapy adherence [1]. Moreover, self-management is considered an important aspect in the provision of high-quality care for the ever-increasing number of chronically ill persons [2]. Therefore, in the Netherlands, prevention and self-management are key terms that are now embedded in the policy of the Ministry of Health [3]. Notably, the number of hits on PubMed yielded with the search term 'self-management' has almost doubled in the last ten years: from 5,384 in 2004 to 11,530 in 2014. A search in the database of the Netherlands Organization for Health Research and Development (ZonMw) yielded 90 projects spread over the 20 ZonMw programs that focus on the topic 'self-management and self-management support' ending in the period 2010-2013 [4]. Clearly, a considerable amount of research in the field of self-management has already been conducted and self-management is still a hot topic [1].

The work presented in this thesis describes the development of a self-management program for employees with non-specific complaints of the arm, neck and/or shoulder (CANS) and the evaluation of this program in the target population by means of a randomised controlled trial (RCT). Self-management at work at the individual level was targeted through six group sessions of 2.5 hours each (one session per week), together with an eHealth module that was accessible for a period of one year. The eHealth module was developed to address the more CANS-specific topics and to tailor the program to the specific needs of the individual participant. The eHealth module was also developed to enhance the self-management behaviour on the longer term (i.e. up to one year).

This final chapter discusses: 1) the role of self-management in health care, 2) the results of our study, 3) proposed working mechanisms of the intervention, 4) recommendations regarding whether or not to implement the intervention, 5) possible modifications to increase efficacy of the program, and 6) the use of self-management in clinical practice. Finally, recommendations are made for future research and some general conclusions are drawn.

Role of self-management in healthcare

As mentioned in the general introduction of this thesis, several self-management programs are available for patients with musculoskeletal disorders, including interventions for osteoarthritis, rheumatoid arthritis, osteoporosis, upper limb pain, fibromyalgia, knee pain, temporomandibular disorders, (chronic) low back pain, and various 'mixed' conditions [5-7]. However, there is inconsistent evidence regarding the effect of self-management programs for patients with chronic

musculoskeletal pain. In general, there is some evidence that group-delivered short programs (< 8 weeks) led by a healthcare professional have the best potential [5]. Based on a compilation of 228 systematic reviews, it appeared that the most effective actions to support self-management are: providing self-management education for individuals with specific conditions that is integrated in routine health care, interactive online self-management programs, telephone support and tele-health initiatives, and self-monitoring of medication and symptoms [8].

There is evidence that disease-specific self-management education, with professional involvement provided as part of routine health care, is more effective than generic self-management educational courses led by lay persons. On the other hand, lay-led self-management courses are popular with attendees. Nevertheless, although they strengthen social support and coping skills on the short-term, there is no evidence of beneficial effects on the long term [8].

Although most people want to do everything they can to maintain and improve their health, they generally need advice and support to do this effectively [8]. In a survey-based study, over 90% of individuals with a chronic condition was interested in being a more active self-carer, and more than 75% said that if they had guidance/support from a professional or peer they would feel more confident about taking care of their own health [9]. According to Johnston et al. [10] an effective self-manager is someone who: 1) has knowledge of his/her condition; 2) follows a care plan developed with his/her health professionals; 3) actively participates in decision-making with health professionals; 4) monitors and manages the signs and symptoms of his/her condition; 5) manages the impact of the condition on his/her physical, emotional and social life; 6) adopts a lifestyle and behaviour that promote health; and 7) has confidence, access and the ability to use support services.

Although self-management support appears to have added value compared to regular care (i.e. improved outcomes and reduced costs [3, 8]), a substantial proportion of patients hardly responds to these interventions. The variance in effect size observed between studies and patients indicates that 'one size does not fit all' [2]. Top-down delivery to a passive patient is unlikely to work [8]. Baseline evaluation of self-management skills, competences and barriers can be valuable in deciding what role self-management is likely to play during the treatment of an individual patient [11].

eHealth is an important tool in a patient's self-management [1]. It is hypothesised that eHealth provides opportunities for further improvement of the quality of health care and for reducing costs [3], and that interactive online self-management programs can have a beneficial effect on behavioural and clinical outcomes [8]. However, individuals using care may differ with regard to the health status and personal perception of their own health condition, e.g. the value one

attaches to independence and self-direction; the value attached to personal contact; and the extent of one's knowledge to actively search for information making use of technology [12]. Thus, not every individual is open for eHealth and/or is likely to benefit from eHealth.

Results of the self-management program for employees with CANS

The self-management intervention improved the perceived disability of participants during their work. However, on most other outcomes, no clear improvement was visible. There are various reasons and/or factors that may have contributed to the negative results of this trial. First, on the general module of the DASH, no significant difference was found between the group following the self-management program (SG) and the group receiving usual care (UCG). Considering the range of the DASH (0-100), the baseline values of the DASH were generally low (22.27 and 22.28 for SG and UCG, respectively), which is not uncommon in this domain [13]. However, a floor effect may have been present and a clinically important improvement of 10 points (as reported in the literature [14]) was less likely to be achieved. Also, most of the participants had a longer duration of complaints (due to being a selected target population) and persons with complaints of a longer duration often have a stable functional disability score and are less likely to show a dramatic change after treatment [15].

The effects could also be influenced by the natural course of the complaints and by regressive fallacy, i.e. the phenomenon in which people with a chronic disease search for interventions when they are feeling at their very worst [16]. In addition, it is likely that the UCG was also triggered to change their behaviour, since they were aware of the existence of a self-management program and filled in the questionnaires. In our study, the UCG changed their behaviour with regard to sports activities, which may have led to improvement on some of the outcome measures, thereby leading to less differences between the two groups [16].

Based on the process evaluation (Chapter 8) it can be concluded that participants in the intervention were satisfied with the program, and with the diversity and scope of the program that covered many important topics; however, the high satisfaction level of the participants might also be caused (in part) by the extra attention they received during the intervention.

Primary outcome measure of the study

The overall goal of the intervention was defined as 'Self-management behaviour at work', with the aim to alleviate the perceived disability of the participants. Indeed, the intervention proved to decrease the perceived disability of participants during their work. However, the question remains as to whether we focused on the most important outcome measure in the RCT, since the

primary outcome was not directly derived from the Attitude-Social influence-self-Efficacy (ASE) Model, i.e. the model we used in the development of our program. It seems more important to measure the self-management behaviour at work itself; therefore, in retrospect, we think that self-management behaviour at work should have been the primary outcome of the study. From our outcome measures it appears that the best outcome to measure 'Self-management behaviour at work' is the self-efficacy at work scale, which focuses on the self-efficacy of participants with regard to several self-management skills.

Possible working mechanisms of the intervention

The intervention aimed to achieve behavioural change in self-management behaviour at work, by means of influencing the participant's attitude, social influence and self-efficacy.

In our study, we found no significant change between the SG and the UCG with regard to attitude, social influence and self-efficacy. This could be partly explained by a ceiling effect on the attitude towards self-management at work (enjoyment) scale and the Dutch General Self-Efficacy Scale [17]. Moreover, data on the experienced support of participants in the SG at 12 months showed that participants generally experienced sufficient support from their colleagues, supervisors, and family and friends, with regard to their participation in the intervention. During the self-management program, participants made various action plans and we assume that the participants learned new skills and obtained additional knowledge. We also assume that the intervention, including the action plans made, contributed to overcoming the various barriers experienced by participants.

On further examination of the results, it seems unlikely that the improvement in perceived disability during work in the SG was caused by changes in attitude, social influence or self-efficacy, although self-efficacy at work could have played a role. It is more likely that the effects found in our study are mainly due to increased knowledge and skills, and due to the intervention reducing the barriers of the participants (as mentioned in the interviews with participants). Therefore, we adapted the model that was originally employed by Detaille et al. [18]; our model now also shows the possible direct influence of the intervention on the skills and knowledge, and on barriers (Figure 1).

