

Activity related pain in patients with chronic musculoskeletal disorders

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Abstract

Purpose. Activity related pain may be a barrier to rehabilitation in patients with chronic musculoskeletal disorders. This study investigated patients' reports of increased pain during activity, and the association between such pain and psychological factors and pain variables.

Method. Questionnaires from 232 adults with chronic musculoskeletal pain measured pain intensity, spread of pain and pain duration. Pain during activity was assessed both on a 11 point Numeric Rating Scale (NRS), and operationalized as a dichotomous measure, where responders defined if they experienced pain during general activity and exercise. Psychological factors were measured by the Hopkins Symptom Check List 25, the Tampa Scale for Kinesiophobia and a subscale of the Arthritis Self – Efficacy Scale. Multiple and logistic regression was used to analyse associations between increased pain during activity and associated variables.

Results. Increased pain during activity was reported by 69 % of participants. Fear of movement was a significant factor for reporting increased pain during activity, both general activity and exercise, also in a subsample with low psychological distress. Other significant factors were spread of pain and a low sense of self efficacy.

Conclusion. Patients with high fear of movement, large spread of pain and low self efficacy were more likely to report increased pain during activity even in the absence of psychological distress.

Introduction

One of the most common treatment offers for musculoskeletal pain is exercise [1] and there is agreement that physical activity is important for the rehabilitation of patients with chronic musculoskeletal disorders [2;3]. However, according to clinical observations many patients with musculoskeletal pain report increased pain when exercising, or even in activities of daily life. In a study by Brox et al [4] pain during activity in a population of patients with low back pain (LBP) was reported significantly higher in subjects with chronic pain compared to subacute and healthy controls. Relations between physical exercise and musculoskeletal pain also seems to be affected by the mode of exercise/sport, and of factors like stress and work-related physical loading [5]. Increased pain after exercise is a well known phenomenon also among healthy people, known as DOMS (Delayed Onset Muscle Soreness), due to physiological reactions in the muscles [6]. However, we lack information about the prevalence of this pain problem in patients with chronic musculoskeletal disorders, as well as the characteristics of patients experiencing such pain.

The mechanisms behind increased pain during activity in patients with chronic musculoskeletal pain still remain, at least partly, unknown. Pain is a complex experience, and the perception of pain during exercise and physical activity in general may be related to several factors. The growing body of research in this area have revealed the impact of psychological and behavioural factors in chronic pain and disability [7-9]. Fear of movement / (re)-injury is one phenomenon within a theory of fear avoidance, and has in some studies been a predictor of pain-related disability and chronic pain [10;11]. The

essence is that pain is interpreted as a sign of danger, and consequently physical activity is avoided. However, the association between pain-related fear avoidance and functional, as well as exercise, capacity has not proven consistent [12-15]. While it is possible that fear of movement predicts pain-related disability, there is some evidence that a person's self-efficacy may mediate disability levels in patients with chronic musculoskeletal pain [16;17]. Self-efficacy refers to a person's beliefs about his or her own ability to manage situations and perform tasks [18]. Studies have shown that the level of self-efficacy on function and pain management is an important factor in pain disability and management, but the contribution of self-efficacy is not consistent [19;20].

Another important factor associated with chronic pain is psychological distress. It is known that psychological distress is elevated in individuals with chronic musculoskeletal disorders [21;22], but it is unclear how it associates with increased pain during activity in these populations. In the previously mentioned study by Brox JI et al [4], the level of psychological distress follows a stepwise increase from low level in healthy controls, to increasing levels in patients with subacute LBP and chronic LBP. Psychological distress seems to be conceptually related to fear of movement, as questionnaires assessing both these phenomena seem to reflect awareness of sensations from the body. It would thus be interesting to explore if fear of movement / (re)-injury is associated with activity-related pain also in patients with non-elevated levels of psychological distress. The result of this exploration could shed light on the eventual similarity or distinction between pain-related fear and general anxiety and somatisation in individuals with activity-related muscle pain.

