# Do pain, function, range of motion, fear and distress differ according to symptom duration and work status in patients with low back pain? A cross-sectional study.

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## Abstract

**Background and objectives**

There is limited research on the relationship between commonly used outcome measures, pain duration and work status. The objective of this study was to examine this relationship in different groups of patients with low back pain (LBP).

**Methods**

This is a multicentre cross-sectional study. Patients with LBP (*n*=141) between 18 - 65 years were divided into groups according to pain duration and work status and compared: acute (<6 weeks), subacute (6-12 weeks), chronic (>12 weeks), on sick-leave versus working. Outcome measures: Pain intensity, function, lumbar mobility, fear avoidance beliefs, and mental distress.

**Results**

No differences were found in outcomes in relation to symptom duration, except for lumbar mobility in the acute group (-1.1 cm, *p*=0.007), and distress in the chronic group (0.2 points, *p*=0.004). Patients on sick-leave had overall significantly worse outcomes versus patients working. Fear avoidance had strongest association to sick-leave measured with correlation analysis (*r*=-.42). Fear avoidance, pain intensity and function discriminated best between those on sick-leave versus those working.

**Conclusion**

Pain, function and fear avoidance beliefs did not differ in patients with different durations of LBP, but lumbar mobility and distress did. Patients on sick-leave had worse symptoms, and fear, pain and function were associated to sick-leave.

Keywords*:* Cross-sectional study, low back pain, fear avoidance, distress, sick-leave

## Introduction

In all Nordic countries, Norway included, musculoskeletal disorders are the predominant cause of sick-leave and disability benefits, and low back pain (LBP) is the condition responsible for a major part of these expenses [1]. In Norway, costs due to productivity losses of LBP-related problems was yearly estimated to 13-15 billions NOK [2], although there has been a slight decrease from 2005 to 2015. In 2015 musculoskeletal disorders (MSD) contributed to 25.9% of non-fatal health loss in Norway in all age groups, and 53 % of MSD was due to LBP [3]. In spite of recent decades of research and calls for action in order to reduce the amount and costs of LBP patients, this is still a large problem. The reasons why these efforts seems inadequate are diverse and a question of debate [4]. Only a small proportion of patients with LBP have a well understood pathology, the majority is often considered to have no tissue specific nociceptive cause [5].

Updated clinical guidelines recommend a biopsychosocial framework in the understanding and treatment of this group of patients, including focus on patient education and early resumption of normal activities [6]. Recent studies [7] have shown associations between pain related fear and disability, emphasising the need for examination of both aspects, independent of time duration [8]. This requires increased use of various patient-reported outcome measures (PROMs). Examples of PROMs often used in LBP research and clinical work are Roland Morris Disability Questionnaire (RMDQ), Fear Avoidance Belief Questionnaire (FABQ) and Hopkins Symptom Checklist 25 [9]. These are all validated and well adopted PROMs and applicable in clinical practice, and they all measure issues that therapy may affect.

Because LBP is multifaceted and heterogeneous, many researchers claim that subgrouping these patients might be beneficial in order to offer better treatment. Fear avoidance beliefs are often referred to as a psychological factor useful in this subgrouping [10]. Some authors propose to categorize LBP patients into different types of avoiders. Some are for example misinformed avoiders who may need fear reducing information, others are pain avoiders who may need pain desensitization, whereas others are affective avoiders who may need fear desensitization [11].

Another way in subgrouping is to focus on symptom duration and work participation. There is limited research on whether there are differences in pain, function and lumbar mobility in persons with different duration of LBP. Duration can be categorized into acute (<6 weeks), subacute (>6-12 weeks), and chronic or persistent LBP (>12 weeks) [12]. Based on theories of neuroplasticity, changes in the peripheral and central nervous system provide nociceptive sensitization for persistent pain [13, 14]. One can ask whether the acute pain is less sensitized compared to chronic pain, and therefore expect differences in symptoms related to pain duration.

Furthermore, it is of interest to examine whether there is a difference in fear avoidance and distress in patients with different duration of LBP. Fear avoidance beliefs and mental distress have been found to be associated with persistent LBP [15]. A Norwegian study investigated the impact symptom duration had on pain, function mobility, fear and distress. One group of acute and one group of patients with chronic LBP symptoms were compared and they found a significantly higher score of fear avoidance and distress in the chronic group [8].