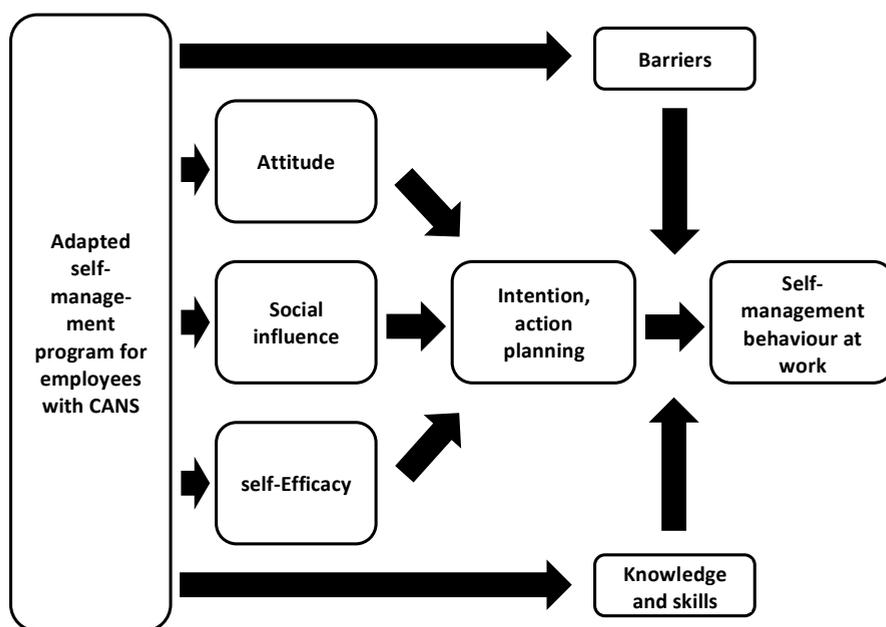


Figure 1: Model representing how the self-management program can influence the determinants of self-management behaviour at work. Based on the Attitude-Social influence-self-Efficacy (ASE) Model [19] and adapted from Dettaille et al. [18].

Should we implement the developed self-management program?

The question is whether self-management programs are suitable for employees with CANS in general. Since the participants have signed up for the intervention, they obviously had a need for an intervention. Other self-management programs for employees with a chronic (musculoskeletal) condition have recently been developed [20, 21]. Although these latter programs were not specifically tailored to fit the needs of employees with one specific condition, the topics included in those programs show many similarities with our program. This is not surprising because, in our focus group study with employees, the participants experienced problems that were similar to those experienced by employees with other types of chronic diseases [22].

Self-management programs mainly target people with long-term and chronic health conditions [23]. In fact, in employees with chronic CANS (> 3 months) two things can happen both after treatment and as a natural course of the disorder: 1) the complaints become stable with some fluctuation over time, or 2) the complaints reduce and the symptoms might even disappear. Theoretically, in both cases self-management is a valuable addition to the routine care treatment

option. In the first scenario, the complaints are chronic and self-management training can help employees to cope with complaints at work and at home. In the second scenario it is likely that, even though the complaints may become less severe, employees still need to pay attention to the risk factors for CANS, especially if the complaints reduce or disappear after treatment. Moreover, self-management skills might also prevent complaints and protect against worsening of the symptoms. Therefore, self-management programs might be valuable for all individuals (not only employees) with CANS.

Although the self-management program was not effective on most outcome measures, the process evaluation allows us to conclude that the intervention fulfilled the needs of employees with CANS and contributed to the improvement of the perceived disability of participants during their work. Therefore, implementation of the self-management program with some modifications (discussed below) seems to be valuable.

Modification of the self-management program

In future, the intervention can be adapted to help individual participants more effectively cope with their complaints and manage their condition. Some participants have already provided specific recommendations with regard to adaptation of the intervention (Chapter 8). Based on these recommendations and on our own experience, we will adapt the self-management program to better address the physical components, the exercises and sports. There is evidence that employees with CANS benefit from stretching, exercises and physical activity [13, 24-26]. Therefore, enhanced integration and facilitation of the exercises and physical activity may result in improved outcomes after completion of the program. Some of these activities will be integrated in the self-management sessions to provide possible alternatives during the sessions. The session with the physical therapist/human movement scientist will be extended, most likely to include individually-tailored advice. It is also recommended to include more physical activity by offering an additional (optional) exercise module for all participants. In the future, during the intake physical therapists will make a more extensive evaluation of the physical complaints of each participant.

Reflecting on the results of this study, it seems that overall exposure to the intervention may not have been sufficient. On the other hand, many self-management interventions for chronic musculoskeletal pain conditions employed a six-week period with weekly sessions, and other interventions employed up to 12 sessions, or sessions twice a week during six weeks, or six sessions spread over four months, or included an additional follow-up session [7]. Holding more sessions (perhaps of shorter duration), spread over a longer period of time and including a follow-up session, will probably increase exposure to the intervention and allow more time for behavioural

change, thereby improving the results. Therefore, at least one follow-up session will be added to the program and the sessions will be spread over a longer period of time. Also, facilitation of the use of the eHealth module will be improved; this may enhance exposure to the intervention, especially to the exercises which are part of the eHealth module. Also, reminders can be sent by email and the eHealth can be made more interactive and attractive, which might enhance its use on the longer term. Based on a questionnaire, each participant could also receive tailored (digital) advice as to which topics of the eHealth could be most valuable for them. Since baseline attitude, social influence, self-efficacy, intention, knowledge, skills and barriers vary between participants, such a computer-tailored eHealth program could support the self-management skills of participants and improve program outcomes.

Moreover, the self-management program for employees with CANS can easily be adapted to the needs of employees with a (certain type of) chronic (musculoskeletal) disorder. Modification of the course manual with different/relevant examples, together with the development of a specific or general eHealth module (based on focus groups interviews and guidelines), will enable other patient populations to benefit from the program. In contrast to other self-management programs targeted at employees, an eHealth module is already integrated in our program and can be used to tailor the intervention to the specific needs of individual participants. Finally, all the general self-management sessions can be accompanied by a disease-specific eHealth module.

Self-management in clinical practice

Because many persons with a chronic condition still go to work, self-management for employees with a chronic (musculoskeletal) condition seems important. After some modifications, the developed intervention can be used in clinical practice. The intervention can also be offered to individual employees with CANS (who can form a group), and can also be offered as an (additional) treatment option for groups of employees within various organisations.

Some reviews suggest that self-management education alone is unlikely to improve clinical outcomes. Instead, it needs to be part of multifaceted interventions that also target clinicians, the environment, and wider health systems issues [8]. Given the fact that many employees with CANS receive treatment from a (physical) therapist, integrating self-management principles in routine health care might produce better outcomes. Integration of self-management principles in routine care can be done by individual therapists (or other clinicians) by forming self-management groups of patients, or by an additional self-management eHealth module. The results of the work presented in this thesis (i.e. focus groups with employees, focus groups with experts, qualitative process evaluation, and quantitative evaluation) might be useful for various practitioners in clini-

cal practice. Individual patient preferences and/or characteristics will indicate whether it is better to participate in group-based self-management programs, or to join online programs, or whether self-management should be integrated in routine health care.