The role of pain and fear of movement / (re)-injury, self-efficacy and psychological distress in predicting activity limitations and disability is an ongoing discussion. So far, research indicates that pain variables and psychological factors are strongly interrelated though the direction of relationship unrevealed [23-25]. However, less is known about the role of these factors in individuals' perception of increased pain during activity. Knowledge in this area could be useful for educational as well as exercise programs in rehabilitation of patients with chronic musculoskeletal disorders.

Hence, the aim of this study was a) to investigate the occurrence of increased pain during activity in patients with chronic muscular pain, and b) to explore the association between fear of movement, psychological distress, self-efficacy and pain related to general activity and exercise.

Methods

Inclusion

Data were from questionnaires distributed to outpatients at the University Hospital of Northern Norway, Department of Physical Medicine and Rehabilitation, Neck and Back unit in the period from October 2005 through October 2006. The unit receives patients referred from primary health-care with various musculoskeletal complaints (ICD 10 diagnosis M00-M99). In this period 549 eligible patients were referred. Patients completed the questionnaires including information about age, gender and education. The informed consent form was signed prior to the consultation. Inclusion criteria were first

time visit, understanding and speaking Norwegian language and age between 18 and 67 years. Patients with suspected malignant diseases stated in the referrals were excluded. Two hundred and sixty three subjects (48 %) met the inclusion criteria and consented to participate. Thirty one responders were later excluded due to incomplete questionnaires (two or more items missing in scales/ subscales), leaving data from 232 patients (42 %), mean age 42 (SD 10.0) years, to be entered into analysis.

The study was approved by the Regional ethical committee for medical research in Northern Norway.

Instruments

Pain intensity

Pain intensity was measured by a numeric rating scale (NRS) [26]. Patients were asked to mark on scales from 0 (no pain) to 10 (worst pain imaginable) how much average pain they had experienced during the latest week “at rest” and “during activity”. We asked for one score on each scale, without distinguishing different activities, in order to limit the response alternatives and thus make it easier for patients to score. In this way we hoped to get more accurate data and minimize recall bias [27]. Assessment of average pain during one week is a reliable estimate for how patients recall their fluctuating pain [28] and is commonly used in clinical studies [29].

Increased pain during activity

Increased pain during activity was assessed in two ways. One was by subtracting each subject's score on the NRS for 'pain at rest' NRS from the score for 'pain during activity' [30]. The presence or absence of pain on activity was operationalized by self reports where the responders answered "yes" or "no" to the question whether they experienced increased pain during general activity or exercise, in case they currently exercised or used to exercise.

Spread of pain

Spread of pain on a continuum was assessed by pain drawings from the validated Norwegian form of the McGill Pain Questionnaire [31]. On the drawing of the front and back of the body a total of 100 squares cover the whole body surface. The respondents are asked to shade the squares covering a painful area. Spread of pain can be measured in different ways, for example by counting painful sites [32] or by calculating the percentage of body surface marked by the patient as painful [33]. By counting shaded squares we could get quite an accurate measure of the pain distribution.

Pain location

Based on the clinical examination as well as the pain drawings the participants' pain locations were categorized as: neck / shoulder / arm pain, low back / leg pain and multiple pain sites.

Physical activity

The level of physical activity was assessed by a subscale of The Saltin and Grimby Physical Activity Questionnaire reflecting levels of leisure time physical activity. The questionnaire is validated for middle aged men [34] and has been widely used in different health related studies [35;36]. The questionnaire is easy to fill in. It has four response options, and respondents are asked to mark the best fitting expression from ‘totally disagree’ to ‘totally agree’. Only two respondents answered at level four, thus level 3 (high activity) and level 4 (very high activity) were collapsed for the analyses.

The Tampa scale of kinesiophobia (TSK)

TSK is a 13-item questionnaire aimed at assessing pain-related fear of movement / (re)-injury [8]. Each item is provided with a 4 points Likert scale with scoring alternatives ranging from ‘strongly disagree’ to ‘strongly agree’. The scores for the 13 items are summed, which gives a possible range from 13 - 52. The Norwegian form of the TSK has been found a valid and reliable instrument, with an internal consistency of 0.81 (Chronbac’s Alpha) and correlated to the Fear Avoidance Belief Questionnaire. A unidimensional underlying construct reflecting fear of movement/(re)-injury was found with Rasch Analyses [37-39].