Examination of mobility is generally part of the clinical examination. Studies have shown that LBP can reduce mobility, especially in ventral flexion [16] [17]. Other studies suggest that some patients have increased mobility [18].

Another question is whether LBP-patients on sick-leave have stronger pain, greater disability, less lumbar range of motion and more fear and distress than LBP-patients still working. A person's ability to stay at work despite of an aggravated condition may differ, and whether to attend work or not may depend on several individual, social, economic, and/or cultural factors. One study examined 170 patients with acute, subacute and chronic LBP who all had declared themselves unable to work. The authors found that 53% were without clinical objective findings, and this proportion increased with increased periods of absenteeism. Among patients with more than 3 months of LBP, 70% were without objective clinical signs. On the other hand, they found an increased proportion of psychological and social problems among patients in the chronic group [19]. In contrast to these results, a cohort study consisting of 895 pregnant women with lower back and/or pelvic related pain, reported a significant correlation between pain, function, occupational stress and sick-leave [20]. Patients on sick-leave had stronger pain and lower functional status compared to patients still working. A cross-sectional study investigating health personnel with MSD (*n*=250), found that persons on sick-leave had significantly lower self-reported and tested function (less trunk flexibility and strength) compared to those working [21]. A randomized controlled trial with 12 months follow-up reported that in patients with chronic LBP (*n*=559) high fear avoidance beliefs were associated with continuous sick-leave one year after inclusion [10].

The main objective of this study was to examine if there is a difference in pain, function, lumbar mobility, fear avoidance and mental distress in patients with different durations of LBP and whether the mentioned symptoms are different in those on sick-leave versus those working. We also wanted to examine if the outcomes were associated to work participation and find the cut-off values that best discriminated between those on sick-leave and those working.

## Material and methods

### Design

This study was a multi-centre cross-sectional study that included patients with a non-specific lumbar spine disorder. One clinic was responsible for the study, but two other clinics were also involved in patient recruitment and testing. The participants received written as well as spoken information about the study, and the form had to be approved and signed prior to inclusion. The study was approved by the Norwegian Regional Ethics Committee, ref: 2015/1886/REK South-east A.

### Participants

Patients of working age (18-65 years) were recruited consecutively among persons with LBP who consulted one of the three selected manual-therapy clinics in Larvik municipality in the time-period 2016-2019. All participants with LBP were recruited at their first consultation and were allowed immediate admission. After they had given their written consent to attend, the participants were screened for eligibility and then tested by one of three manual therapists at one of the three different clinics. The manual therapists had 35 to 40 years of experience in the management of LBP disorders.

The definition of LBP and of pain duration was according to the Norwegian Dissemination Unit for Musculoskeletal Disorders as pain in the spinal area from the lower rib to the gluteal folds and thighs. The included persons were immediately categorized according to duration of their LBP: <6 weeks (acute), 6-12 weeks (subacute), and >12 weeks (chronic). Definitions of acute and subacute vary somewhat in literature [12]. The participants in the acute and subacute group should not have had symptoms prior to current pain the last 6 months and should not have visited the public health care because of LBP the last 6 months.

Patients with fractures, known cancer disease, known rheumatological or mental disorder, previous back surgery, pregnancy, progressing paresis, infections, poor Norwegian language, unemployed, on disability benefits and persons with ongoing insurance claims, were excluded.

**Outcome measures**

The participants first underwent an examination of their lumbar mobility measured by the modified Schobers test by one of the three manual therapists, and then filled in the self-reporting questionnaires via InfoPad software on Ipads. The registrations were only made once at the first consultation. Symptom duration were recorded based on patients' self-report and then categorized into acute, subacute and chronic phase. Therapists at the three different clinics had previously trained in the measurement of mobility to ensure high levels of inter-tester reliability.

The following measures were used:

*Pain:* Numeric Pain Rating Scale (NPRS) was used. NPRS is a 10 cm horizontal line with 11 numeric categories, where 0 is no pain and 10 is maximum imaginable pain [22]. NPRS was chosen because it is easy to use and is appropriate for tablet usage. Four pain scales were registered: 1) average pain last two weeks, 2) max pain last two weeks, 3) average pain last 24 hours, and 4) pain at the moment of registration. Non-specific LBP varies from one moment to another, and in order to avoid under- or overestimation of the patients pain we used all four scales as proposed by von Korff et al. and calculated the mean [22].