Because manual physical therapists do not adequately cover psychological and social dimensions in their screening [27] and because (according to patients) physical therapy has little influence on the management of their complaints after discharge [28], integrating aspects of self-management and providing self-management education/support could be valuable for patients with musculoskeletal disorders in physical therapy practice [28]. Moreover, participation in work is considered an essential part of the quality of life and is also insufficiently covered in routine care due to failure of the systems of the parties involved (e.g. healthcare providers, employers, insurance companies, and employees) [29]. Therefore, work-related care should be integrated to a greater extent in routine care [30]. In physical therapy, 37% of the patients have complaints caused by their work, or the complaints have a deleterious effect on their work [31]; physical therapists help to prevent or reduce absenteeism among these patients [29]. Healthcare practitioners are ideally placed to assist individuals with chronic musculoskeletal conditions to remain at work, or to return to work [10]. Self-management interventions can provide equal or better results compared to individual physical therapy [32-34]. Given the lack of evidence for conservative interventions for treating work-related CANS [35] and the multifactorial origin of CANS, self-management principles (perhaps combined with principles of shared decision-making and motivational interviewing) can be applied by physical therapists (or other healthcare practitioners), to tailor their treatment to the needs of the individual patient.

If healthcare providers apply self-management principles to achieve a behavioural change in their patients, then training and upgrading of the skills of these clinicians is important to enable them to best support employees/patients in their self-management behaviour [23]. Professional training for clinicians has a significant positive impact on clinicians' engagement in clinical self-management support and patient centeredness, as well as on their overall confidence to support self-management [23, 36]. Therefore, training in self-management skills to support employees/patients is worthwhile for all clinicians. Moreover, training in self-management skills should be (further) integrated in the basic training of students who will provide care (including, for instance, physical therapy) in the future.

Recommendations for future research

More research is required to further elucidate the use of self-management for employees with CANS. In future research, the intervention should be adapted in accordance with the above-

mentioned modifications. In our study, most participants had a relatively high level of education, which might have influenced the results. Detaille et al. [16] found that lower educated workers benefitted significantly more from their intervention compared to higher educated workers. Since higher educated employees might have a better attitude and more knowledge about their complaints, and a higher self-efficacy, this suggests that the results of the present study might differ had our study included participants with a relatively lower educational level. In addition, the cost-effectiveness of the intervention needs to be investigated.

Moreover, it seems worthwhile to evaluate which characteristics might predict a better outcome (responder analysis) after participating in the self-management program. This will provide valuable information as to which employees might benefit most from the intervention in the future. Given the high satisfaction level of the participants, and the limited positive effects measured in the quantitative evaluation, it would also be interesting to ask participants how much the intervention was 'worth' to them: i.e. what price would they be willing to pay for the intervention.

As mentioned before, part of the intervention could be adapted to an (computer-tailored) additional eHealth module, and an eHealth module which can be used in addition to regular physical therapy. Research on the effectiveness and cost-effectiveness of such an additional module is recommended. The intervention could also be adapted to the needs of employees with other musculoskeletal disorders, or a general program can be developed with one or more disease-specific eHealth modules. Future research should indicate whether the developed program is also suitable for employees with different medical conditions.

Follow-up period

Self-management programs aim to produce long-term self-management; however, behavioural change is a long-term process and a relatively long follow-up period might be needed to detect a change in outcomes. We used a follow-up period of 12 months; however, for some outcome measures, a longer follow-up period (up to 24 months) might be needed [37]. Therefore, if possible, we recommend to evaluate the effectiveness of the program over a longer period (e.g. 24 months).

Perspective of employers and targeting the physical/social working environment

The perspective of the employers and supervisors was not taken into account in the development of the intervention described here. Therefore, as indicated by Detaille et al. [18], a point of discussion is whether a self-management program for employees is sufficient to facilitate the workability of employees, or whether the physical and social working environment should also be the object of an intervention. In the future development of interventions, we recommend to take into account the viewpoints of employers and supervisors. Moreover, an additional intervention should also target the physical and social working environment of the employee to enhance

the long-term results. Finally, including the perspectives of other stakeholders (e.g. colleagues, supervisors, and moderators) during the process evaluation might also be valuable.

Measurement of adherence to and outcomes of self-management interventions

Since there is lack of homogeneity in the measurement of adherence to self-management [38] we recommend the use and development of general measures of adherence and general outcome measures (if possible) in the evaluation of self-management interventions. The Patient Activation Measure (a 22-item instrument which assesses patient self-reported knowledge, skills and confidence for self-management of one's health or chronic condition) [39] might be a valuable outcome to measure self-management in general. However, this instrument does not evaluate self-management behaviour at work. In future research, evaluating the actual self-management behaviour (including condition-specific knowledge and skills) seems more important compared to evaluating disability status, especially in conditions that are unlikely to improve substantially over time.

Overall conclusion

In the future, self-management can increasingly become an integral part of routine health care. If possible, self-management programs should be condition specific and individually tailored. The self-management program described in this thesis did meet the needs and expectations of the participants; moreover, participants were able to adapt their behaviour and apply the self-management principles in practice. The developed intervention contributed to the improvement of self-management behaviour at work and improved the perceived disability of the participants during their work. Adaptations are recommended so that the program will better address physical components, exercises and sports. To enhance exposure to the program, at least one follow-up session should be added. Also, increased facilitation of the use of the eHealth module is recommended. These modifications will serve to improve implementation of the self-management program. Moreover, (parts of) the self-management program can be used as an additional (eHealth) module in physical therapy practice. Self-management principles can also be applied by physical therapists or other healthcare professionals to tailor their treatment to the needs of the individual patient and to actively involve patients in the treatment of their condition.

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Summary

Work-related musculoskeletal disorders (WRMDs) are a considerable problem in the workplace, often leading to human suffering, lost time due to sickness absence, and lower work productivity. WRMDs are those musculoskeletal disorders which are induced or aggravated by work and/or the circumstances of its performance, although activities such as housework or sports may also be involved. Self-management is an approach increasingly used in chronic disease care to improve self-efficacy and wellness behaviours. Barlow et al. (2002) defined self-management as *“the ability to manage the symptoms, treatment, physical and psychosocial consequences, and lifestyle changes inherent in living with a chronic condition.”* Although several self-management programs are available for people with musculoskeletal disorders, there is inconsistent evidence for the effect of these programs for patients with chronic musculoskeletal pain.

Complaints of the arm, neck and/or shoulder (CANS) are a major part of WRMDs. Given the need for effective intervention programs for people suffering from CANS and in view of the multifactorial (biopsychosocial) origin of CANS, multi-component interventions that include both biomechanical and psychosocial components are recommended. Self-management programs that address the physical and psycho-social characteristics, and personal factors of the individual worker, as well as the characteristics of their work environment, may be useful for employees with CANS. Currently, no self-management programs exist for employees with CANS.

This thesis describes the process of adaptation of an existing self-management program for employees with a chronic somatic disease into a self-management program for use in employees with chronic non-specific complaints of the arm, neck and/or shoulder (CANS). To evaluate the effectiveness of the developed self-management program (including an eHealth module) compared to usual care, a randomised controlled trial (RCT) was designed and conducted. The results of this RCT are also described in this thesis.

Chapter 1, the general introduction, provides background information on non-specific CANS and describes the relevance of self-management in the work environment for this population. Non-specific CANS is defined by pain, stiffness or tingling sensations located in the neck, shoulders, upper back, arms, and/or hands for longer than two weeks, and related to work and/or activities. As described in this chapter, disability (impairments, activity limitations, and participation restrictions) can be present in employees with chronic non-specific CANS. Non-specific CANS is presumed to have a multi-factorial origin, and is often influenced by work-related physical factors, work-related psychosocial factors, and personal factors. The importance of each factor, and its individual contribution to the risk profile, varies between individuals and work environments. Given the need for effective intervention programs for people suffering from non-specific CANS, the relevance of the development of a self-management program (including an eHealth module) is explained. The overall goal of the intervention was defined as ‘Self-management behaviour at

work' with the aim to alleviate the perceived disability of the participants. The eHealth module is focused on providing participants with the opportunity to find additional resources which, together with the personal action plans made during the group sessions, will allow to tailor the program to the needs of the individual participant.