Hopkins symptoms check list 25 (HSCL 25)

Psychological distress was assessed by the Norwegian form of Hopkins Symptom Check List, 25 questions version (HSCL 25) [40] the validated Norwegian version [41]. The questionnaire contains 25 questions comprising the dimensions of depression, anxiety and somatisation, and strong relationship between the dimensions have been confirmed

by Rasch analyses [42]. The items are scored on a 4 points Likert scale rating from ‘not at all’ to ‘very much’, summed and then divided by 25. The cut off score for HSCL is suggested to be 1.70, indicating psychological distress in subject with scores > 1.70 [41].

Arthritis self-efficacy scale (ASES) (the self-efficacy for pain subscale)

Self-efficacy was assessed by the subscale for pain in the Arthritis Self-Efficacy Scale, originally developed for patients with rheumatoid arthritis [43]. The instrument has been validated for a Swedish population [44] and a Norwegian version of the ASES self-efficacy for pain subscale has been used in several studies on back pain [4;19]. The scoring options for the self-efficacy for pain subscale were on a 6 level Likert scale ranging from ‘totally disagree’ (0) to ‘totally agree’ (6) with a possible raw score for each of the five questions from 0-6. The scores for the 5 items are summed and divided by 5, which gives a possible range from 0-6.

Data analyses

For statistical analyses, SPSS 15.0 was used. Data were first explored by descriptive statistics. In 20 % of the subjects, one item was missing in either HSCL 25, TSK or ASES. To preserve variance the missing items were substituted by the subjects mean score on subscales in the respective questionnaires [45]. Data on pain and psychological variables were normally distributed, and gender differences were explored with t-tests. Differences between different levels of physical activity and pain location areas were explored with one way ANOVA. In order to explore the occurrence and actual increase

of pain from rest to activity we subtracted each subject's score for 'Pain at rest' NRS from the score for 'pain during activity' NRS.

We explored the associated factors in a multiple regression analysis with "pain during activity" (NRS) as a dependent variable. The independent variables (educational level, pain location, pain duration, spread of pain, fear of movement/(re)-injury, emotional distress, self-efficacy and BMI) were first analyzed separately, and the significant factors were entered into a backward multiple regression analysis. Age and sex were added to the model as these are factors known to influence pain. Linearity and multicollinearity were checked.

We then analyzed the likelihood that participants would report pain during activity. The dependent variable was operationalized as dichotomous measures, where responders answered "yes" or "no" to questions whether they experienced increased pain during general activity and exercise. The questionnaires concerning pain related to general activity and exercise were answered and analyzed by 222 and 215 respondents, respectively. Logistic regression analysis (Backward Wald) was used. Pearson's correlations coefficient and linearity of the associations for the predictors were studied. Firstly, educational level, pain variables (pain location, pain duration and spread of pain), BMI and psychological factors (fear of movement/(re)-injury, emotional distress and self-efficacy) were analyzed in univariate analysis, including age and sex. Then the significant factors ($p < 0.05$) as well as age and sex were entered into a Backward Wald analysis. Logistic regression analyses were carried out in the whole study sample, and in a subgroup with scores on HSCL-25 indicating non elevated level of psychological distress (mean sum-score/25 < 1.70). A significance level was set at 0.05.

Results

Characteristics of participants

Thirty-one percent (n = 73) of the participants reported mainly neck / shoulder / arm pain, 47 % (n = 110) reported low back / leg pain, and 22% (n = 49) reported multiple pain sites. Seventy-five per cent (n = 176) of the participants had previously attended physical therapy including exercise. Fifty-two per cent of them reported short time relief while 40 % reported no relief. Descriptive data on demographics, Body Mass Index (BMI), leisure time physical activity, pain and psychological factors are presented in Table 1. There were no significant differences between participants (Table 1) and consenters with uncompleted questionnaires regarding age (42, SD 10), sex (50 % female) and education (primary school 13 %, vocational training 48 %, high school 14 % and university education 25 %). Compared to non-consenters, participants had a higher educational level and included more men (non-consenters were 76 % female), while there was no difference in age.