*Function:* Several self-reporting forms measuring overall function in daily activities exists [23]. In this study Roland Morris Disability Questionnaire (RMDQ) was used [24]. It is a PROM designed to assess physical disability due to LBP with 24 yes/no questions that relate to the extent to which LBP affect daily activities, and higher score reflects a higher level of impairment [9]. The minimum score is 0 and the maximum is 24.

*Lumbar mobility:* The modified Schober test (mSchober), a validated method for measurement of lumbar flexion, was used to estimate lumbar mobility [25] [26]. It was originally designed for measuring specific lumbar mobility and primarily as a diagnostic tool for ankylosing spondylitis, but has also been widely used as an outcome measure in LBP patients, both as a clinical and as a scientific instrument. mSchober measures lumbar mobility very locally and does not f.ex. take hamstring's flexibility into account, in contrast to finger-tip-to-floor [27]. Studies of the validity of mSchober differs; Macrae found a very high correlation (Pearson $r$=0.97) to X-rays [25], whereas other studies reported lower correlation ($r$=0.67). Both studies estimated the intra- and intertest-reliability as excellent. A study of lumbar mobility in patients with LBP and pelvic related pain concluded that mSchober was best suited for measuring isolated lumbar mobility [28].

The measurement is performed by marking a point on the sacrum at the height of spina iliaca posterior superior when the patient is in neutral upright position. Then a line is drawn 5 cm caudally, and a new point is marked. From there a tape (that follows the skin) measures 15 cm cranially, and a new mark is set. Then the person is asked to bend forward as far as possible and the distance between the caudal and cranial points is measured again. The difference between the two measurements is an indication of amount of flexion occurring in the lumbar spine [26]. Average normal mobility is estimated to 6.6 cm [28]. In this study the patients were allowed to repeat the movement twice to get used to the test. The second measurement was registered.

*Fear avoidance:* Degree of fear avoidance was measured with the Fear Avoidance Beliefs Questionnaire (FABQ) [8, 29]. It was developed based on the assumption that fear and avoidance behavior can influence patient's beliefs about how physical activity and work can affect their LBP. FABQ has 16 questions with statements about what may be possible causes and harmful conditions regarding back pain, and each question is graded on a scale from 0 to 6. The first five questions concern physical activity (FABQ-FA), and the last 11 are related to work (FABQ-A). The sub-scales are summarized separately, and then a total score is calculated. High scores of FABQ have been found to predict long-term sick-leave [30] [31].

*Emotional distress* was estimated using the Hopkins Symptom Checklist (HSCL25). The form consists of 25 questions that chart anxiety, depression and somatization. The patient's response is scored on a scale from 1 to 4, where 1=no symptoms and 4=very severe symptoms, and the average score is calculated [32]. The form indicates unspecific psychosomatic symptoms and distress and not necessarily a psychiatric diagnosis. An average score of >1.7 indicates a patient with a high level of distress and healthcare consumption [33].

*Occupational status* was self-reported and registered whether the participant was on sick-leave or working on the first visit, using a question about full-time job, part-time job, on sick-leave full-time or part-time, student, unemployed or receiving disability benefits, obtained from the 'National Clinical Guidelines regarding LBP with and without nerve root affection' [12]. Part-time sick-leave was in our study defined as sick-leave.

**Data analysis**

Registrations were transferred from InfoPad and processed in SPSS (version 25). To test the normal distribution of data, a Kolmogorov-Smirnov Test was done. As data was normally distributed parametric statistics could be used. To examine if the three groups with different duration of LBP had significantly different scores in the different measures, one way ANOVA with Bonferroni controlling for multiple comparison was used. When examining if the scores in those on sick-leave versus working were significantly different, independent t-test was used, reporting mean difference and 95% confidence level (CI). Statistical significance level was set at 5% ($p<0.05$).