In this thesis the following research questions are addressed:

- Which problems and needs are experienced by employees with CANS? (Chapter 2)
- What is the opinion of experts on the content and strategies of a self-management program for employees with CANS, and what are the possible hindrances and facilitators for implementation of the program? (Chapter 3)
- Is the original self-management program, as developed by Detaille et al., a suitable intervention to approach the problems and needs of employees with chronic non-specific CANS; also, which adaptations might be needed to tailor the original intervention for employees with chronic non-specific CANS? (Chapter 4)
- What is the reliability (in terms of test-retest reliability, item-to-total correlation and internal consistency) and the discriminant, discriminative and structural validity of a Dutch version of the SPS-6 (a measurement tool to assess presenteeism) in a population with musculoskeletal health problems? (Chapter 5)
- What is the most useful design to evaluate the effectiveness of a self-management program (including eHealth) for employees with chronic non-specific CANS (persisting > 3 months)? (Chapter 6)
- What is the effectiveness of a self-management program (including eHealth) compared to usual care, in employees with chronic non-specific CANS (persisting > 3 months)? (Chapter 7)
- What are the experiences of participants in a self-management program for employees with chronic non-specific CANS? (Chapter 8)

Chapter 2 describes the results of a qualitative study based on discussions among three focus groups, that aimed to identify the problems as experienced by employees with CANS. A total of 15 employees with CANS participated in this study. The results show that participants did not always have sufficient insight into the causes of their complaints, and were not always fully aware of the possibilities to influence their complaints or of their own role in coping with their complaints. Generally, all participants suffered from pain and felt that they could not manage this pain adequately. Some participants were aware that they had a problem in taking their own personal limits (physical/mental) into account, and some mentioned that they often go beyond their individual limits because they have a relatively high threshold before actually asking for help. Many participants felt that fatigue had a serious impact on both their daily life and on the management of their complaints. Participants sometimes felt uncomfortable about dealing with various disrupting physical factors (pain, limitations, fatigue), psychosocial factors (stress, lack of

balance work/private life, difficulties in communication, misunderstanding from others), personal factors (difficulties in setting limits, high threshold before asking for support, high level of personal standards and expectations), and environmental factors (non-optimal workplace, culture within the organisation). The identified needs of participants included information about the possible causes of CANS and possible solutions, e.g. treatment; facilities; (relaxation) exercises; working and dealing with pain, limitations, fatigue, workload and stress; work(place) adaptations; work style; taking into account one's own limits and asking for help; and communication with others. All these factors should be addressed in future interventions, and tools to deal with these specific factors should be provided. We concluded that employees with CANS had to deal with their complaints in their daily life and at work. Several recurring problem areas were identified and the results endorse the multi-factorial origin of CANS. In general, participants experienced problems similar to those of employees with other types of complaints or chronic diseases. These problems were related to their illness, insufficient awareness of possibilities to influence and manage their complaints themselves, inadequate communication with supervisors, and a lack of relevant adaptations at the individual's workplace.

Chapter 3 describes the results of a qualitative study consisting of discussions with three focus groups involving 17 experts (with experience with CANS, self-management and/or eHealth interventions). The aim of this study was to determine whether a self-management program (including an eHealth module) would be a realistic option for employees with CANS, and to determine the content of the intervention. Experts emphasised that an intervention that aimed at understanding or, moreover, decreasing CANS in employees, should focus on increasing employees' self-efficacy and empowerment. According to the experts, employees with CANS have difficulty in managing their own health problem and their work. Informed awareness and behavioural change were considered important for this group of employees. According to the experts, providing knowledge can also be a part of a self-management intervention. It could consist partly of creating awareness with regard to possible risk factors, cues to prompt individual to become aware, as well as advice on how participants could influence these risk factors themselves. Social support was considered valuable and experts indicated that the combination of group sessions and e-health could work well.

Chapter 4 describes how the intervention mapping protocol was used to adapt the original intervention of Daille et al. to our target population. Intervention mapping is a stepwise approach (consisting of six steps) for theory and evidence-based development and implementation of interventions (Bartholomew et al., 2011). A needs assessment was performed (step 1 of the intervention mapping protocol) consisting of a review of the Dutch multidisciplinary guideline on CANS, and of focus group sessions held with employees with CANS (described in Chapter 2) and with relevant experts (described in Chapter 3). After the needs assessment, the objectives of the

intervention and the determinants of self-management at work were formulated (step 2). Based on the needs assessment, the overall goal of the intervention was defined as 'Self-management behaviour at work' with the aim to alleviate the perceived disability of the participants. Self-management at work was defined as 1) to be able to cope with pain, fatigue, limitations, disability and emotional aspects caused by CANS, 2) to be aware of which factors at the workplace cause stress and to adequately deal with work stress by re-organising work in light of the complaints and according to one's capacity, and 3) to be able to communicate effectively about CANS with one's supervisor and colleagues. Furthermore, theory-based intervention methods and practical strategies were selected (step 3) and an intervention program (including the eHealth module) was developed (step 4). Finally, plans for implementation and evaluation of the program (steps 5 and 6) were developed. This study resulted in a theory and practice-based self-management program, based on behavioural change theories, guideline-related evidence and practice-based knowledge, that fitted the needs of employees with CANS.

Chapter 5 describes how a Dutch-language version of the Stanford Presenteeism Scale (SPS-6), a measurement tool to assess presenteeism (which can occur in employees with CANS); also, one of the outcome measures of the RCT was developed, and the reliability, discriminant, discriminative and structural validity of the Dutch version of the SPS-6 (DSPS-6) was examined in a study population with musculoskeletal health problems. First, the original SPS-6 (English language) was translated and adapted to the Dutch culture. After that, thirty participants filled in the DSPS-6 at baseline (T₀) and after 5 days (T₁). Internal consistency (Cronbach's alpha), test-retest reliability (Spearman's correlation coefficient, Spearman's rho), item-to-total correlations, discriminant validity (association with job stress and job satisfaction; t-tests), discriminative validity (patients reporting a (work) disability compared with those indicating that they had no disability; Spearman's rho, t-tests), structural validity (Varimax rotation with Kaiser Normalization), and floor and ceiling effects were investigated. The DSPS-6 showed good reliability and structural validity, and the discriminative validity of the DSPS-6 was partly supported. However, the concept of presenteeism was not sufficiently distinctive from the constructs of job stress and job satisfaction (discriminant validity). The results of the present study showed that adaptation of the SPS-6 into Dutch was successful. Further research on the reliability, validity, and responsiveness of the DSPS-6 in a larger group of participants was recommended.

To evaluate the effectiveness of the self-management intervention (including an eHealth module) a RCT was designed. The design of the RCT, for which 142 participants were targeted to be recruited and randomised (with pre-stratification) to either the self-management group or usual care group, is described in **Chapter 6**. The self-management group participated in a self-management program consisting of six group sessions and an eHealth module. The group receiving usual care was allowed to use all the usual care available. The primary outcome of the study was

the self-reported disability of arm, shoulder, and hand, as measured with the Disabilities of the Arm, Shoulder and Hand questionnaire (DASH). Secondary outcomes included absenteeism, pain in the previous week, quality of life, catastrophising pain, self-efficacy, work style, presenteeism, fatigue, the use of usual care, and limitations experienced on the job. Data were collected at baseline and at 3, 6, and 12 months follow-up. A strength of the study was that the intervention is specifically tailored to match the needs of employees with CANS. The study also had some potential weaknesses (e.g. use of co-interventions, combination of group sessions and eHealth, self-reporting of data and possible contamination, Hawthorne effect, and recall or information bias) which are also discussed.