Psychological factors

Psychological distress, as evaluated by HSCL was elevated (≥ 1.70) in 51% of respondents (mean 2.14, SD 0.38), and was similar in men (mean 1.78, SD 0.50) and women (mean 1.78, SD 0.47). Self-efficacy was similar in men (mean 4.5, SD 2.1) and

women (mean 4.2, SD 1.6), while fear of movement/ (re)-injury was significantly higher in men (mean 32.1, SD 7.6) than in women (mean 28.4, SD 6.8) ($p < 0.05$).

The occurrence of activity related pain

The participants reported a significant increase in pain intensity (NRS) from rest to activity (1.6, SD 2.4), ($p < 0.001$). Pain at rest and pain during activity was positively correlated ($r = 0.56$, $p < 0.001$). Increased pain during activity (NRS) was reported by 69% ($n = 160$) of the respondents, at a mean value of 2.5 (SD 1.6). Among these 48 (30%) participants reported neck/arm pain, 79 (50%) reported low back / leg pain and 33 (20 %) reported multiple pain sites. In analyses of patients who reported increased pain intensity during activity (NRS) (69 %) compared to patients who reported no change or decrease in pain during activity (NRS) (31%), no group differences were reported with respect to sex, BMI, self-efficacy, emotional distress or fear of movement/(re)-injury. Age was significantly higher in patients who reported no change or decrease in pain during activity, compared to patients who reported increased pain intensity during activity.

Pain at rest was significantly higher in patients with multiple pain sites (mean 6.5, SD 2.3) than in patients with low back / leg pain (mean 5.4, SD 2.4, $p < 0.03$) while pain during activity (NRS) was reported similar across patients in different pain categories: Multiple pain sites (mean 7.6, SD 2.2), low back / leg pain (mean 7.2, SD 2.2) and neck/shoulder/arm pain (mean 7.0, SD 1.8). Pain during activity (NRS) was reported significantly lower among participants at the highest level of leisure time physical

activity (mean 6.25, SD 2.30) compared to participants at the moderate level (mean 7.3, SD 2.1, $p = 0.03$).

Increased pain during general activity (dichotomized variable) was reported by 66% of the participants. Seventy-five percent of them reported increased pain at activity also on the NRS, and the rest reported no change in pain from rest to activity (NRS).

Pain during activity

Pain during activity (NRS) was the dependent variable. Fear of movement/(re)-injury and pain at rest (NRS) remained in the final model (table 2), explaining 36 % of the variance in pain during activity (NRS).

Increased pain during general activity and exercise

The dichotomous variables asking for increased pain during general activity and exercise were dependent variables. The univariate logistic regression analysis showed that spread of pain, fear of movement / (re)-injury, psychological distress and self-efficacy were significantly associated with the likelihood of reporting pain during exercise and general activity. Pain at rest was significantly associated with the likelihood of reporting pain at general activity (OR 1.17, 95% CI 1.03 – 1.32, $p = 0.01$), but lost significance in a multivariate analysis.

As shown in table 3 fear of movement / (re)-injury emerged as significantly associated with the likelihood of reporting increased pain during general activity and

exercise in the final model. Spread of pain was more strongly associated to pain during general activity and self-efficacy more strongly associated to pain during exercise in this model (Table 3).

Associations in a sub group with non elevated level of psychological distress

As we were interested in the concurrent properties or differences between fear of movement/(re)-injury and psychological distress in predicting pain during general activity and exercise, these two variables were then tested in one model. In this model fear of movement / (re)-injury remained significantly associated with reporting increased pain during both exercise (OR 1.09, 95% CI 1.05 – 1.13, $p < 0.001$) and during general activity (OR 1.07, 95% CI 1.03 – 1.12, $p < 0.001$).