In the RCT that was designed, 123 patients with non-specific CANS could be randomly assigned to either the self-management group or usual care group. The results on the outcome measures evaluated at 3, 6 and 12 months are presented in **Chapter 7**. This is the first study to evaluate the effectiveness of a self-management program (including an eHealth module) in employees with non-specific CANS. On the general module of the DASH, no significant difference between self-management and the usual care group was detected. On the DASH work module the between-group effect was -3.82 (95% CI -7.46 to -0.19 , $p=0.04$), indicating that that self-management group had a 3.83 lower average score compared to the usual care group. However, the difference between the self-management group and the usual care group did not appear to be clinically important. For the question concerning the limitations experienced in job-related activities, the between-group effect measured at 12 months was -1.01 (95% CI -1.97 to -0.04 , $p=0.04$). The mean hours of sport activities in the last three months was 1.00 hours (95% CI -1.90 to -0.12 , $p=0.03$) less in the self-management group compared to the usual care group. None of the other outcomes measured showed a significant difference between the groups. It can be concluded that the self-management intervention improved participants' perceived disability during work and contributed to the improvement of self-management behaviour at work. However, because on most of the outcome measures no significant between-group differences were found, the results of this study should be interpreted with caution. Future studies should enhance the use of the eHealth module by placing more emphasis on it during the self-management sessions. The cost-effectiveness of the intervention should also be investigated. Finally, a longer follow-up period should be allowed in order to evaluate whether the results are more pronounced on the longer term, because most behavioural changes require a certain period of time.

Together with the RCT, a process evaluation with participants in the intervention group was planned to investigate whether the self-management program and program topics fitted the needs of employees with CANS. The results of the process evaluation, consisting of semi-structured interviews and questionnaires, are presented in **Chapter 8**. In this study, the first 31 consecutive participants of the intervention group of the RCT were interviewed shortly after

their last group session. All semi-structured interviews were guided by an interview guide and were audio-recorded. Data were analysed using qualitative data analysis by two authors, and the emerging themes were discussed. Participants reported that they liked the diversity of the program and benefitted from the interaction with others. The eHealth module, especially the section with the exercises, was generally experienced as positive. Participants obtained more knowledge and insight into their complaints and experienced an increased awareness, which contributed to the acceptance of and coping with the complaints. There was also some criticism; for example, about some parts of the program and the lack of a follow-up session. In general, participants were satisfied with the program; the intervention fitted the needs of employees with CANS. Almost all participants experienced a behavioural change. Many participants made changes at work and in their leisure time, whereas some felt that continuing their changed behaviour would be a challenge. Moreover, all participants in the intervention group were asked about their experiences (by means of a questionnaire) at 3 (n=58) and 12-month (n=53) follow-up. Participants were generally positive about the content of the self-management sessions and the capability of the moderators. For some of the participants, the intervention played a role in their considerations of whether to visit a physician or therapist, or in their considerations to ask for an ergonomic workplace investigation (although for most participants this was not the case). The intervention seemed to meet the needs and expectations of most participants. Moreover, many of the participants would recommend the intervention to colleagues and were able to apply in practice what they had learned during the intervention. More than half of the participants (mainly) agreed that the eHealth module was a good and useful addition to the sessions, and participants in the intervention group found that the level of support was generally high.

Chapter 9, the general discussion, addresses the role of self-management in healthcare, the results of our study (including a discussion on the primary outcome measure of the study), possible working mechanisms of the intervention, recommendations as to whether or not to implement the intervention, possible modifications to the program, the use of self-management in clinical practice, and some recommendations for future research. Although there is evidence that self-management support has added value compared to care as usual (improved outcomes and reduced costs), a substantial proportion of patients hardly respond to these interventions. The variance in effect size observed between the studies and patients indicates that 'one size does not fit all'. Evidence suggests that disease-specific self-management education, with professional involvement provided as part of routine healthcare, is more effective than generic self-management educational courses led by lay people. The self-management intervention presented in this thesis improved the perceived disability of participants during their work. However, on most other outcomes no clear improvement was visible. Floor effects, ceiling effects, regressive fallacy, and the fact that the usual care group may also have been triggered to change their behaviour could have influenced these results. We think that the effects found in this study are mainly due to

increased knowledge and self-management skills, and a reduction in barriers of the participants as a result of the intervention.

Although the self-management program was not effective on most outcome measures, the process evaluation allows to conclude that the intervention fulfilled the needs of employees with CANS and contributed to improvement of the perceived disability of participants during work. Therefore, implementation of the self-management program, with some modifications (better managing the expectations, addressing physical components, exercises and sports; including a follow-up session), seems valuable. Also, more facilitation of the use of the eHealth module is recommended. Moreover, (parts of) the self-management program can be used as an additional (eHealth) module in physical therapy practice. Self-management principles can also be used by physical therapists or other healthcare professionals to tailor their treatment to the needs of the individual patient and to actively involve the patient in the treatment of his/her condition.

Samenvatting

Werkgerelateerde musculoskeletale aandoeningen vormen een groot probleem en leiden vaak tot menselijk lijden, ziekteverzuim en een verminderde werkproductiviteit. Werkgerelateerde musculoskeletale aandoeningen zijn chronische musculoskeletale aandoeningen die veroorzaakt of verergerd worden door de arbeidsinhoud, (fysieke) arbeidsomstandigheden en/of werkgerelateerde psychosociale factoren, ofschoon andere activiteiten zoals huishoudelijke taken of sport en persoonlijke factoren ook een rol kunnen spelen. Zelfmanagement wordt meer en meer gebruikt om de eigen-effectiviteit en het gezondheidsgedrag bij mensen met chronische aandoeningen te verbeteren. Barlow e.a. (2002) definieerden zelfmanagement als *“de mogelijkheden om symptomen, behandelingen, lichamelijke en psychische consequenties en leefstijlveranderingen samenhangend met leven met een chronische aandoening te kunnen managen.”* Hoewel er verschillende zelfmanagement programma's voor mensen met musculoskeletale aandoeningen beschikbaar zijn, is er geen consistent bewijs voor de effectiviteit van deze programma's voor patiënten met chronische musculoskeletale klachten.

Klachten van de arm, nek en/of schouder (KANS) vormen een substantieel onderdeel van werkgerelateerde musculoskeletale aandoeningen. Gezien de behoefte aan effectieve interventies voor mensen met KANS en de multifactoriële (biopsychosociale) oorsprong van KANS zijn interventies met zowel een biomechanische als een psychosociale component aanbevolen. Zelfmanagement programma's die zowel fysieke als psychosociale kenmerken, alsmede de persoonlijke factoren van de individuele werknemer en de werkomgeving aanpakken, zouden nuttig kunnen zijn voor werknemers met KANS. Op dit moment bestaat er geen zelfmanagement programma voor werknemers met KANS.

Dit proefschrift beschrijft de systematische aanpassing van een bestaand zelfmanagement programma van Detaille et al. voor werknemers met een chronische somatische aandoening zodat het gebruikt kan worden voor werknemers met chronische, specifieke KANS. Om de effectiviteit van het ontwikkelde zelfmanagement programma (inclusief een eHealth module) te vergelijken met de gebruikelijke zorg, werd een gerandomiseerde gecontroleerde trial (RCT) ontworpen en uitgevoerd. De resultaten van deze RCT worden tevens in dit proefschrift beschreven.