If fear of movement/(re)-injury were a construct significantly different from psychological distress, the result from our previous analyses with respect to fear of movement / (re)-injury would be replicated in a subgroup with non elevated levels of psychological distress ($n = 114$). The result from these analyses showed that fear of movement/(re)-injury remained a significant predictor in this subgroup for increased pain both during general activity ($p < 0.001$, OR 1.07, 95% CI 1.03 – 1.12) and exercise ($p < 0.001$, OR 1.08, 95% CI 1.03 – 1.13).

Discussion

Occurrence of increased pain during activity

This study appears to be the first to assess the incidence of increased pain during activity in a sample of patients with local and generalized muscle pain. As anticipated, the majority of the participants reported increased pain. However, two points are worth noting. First, 31 % of the population reported no change, or decreased pain intensity during activity. Second, the mean value of increased pain was fairly low; suggesting that some patients reported increased pain during activity as modest.

Associations between psychological factors, pain variables and increased pain during activity

Fear of movement / (re)- injury was the factor found to be associated with increased pain during activity across two different analysing methods. It is noteworthy that this was despite the fact that there were no differences on the TSK between participants reporting increased pain and those reporting no change or decreased pain during activity.

The role of fear of movement / (re)-injury in increased pain during activity may be of a mediating nature, meaning that fear increases the perceived pain [46]. As well, it is likely that increased pain increases fear and that fear and pain is mutually reinforcing. The likelihood of reporting pain during exercise increased with 8 % per unit in TSK. Participants in this study presented with a high level of fear of movement/(re)-injury, thus

we can assume that the clinical significance of fear of movement/(re)-injury concerned patients with high levels of such beliefs. However, fear of movement/(re)-injury has not proven stable as a predictor of pain and function, and may as well be a consequence of pain during activities [47]. As anticipated, psychological distress was correlated with fear of movement/(re)injury. The elevated level of psychological distress in this study sample is in concordance with other studies [4; 22]. However, our study did not reveal psychological distress as significantly associated to increased pain during activity. Fear of movement / (re)-injury remained significantly associated with the likelihood of reporting increased pain during activity also in a subgroup of subjects with a non elevated level of psychological distress. These results indicated that fear of movement / (re)-injury may develop regardless of an individual's level of distress and somatisation. Thus, fear of movement/(re)-injury seems to be a different construct than general anxiety and may as well reflect a rational behaviour to avoid painful movements. The sense of self-efficacy also had a modest, but significant role in predicting the likelihood of reporting pain during exercise. A lower sense of self-efficacy was significantly associated with reporting pain during exercise, which could indicate that the pain experience during exercise is of a different nature than the one of general activity. Fear of movement / (re)-injury and self-efficacy have emerged as important factors regarding function and disability, especially in patients with low back pain [48;49], and this study adds information about the contribution of these factors in perception of increased pain during activity. It is discussed whether some patients become disabled partly because of low self-efficacy beliefs; the person's doubt in own ability becomes a self-fulfilling prophecy [48]. The data in this study bring some support to the notion that trust in own ability to manage

pain influences a person's perceived pain and render it less threatening. However, less pain is also less threatening, and less pain during exercise may increase perceived control over pain and thus influence self-efficacy. In this perspective the association between the pain experience during exercise and perceived control over pain (pain self-efficacy) may also reflect how some patients continue to exercise despite pain. In a recent study, Mannerkorpi and associates found that patients associated physical activity with well-being and health, even if pain increased as a result of physical activity [50]. In some studies, the impact of psychological factors seems to vary across patients with different localizations of pain [51]. However, in the present study localization of pain was outweighed by fear of movement / (re)-injury in the prediction of pain during general activity and exercise.