Hoofdstuk 1, de algemene inleiding, geeft achtergrondinformatie over specifieke KANS en beschrijft de relevantie van zelfmanagement in de werkomgeving voor werknemers met KANS. Specifieke KANS kenmerkt zich door langer dan twee weken aanhoudende pijn, stijfheid tintelingen en/of doof gevoel in de nek, boven rug, armen en/of handen die gerelateerd zijn aan het werk en/of andere activiteiten en die niet verklaard kunnen worden door een bepaalde aandoening. Indien de klachten langer dan 12 weken aanwezig zijn spreekt men van chronische specifieke KANS. In dit hoofdstuk wordt beschreven dat werknemers met chronische specifieke KANS functioneringsproblemen (stoornissen, beperkingen in activiteiten en participatieproblemen) kun-

nen ondervinden. Aspecifieke KANS heeft een multifactoriële oorsprong en wordt beïnvloed door (werkgerelateerde) fysieke factoren, (werkgerelateerde) psychosociale factoren en persoonlijke factoren. Het belang van elke factor en de bijdrage aan het individuele risicoprofiel verschillen tussen individuen en werkomgevingen. Aangezien er een behoefte is aan effectieve interventies voor mensen met aspecifieke KANS, lijkt het ontwikkelen van een zelfmanagement programma (inclusief eHealth module) zinvol. Het overkoepelende doel van de interventie is gedefinieerd als 'het bevorderen van zelfmanagement gedrag op het werk', met als doel de ervaren functioneringsproblemen in de werkomgeving van de deelnemers te verbeteren. De eHealth module is gericht op het aanbieden van een aanvullende informatiebron over KANS, die tezamen met de persoonlijke actieplannen die gemaakt worden tijdens de bijeenkomsten, het mogelijk maakten de interventie aan te passen aan de behoefte van de individuele deelnemer.

In dit proefschrift komen de volgende onderzoeksvragen aan de orde:

- Welke problemen en behoeften komen er voor bij werknemers met KANS? (hoofdstuk 2)
- Wat is de mening van experts over de inhoud en strategieën van een zelfmanagement programma voor werknemers met KANS en wat zijn mogelijke belemmerende en bevorderende factoren? (hoofdstuk 3)
- Is het zelfmanagement programma voor mensen met een chronisch somatische aandoening, zoals ontwikkeld door Detaille e.a., een passende interventie om de ervaren problemen en behoeften van werknemers met chronische aspecifieke KANS aan te pakken en welke aanpassingen aan het programma zijn nodig om de originele interventie aan te passen aan de ervaren problemen en behoeften van werknemers met aspecifieke chronische KANS? (hoofdstuk 4)
- Wat is de betrouwbaarheid (in termen van test-hertest betrouwbaarheid, item-totaal correlatie en interne consistentie) en de discriminante, discriminatieve en structurele validiteit van de Nederlandse versie van de SPS-6 (een meetinstrument om presentisme te beoordelen) in een populatie met musculoskeletale aandoeningen? (hoofdstuk 5)
- Wat is het optimale studiedesign om de effectiviteit van een zelfmanagement programma (inclusief eHealth module) voor werknemers met chronische aspecifieke KANS (aanwezig > 3 maanden) te onderzoeken? (hoofdstuk 6)
- Wat is de effectiviteit van een zelfmanagement programma (inclusief eHealth), in vergelijking met gebruikelijke zorg, bij werknemers met aspecifieke chronische KANS (aanwezig > 3 maanden)? (hoofdstuk 7)
- Wat zijn de ervaringen van deelnemers aan een zelfmanagement programma voor werknemers met chronische aspecifieke KANS? (hoofdstuk 8)

Hoofdstuk 2 beschrijft de resultaten van een kwalitatieve studie bestaande uit drie focusgroepen bedoeld om de ervaren problemen van werknemers met KANS te identificeren. In totaal partici-

peerden 15 werknemers met KANS in deze studie. De resultaten lieten zien dat deelnemers onvoldoende inzicht hadden in de oorzaken van hun klachten en soms onvoldoende op de hoogte waren van de mogelijkheden om hun klachten te beïnvloeden en dat ze geen inzicht hadden in hun eigen rol bij het omgaan met de klachten. Over het algemeen hadden alle deelnemers last van pijn en hadden zij het gevoel dat ze niet adequaat met de pijn konden omgaan. Sommige deelnemers waren zich bewust van het feit dat zij moeite hadden met het in acht nemen van hun eigen grenzen (lichamelijk en geestelijk) en sommige deelnemers gaven aan dat zij vaak over hun eigen grenzen heen gaan omdat ze een drempel ervaren met betrekking tot het vragen om ondersteuning. Veel deelnemers gaven aan dat vermoeidheid een duidelijke invloed had op hun dagelijkse activiteiten en op het managen van hun klachten. Deelnemers vonden het soms ongemakkelijk om te gaan met verschillende versturende fysieke factoren (pijn, beperkingen, vermoeidheid), psychosociale factoren (stress, verstoorde balans werk/vrije tijd, communicatieproblemen, onbegrip van anderen), persoonlijke factoren (moeite met aangeven van grenzen, hoge drempel voor het vragen om ondersteuning en hoge persoonlijke normen en verwachtingen) en omgevingsfactoren (niet optimale werkplek, cultuur binnen de organisatie). De geïdentificeerde behoeften van de deelnemers waren onder andere meer informatie over de mogelijke oorzaken van KANS en mogelijke oplossingen in de vorm van behandelopties, beschikbare faciliteiten en (ontspannings) oefeningen. Zij wilden daarom ondersteuning bij het werken en omgaan met pijn, beperkingen, vermoeidheid, werkdruk en stress. Er waren vragen rond werk(plek) aanpassingen, werkstijl, het in acht nemen van grenzen en inschakelen van hulp en op welke wijze dit te communiceren met anderen. Al deze factoren zouden onderdeel moeten zijn van toekomstige interventies waarbij er handvatten worden verstrekt hoe actief met de vermelde factoren aan de slag te gaan. We concludeerden dat werknemers KANS hun klachten moeten leren beïnvloeden in het dagelijkse leven en tijdens het werk. Verschillende terugkerende problemen werden geïdentificeerd en de resultaten van het onderzoek onderschreven de multifactoriële oorsprong van KANS. Over het algemeen ervoeren de deelnemers dezelfde problemen als werknemers met andere soorten chronische aandoeningen. Deze problemen waren gerelateerd aan de aandoening, onvoldoende bewustzijn van de mogelijkheden om zelf de klachten te beïnvloeden en te managen, inadequate communicatie met leidinggeveneden en een gebrek aan relevante individuele aanpassingen op het werk (zowel werkplek als werkdruk).

Hoofdstuk 3 beschrijft de resultaten van een kwalitatieve studie bestaande uit drie focusgroepen met in totaal 17 experts. De experts hadden ervaring met KANS, zelfmanagement en/of eHealth interventies. Het doel van deze studie was om te bepalen of een zelfmanagement programma (inclusief een eHealth module) een realistische mogelijkheid zou zijn voor werknemers met KANS en om de inhoud van de interventie nader vast te stellen. De experts benadrukten dat een interventie bedoeld om inzicht te krijgen in KANS en om KANS te verminderen zich zou moeten richten op het vergroten van de eigen-effectiviteit en op empowerment van de werknemers. Volgens de

experts hebben werknemers met KANS moeite met het managen van hun gezondheidsprobleem en het zoeken naar balans in werk en privé. Inzicht, bewustzijn en gedragsverandering werden beschouwd als belangrijk voor werknemers met KANS. Volgens de experts kan het verstrekken en opdoen van kennis ook deel uitmaken van een zelfmanagement interventie. Een interventie kan ook deels bestaan uit het creëren van bewustzijn ten aanzien van mogelijke risicofactoren, het leren inschatten van signalen met betrekking tot risicofactoren en advies over hoe deelnemers deze risicofactoren zelf kunnen beïnvloeden. Sociale steun werd beschouwd als waardevol en experts gaven aan dat de combinatie van groepsbijeenkomsten en eHealth goed zou kunnen werken.

Hoofdstuk 4 beschrijft hoe de oorspronkelijke interventie van Detaille e.a. voor mensen met een chronisch somatische aandoening met behulp van het intervention mapping protocol werd aangepast aan onze doelpopulatie. Intervention mapping is een stapsgewijze benadering (bestaande uit zes stappen) voor het ontwikkelen en implementeren van interventies op basis van theorie en evidentie. Allereerst werd een behoefteanalyse uitgevoerd (stap 1 van het intervention mapping protocol), bestaande uit een review van de Nederlandse multidisciplinaire richtlijn voor specifieke KANS, focusgroepen met werknemers met KANS (beschreven in hoofdstuk 2) en focusgroepen met relevante experts (beschreven in hoofdstuk 3).

Na de behoefteanalyse werden de doelstelling van de interventie en de determinanten van zelfmanagement op het werk geformuleerd (stap 2). Gebaseerd op de behoefteanalyse werd het doel van de interventie gedefinieerd als 'zelfmanagement gedrag op het werk' met als doel dat de ervaren functioneringsproblemen van de deelnemers zouden verminderen. Zelfmanagement op het werk werd gedefinieerd als: 1) om kunnen omgaan met pijn, vermoeidheid, beperkingen, participatieproblemen en emotionele aspecten die het gevolg zijn van KANS; 2) zich bewust zijn van welke factoren op de werkplek stress veroorzaken en vervolgens leren adequaat om te gaan met werkstress door het werk aan te passen aan de eigen mogelijkheden; en 3) in staat zijn om effectief over de klachten te kunnen communiceren met leidinggevende en met collega's. Vervolgens werden op theorie gebaseerde methoden en strategieën geselecteerd (stap 3) en werd de interventie (zelfmanagement programma inclusief eHealth module) ontwikkeld (stap 4). Ten slotte werden plannen voor de implementatie en evaluatie (stap 5 en 6) ontwikkeld. Deze studie resulteerde in een practice-based zelfmanagement programma, gebaseerd op gedragsveranderingstheorieën, richtlijnen en evidence-based kennis, dat voldeed aan de behoeften van werknemers met chronische specifieke KANS.

Hoofdstuk 5 beschrijft hoe de Stanford Presenteïsm Scale (SPS-6) werd aangepast voor de Nederlandse situatie. De SPS-6 is een meetinstrument om presenteïsme (verminderde werkproductiviteit en kwaliteit) te beoordelen. Presenteïsme werd gezien als een relevante uitkomst bij

werknemers met KANS. Tevens werden de betrouwbaarheid en de discriminante, discriminatieve en structurele validiteit van de Nederlandse versie van de SPS-6 (DSPS-6) onderzocht in een populatie met musculoskeletale aandoeningen.

Eerst werd de originele Engelstalige versie van de SPS-6 vertaald en aangepast aan de Nederlandse cultuur (DSPS-6). Vervolgens vulden 30 deelnemers de DSPS-6 in op baseline en na vijf dagen. De interne consistentie (Cronbach's alpha), test-hertest betrouwbaarheid (Spearman's correlatie coëfficiënt, Spearman's rho), item-totaal correlatie, discriminante validiteit (associatie met werkstress en werk tevredenheid; t-tests), discriminatieve validiteit (patiënten die functioneringsproblemen op het werk rapporteerden vergeleken met patiënten die geen problemen rapporteerden; Spearman's rho, t-tests), structurele validiteit (Varimax rotatie met Kaiser normalisatie), en bodem- en plafond effecten werden onderzocht. De DSPS-6 liet een goede betrouwbaarheid en structurele validiteit zien. De discriminatieve validiteit van de DSPS-6 werd deels ondersteund. Het concept presenteeïsme werd echter onvoldoende onderscheiden van de constructen werkstress en werk (discriminante validiteit). De resultaten van deze studie toonden aan dat de aanpassing van de SPS-6 naar het Nederlands succesvol was. Verder onderzoek naar de betrouwbaarheid, validiteit en responsiviteit van de DSPS-6 in een grotere groep respondenten werd aanbevolen.

Om de effectiviteit van de zelfmanagement interventie (inclusief eHealth module) te evalueren werd een RCT ontworpen. De opzet van de RCT, waarin een zelfmanagement programma vergeleken werd met de gebruikelijke zorg, wordt beschreven in **hoofdstuk 6**. De zelfmanagementgroep participeerde in een zelfmanagement programma bestaande uit zes bijeenkomsten en kreeg toegang tot een eHealth module. Beide groepen hadden toegang tot de gebruikelijke zorg. De primaire uitkomstmaat van de studie was het zelfgerapporteerde functioneren van de arm, nek en/of schouder, gemeten met de Disabilities of the Arm, Shoulder and Hand vragenlijst (DASH). Secundaire uitkomsten maten waren onder andere absenteeïsme, presenteeïsme, pijn in de voorafgaande week, kwaliteit van leven, catastroferen van pijn, eigen-effectiviteit, werkstijl, vermoeidheid, het gebruik van gebruikelijke zorg en ervaren beperkingen tijdens het werk. De gegevens werden verzameld op baseline en na drie, zes en 12 maanden follow-up. Een sterk punt van de studie is dat de interventie specifiek is aangepast om tegemoet te komen aan de behoeften van werknemers met KANS. De studie had een aantal potentiële zwakte punten zoals bijvoorbeeld het gebruik van co-interventies (risico op het verminderen van het contrast), de combinatie van groepssessies en een eHealth module (niet duidelijk wat het effect is van de afzonderlijke elementen), het gebruik van zelfgerapporteerde gegevens (bias) en mogelijke contaminatie (contact tussen zelfmanagementgroep en gebruikelijke zorg groep), Hawthorne effect (effect van aandacht door het deelnemen aan de interventie), herinneringsbias en informatiebias bij het invullen van de vragenlijsten. Deze worden allen besproken worden in de discussiesectie van hoofdstuk 6.

In de RCT werden 123 werknemers met aspecifieke KANS at random toegewezen aan de zelfmanagement groep of de gebruikelijke zorg groep. De resultaten van de studie op de uitkomstmaten gemeten na 3, 6 en 12 maanden worden gepresenteerd in **hoofdstuk 7**. Dit is de eerste studie die de effectiviteit van een zelfmanagement programma (inclusief eHealth module) onderzocht heeft bij werknemers met chronische aspecifieke KANS. Op de algemene module van de DASH werd geen significant verschil gevonden tussen de zelfmanagementgroep en de gebruikelijke zorg groep.

Op de werkmodule van de DASH werd wel een significant effect tussen de groepen gevonden van -3.82 punten (95% CI -7.46 tot -0.19, $p=0.04$), hetgeen aangeeft dat de zelfmanagementgroep een 3.82 lagere gemiddelde score had dan de gebruikelijke zorg groep. Echter, het verschil tussen beide groepen was niet klinisch relevant. Voor de vraag aangaande de ervaren beperkingen in werkgerelateerde activiteiten was het effect tussen de groepen na 12 maanden -1.01 punten (95% CI -1.97 tot -0.04, $p=0.04$). Het gemiddelde aantal uren sportbeoefening in de afgelopen drie maanden was één uur (95% CI -1.90 tot -0.12, $p=0.03$) minder in de zelfmanagement groep in vergelijking met de gebruikelijke zorg groep. Geen van de overige uitkomstmaten verschilde significant tussen de groepen. Er kan geconcludeerd worden dat de zelfmanagement interventie de ervaren functioneringsproblemen van de deelnemers tijdens het werk verbeterde en bijdroeg aan de verbetering van het zelfmanagement gedrag op het werk. Echter, aangezien op de meeste uitkomstmaten geen significante verschillen tussen de groepen werden gevonden moeten de resultaten van deze studie met de nodige voorzichtigheid geïnterpreteerd worden. Het is aanbevelingswaardig om in toekomstige studies het gebruik van de eHealth module te verbeteren. De kosteneffectiviteit van de interventie dient ook onderzocht te worden. Ten slotte is een langere follow-up periode aanbevelingswaardig om zo te kunnen vaststellen of er meer uitgesproken resultaten gevonden worden op lange termijn, aangezien gedragsverandering veelal een langdurige tijdsperiode nodig heeft.