Interestingly, multiple pain sites did not have an impact on reported pain on activity while spread of pain emerged as a significant factor for the likelihood of reporting pain during general activity. An 8 % increase for each unit in this case must be considered significant. It is known that having pain in one site enhances the risk of developing pain in other sites, indicating a spread of pain over time [52]. It is also known that patients with fibromyalgia report increased pain during physical activity, and it is suggested that the phenomenon is of the nature of altered central pain mechanisms [53]. The associations between widespread pain and increased pain during activity in patients with musculoskeletal disorders may as well reflect central sensitisation. In agreement with findings in this study, Bunketorp and colleagues found that pain location was not significant for pain disability, but the more widespread pain and the more negative

emotions connected to pain, the more it interferes with the person's ability to function in daily and recreational activities [17].

Clinical implications

Pain related to activity may be one of the reasons why patients stop exercising and decrease their activity. This study provides knowledge which will be valuable in clinical settings including patient education. Measuring and discussing increased pain during activity with patients seems to be of importance, to identify patients for whom this phenomenon is a significant problem. The level of self-efficacy and fear of movement / (re)-injury may serve as prognostic tools for the outcome of exercise based rehabilitation. Treatment including cognitive approaches to strengthen patients self-efficacy and lower fear of movement/(re)-injury, for example by cognitive behavioural therapy may be promising in some patients for whom this is a problem [10;54].

We also suggest a more targeted treatment based on the individual patient's problems and needs. Questions to be discussed with patients are: Is painful physical activity a problem? Is fear of movement / (re)-injury a problem? Is the pain problem local or widespread? A thorough clinical examination is necessary to rule out conditions where activity should be limited, like some acute injuries. Research within the field of fibromyalgia suggests that activity-related pain is of a different nature with respect to neuromuscular functioning than the chronic widespread pain [55]. Vollestad and Mengshoel conceptualize this type of pain as acute pain within a chronic pain course. This understanding of pain related to exercise should be considered in patient educational

programmes and patients should be informed about possible pain increase if exercising is part of rehabilitation. It will be helpful for patients to know about the nature of this pain, and be prepared for it. Unexpected pain during activity could provoke fear and focus on the pain, making patients restrict exercise [56].

Strengths and limitations

The strength in this study is that data are collected from a large number of patients, representing a broad spectrum of musculoskeletal disorders. All subjects regardless of pain localizations were included. A rationale for this approach was that coexistence of musculoskeletal pain from different locations is high [57] and pain is better represented on a continuum from localized pain to widespread pain [52]. This is supported by the present study, as spread of pain was significantly associated with increased pain during general activity and pain localization was not. For this reason, Natvig [57] recommends treating subjects with musculoskeletal pain as one sample in research, and this methodology is common in multiple regression models [58]. In addition, investigating subsamples with different pain sites, would have limited the possibility to test several factors in a multiple regression model, due to low numbers of subjects in each group [59].

The consent (48 %) and participation rate (43 %) limits the study. Another limitation is that participants had a higher educational level and included more men than non-consenters. This may have influenced the results, as fear of movement / (re)-injury was significantly higher in men and education is associated with muscle pain [60]. In line with this, a lower proportion of high school and university/college education was found

in our respondents than in the general population or the county of residence. However, the educational level in the present study is comparable with other studies with similar populations [61;62]. Another limitation is the assumption that pain perception during activity as well as pain-related fear of movement / (re)-injury is contextual. Social and cultural factors appear to be of significance [63;64] and previous exercise experiences and learning contribute to changes in the expectation of physical activity as dangerous and pain-provoking [10]. These issues were beyond the scope of the present study.

The use of a dichotomized variable asking participants to answer ‘yes’ or ‘no’ may be questionable, as it may lead the participants to answer ‘yes’. Methodological incongruence may also be reflected in the fact that the overlap between participants who confirmed the presence of increased pain during general activity and participants who scored increased pain on NRS was 70 %. Another possible explanation to this phenomenon is that patients’ experiences of increased pain during activity reflects more than the sensational experience of pain, and thus describe presence of pain despite that no increase in pain intensity (NRS) is reported. However, fear of movement/(re)-injury was the final associated factor found across two methods for assessing pain during activity, which we believe to strengthen the finding of this variable’s significance.

The design used in our study was cross-sectional, thus causal relationships cannot be determined. Our data was based on patients’ self-reports and the terms ‘exercise’ and ‘general activities’ as used here offered different interpretation possibilities. However, data on individual’s beliefs and perception of pain are only available through self-reports.

Conclusion

In this study increased pain during activity was reported by a majority of the participants. High levels of pain-related fear of movement / (re)-injury was associated with increased pain during activity, also among individuals with non-elevated levels of psychological distress. More widespread pain and a lower sense of self-efficacy were also factors associated to the likelihood of reporting increased pain during activity. To establish knowledge about causal relationship between behavioural factors, self efficacy and pain during activity longitudinal studies would be helpful.

Declaration of interest:

There are no conflicts of interest

Acknowledgements:

This project has been financed with the aid of EXTRA funds from the Norwegian Foundation for Health and Rehabilitation. The authors also would like to thank Dr. Tonje Braaten of ISM, University of Tromsø, for assistance with statistics.

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Table 1 Characteristics of participants (n = 232)

Background data	Study sample
Age (Mean, SD)	42 (10.0)
Sex (female) (n, %)	124 (53)
BMI (Mean, SD)	27.8 (16.7)
Education (n, %)	
- Primary school	46 (20)
- Vocational training	92 (40)
- High school	26 (12)
- College / university	65 (28)
Working status (n, %)	
- Working	64 (32)
- Sick leave < 12 weeks	12 (6)
- Sick leave 13-52 weeks	53 (27)
- Rehabilitation or disability pension	69 (35)
Leisure time physical activity (n, %)	
- Sedentary	32 (14)
- Moderate	169 (73)
- High / Very high	31 (13)
Pain duration (n, %)	
< 6 months	1 (0.4)
7-12 months	22 (10)
13-60 months	101 (47)
61-119 months	43 (20)
> 120 months	50 (23)
Pain intensity at rest (NRS) (Mean, SD)	5.6 (2.4)
Pain intensity on activity (NRS) (Mean, SD)	7.2 (2.4)
Spread of pain (squares on pain drawing, range 2 – 86) (Mean, SD)	16.5 (11.8)
Fear of movement , TSK (Mean, SD)	30.3 (11.9)
Psychological distress , HSCL 25 (Mean, SD)	1.79 (0.48)
Self-efficacy , ASES (Mean, SD)	4.3 (2.1)

Table 2. The relationship between the predictive factors and reported pain during activity (NRS) explored by multiple regression analyses. In the final model pain at rest (NRS) and fear of movement/ (re) injury remained significantly associated with reported pain during activity. P-values for adjusted B (CI) in the final model are provided.

	B	CI B	p	Adjusted B	CI Adjusted	Adjusted p
Educational level	- 27	0.50 – 0.60	0.01			
Pain Location	0.10	-0.25 – 0.45	0.58			
Duration of pain	0.24	- 0.05 – 0.52	0.10			
Spread of pain	0.25	0.00 – 0.48	0.03			
Body Mass Index	6.90	6.35 – 7.43	0.21			
Psychological Distress	1.28	0.66 – 1.77	0.001			
Self efficacy	- 0.05	- 0.08 – -0.03	<0.001			
Pain at rest	0.50	0.41 – 0.60	<0.001	0.48	0.40 – 0.58	<0.001
Fear of movement	0.70	0.34 – 0.10	<0.001	0.60	0.30 – 0.90	<0.001

Table 3. Logistic regression (Backward Wald) prediction for the likelihood of reporting increased pain during activity, given the influence of predictive factors. The final model with the odds ratio (with 95 % confidence intervals) for the likelihood for each factor and p –values are given.

Predictive Factors	Increased pain at general activity (n = 222)			Increased pain during exercise (n = 215)		
	OR	CI	p	OR	CI	p
Spread of pain	1.08	1.04 – 1.12	< 0.001	1.03	0.10 – 1.05	0.83
Self efficacy	0.98	0.94 – 1.01	0.18	0.95	0.92 – 0.98	< 0.001
Fear of movement	1.08	1.08 – 1.03	< 0.001	1.08	1.03- 1.29	< 0.001