Er is eveneens een procesevaluatie uitgevoerd met de deelnemers van de interventiegroep om zo te onderzoeken in hoeverre de inhoud van het zelfmanagement programma voldeed aan de behoeften van werknemers met KANS. De resultaten van de procesevaluatie, bestaande uit semigestructureerd interviews en vragenlijsten worden in **hoofdstuk 8** gepresenteerd. In deze studie werden de eerste 31 achtereenvolgende deelnemers in de interventiegroep van de RCT geïnterviewd kort na hun laatste bijeenkomst. Alle semigestructureerde interviews werden afgenomen op basis van een interviewgids en werden opgenomen met audio apparatuur. Gegevens werden door twee auteurs geanalyseerd door middel van kwalitatieve data-analyse, waarna de geïdentificeerde thema's besproken werden. Deelnemers rapporteerden dat zij de diversiteit van het programma prettig vonden en dat zij wat hadden gehad aan de interactie met andere deelnemers. De eHealth module, met name het deel met de oefeningen, werd over het algemeen

ervaren als positief. Deelnemers verkregen meer kennis en inzicht in hun klachten en ervarden een verhoogd bewustzijn ten aanzien van hun klachten, hetgeen bijdroeg aan de acceptatie van en het omgaan met de klachten. Er waren ook kritiekpunten; men zou graag meer aandacht willen voor het fysieke aspect van de klachten en met zou graag een follow-up sessie willen. In het algemeen waren de deelnemers tevreden over het programma. De interventie voldeed aan de behoeften van werknemers met KANS. Vrijwel alle deelnemers ervarden een gedragsverandering. Veel deelnemers voerden wijzingen door op hun werk en in hun vrije tijd, hoewel sommige deelnemers het idee hadden dat het continueren van deze gedragsverandering in de toekomst een uitdaging zou zijn. Naast de interviews werden alle deelnemers in de interventietroep bevestigd over hun ervaringen door gebruik te maken van een vragenlijst bij drie (n=58) en zes maanden (n=53) follow-up. Deelnemers waren over het algemeen positief over de inhoud van de zelfmanagement sessies en de capaciteiten van de trainers. Bij sommige deelnemers had de interventie een rol gespeeld in hun overwegingen een arts of therapeut te consulteren, of een werkplekonderzoek aan te vragen. De interventie leek te voldoen aan de behoeften en verwachtingen van de meeste deelnemers. Bovendien zouden veel deelnemers de interventie aanbevelen aan collega's met KANS en gaven zij aan in staat te zijn om hetgeen zij tijdens de interventie geleerd hadden in de praktijk toe te passen. Meer dan de helft van de deelnemers was het er enigszins of helemaal mee eens dat de eHealth module een goede aanvulling was op de bijeenkomsten en de ervaren steun bij deelnemers in de interventiegroep was over het algemeen hoog.

Hoofdstuk 9, de algemene discussie, gaat over de rol van zelfmanagement in de gezondheidszorg, de resultaten van onze studie (inclusief een discussie over de primaire uitkomstmaat van de studie), mogelijke werkingsmechanismen van de interventie, aanbevelingen in hoeverre de interventie al dan niet te implementeren, mogelijke aanpassingen van het programma, de rol van zelfmanagement in de klinische praktijk en enkele aanbevelingen voor toekomstig onderzoek. Hoewel er aanwijzingen zijn dat zelfmanagement support een meerwaarde heeft ten opzichte van de gebruikelijke zorg (betere resultaten en lagere kosten), heeft een aanzienlijk deel van de patiënten nauwelijks baat bij dergelijke interventies. De variatie in effecten waargenomen tussen verschillende studies en tussen patiënten geeft aan dat 'one size does not fit all'. Er is evidentie dat aandoening specifieke zelfmanagement programma's, waarbij een professional betrokken is die onderdeel uitmaakt van de gebruikelijke gezondheidszorg, effectiever is in vergelijking met generieke zelfmanagement programma's geleid door coaches zonder achtergrond in de gezondheidszorg. De zelfmanagement interventie beschreven in dit proefschrift verbeterde de ervaren functioneringsproblemen van de deelnemers tijdens het werk. Echter, op de meeste uitkomstmaten werd geen duidelijke verbetering gevonden. Bodemeffecten, plafondeffecten, het natuurlijk beloop en het feit dat de groep die gebruikelijke zorg kreeg ook getriggerd is om haar gedrag te veranderen kunnen invloed hebben op de resultaten van dit onderzoek. Wij denken dat de effecten zoals die in deze studie gevonden zijn voornamelijk zijn toe te schrijven aan

toegenomen kennis en zelfmanagement vaardigheden en aan een vermindering van de ervaren barrières van de deelnemers als gevolg van het participeren in deze studie. Hoewel het zelfmanagement programma niet effectief was ten aanzien van de meeste uitkomstmaten, kan vanuit de procesevaluatie geconcludeerd worden dat de interventie voldeed aan de behoeften van de deelnemers en bijdroeg aan de verbetering ten aanzien van de ervaren functioneringsproblemen van de deelnemers tijdens het werk. Implementatie van het zelfmanagement programma, met enkele aanpassingen (beter managen van de verwachtingen, meer aandacht voor fysieke componenten, oefeningen en sport; toevoegen van een follow-up sessie), lijkt waardevol. Tevens dient het gebruik van de eHealth module te worden gestimuleerd. Beargumenteerd wordt dat (een deel van) het zelfmanagement programma gebruikt kan worden als een toegevoegde (eHealth) module in de fysiotherapiepraktijk. Zelfmanagementprincipes kunnen tevens gebruikt worden door fysiotherapeuten of andere gezondheidszorgprofessionals om zo hun behandeling aan te passen aan de behoeften van de individuele patiënt en de patiënt actief te betrekken bij de behandeling van zijn/haar aandoening.

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Curriculum vitae

Nathan Hutting werd geboren op 20 september 1980 in Nijmegen. Na het voortgezet onderwijs (Karel de Grote college, Nijmegen) begon hij in 1999 aan zijn studie fysiotherapie aan de Hogeschool van Utrecht. Na het behalen van zijn diploma in 2003 werkte hij als fysiotherapeut in de eerste lijn en startte hij datzelfde jaar met zijn opleiding manuele therapie aan de Vrije Universiteit Brussel, België. In 2008 behaalde hij cum laude de titel 'Master of Science in manual therapy'. Van 2005 tot heden is Nathan als maatschapslid verbonden aan Het Centrum Fysiotherapie & Manuele therapie in Rijen.

In december 2011 begon hij aan zijn promotieonderzoek getiteld 'Zelfmanagement en inzetbaarheid van werknemers met klachten van arm, nek en/of schouder; KANS duurzaam onder controle', een door ZonMw gesubsidieerd onderzoek. Het onderzoek werd uitgevoerd in een samenwerkingsverband tussen het Lectoraat Arbeid & Gezondheid van de Hogeschool van Arnhem en Nijmegen en IQ Healthcare van het Radboudumc in Nijmegen. Momenteel is hij, naast zijn werkzaamheden in zijn eigen praktijk, werkzaam als onderzoeker bij het Lectoraat Arbeid & Gezondheid. Daarnaast is hij bestuurslid van de Nederlandse Vereniging voor Manuele Therapie (NVMT).

Nathan woont samen met Jessie. Hij heeft een dochter, Maartje (2009).

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