In order to examine the associations between all outcome measures in all patients, a correlation analysis with Pearson's r was performed. When examining similar constructs and in reliability testing, correlations $r>0.70$ to 0.90 are usually considered high and >0.90 very high, ≥0.50 to 0.69 moderate, ≥ 0.26 to 0.49 low, and <0.25 representing little, if any correlation. However, when correlating different constructs such as pain and fear avoidance, lower coefficients can be defined when interpreting the strength of a relationship, i.e. $r\geq 0.50$ can be defined as strong, ≥0.30 to 0.49 moderate and 0.10 to 0.29 low [34, 35] [36]. The latter was used in interpretation of results in this study.

To examine which factors that were associated with being on sick-leave, a stepwise linear regression analysis was performed, using sick-leave as the dependent variable and multiple independent variables (gender, age, self-reported physical and mental function, and lumbar mobility). Variables not contributing significantly are automatically excluded in the first steps. In the final model, only those variables contributing significantly to sick-leave are maintained and presented as $R^2$. The coefficient $R^2$ is the square of the correlation coefficient *r*, and indicates the percentage of variance that is shared by two or more variables. Furthermore, to identify which measure that was most important to discriminate between those on sick-leave versus not, Receiving Operating Characteristic Curve (ROC) and Area Under the Curve (AUC) was used, with work status (not working=0) as reference line. The greater the AUC, the better the variable discriminates. The AUC must be >.50 in order to show an influence above chance. Cut-off values, based on sensitivity and specificity estimations, were found for all outcome measures.

No sample size calculation was done, but ≥40 in each group should be a sufficient number for an analysis with adequate statistical strength for this type of cross-sectional study [35].

## Results

Altogether 141 patients were included, 71 men and 70 women. Mean age for men was 46.9 (SD 11.6) years and 45.6 (SD 11.9) for women. Data was collected consecutively until there were 50 persons in the acute group, 40 in the subacute group and 51 in the chronic group. Background characteristics for gender, age and mean raw scores CI for different variables are listed in Table 1. There were no significant differences regarding number of men and women in any of the three groups. Mean age was higher in those with subacute LBP than in those with chronic LBP ($p$=0.03).

*Pain, function, lumbar mobility, fear avoidance and distress in three groups with LBP*

No differences were found between patients with acute, subacute and chronic LBP regarding pain, function or fear (Table 1). Mean lumbar mobility (mSchober) was significantly less in the acute group compared to the chronic group (4.6 cm, SD 1.6) ($p$=0.007). Furthermore, mental distress was significantly higher in the chronic group compared to those with acute LBP (1.6, SD 0.5) (*p*=0.004).

***Table 1** here*

*Comparing outcome measures between patients on sick-leave and patients working*

There were significant worse scores for patients on sick-leave (*n*=42) compared to those still working (*n*=99) regarding pain (*p*<0.001), function (*p*<0.001), fear avoidance (*p*<0.01) and distress (*p*<0.001) (Table 2).

***Table 2** here*

The correlation analysis between all outcome measures in the total sample of participants (*n*=141), including work status, demonstrated overall low to moderate correlations (*r*=.13 to .44). Lumbar mobility had a low, but significant association to function (*r* =-.28), but not to work, pain, fear or distress (Table 3).

***Table 3** here*

In the first step of the stepwise regression analysis, using work as dependent variable and the other outcomes as independent variables, lumbar mobility and distress were excluded together with age and gender, as these did not contribute significantly. In the final step, pain, function and fear avoidance contributed significantly to sick-leave, fear avoidance explained most of the variance ($R^2$ =.17) (Table 4).

***Table 4** here*

The ROC-analysis showed that FABQ discriminated best between those on sick-leave versus not (AUC=0.760), followed by pain intensity (AUC=0.735), function (AUC=0.722) and distress (AUC=0.649), as illustrated in Figure 1. Sensitivity and specificity values and cut-off scores are listed in Table 5. Lumbar mobility measured with modified Schober did not discriminate between those on sick-leave and those working (AUC=0.398).

***Figure 1*** *here:*

***Table 5*** *here:*

## Discussion

The objective of this study was to examine if there is a difference in pain, function, lumbar mobility, fear avoidance and mental distress in patients with different durations of LBP, and whether the mentioned outcomes are different in those on sick-leave versus those working. In our study, pain, function and fear avoidance scores showed no significant difference between the three groups categorised according to duration of LBP, suggesting that these outcomes are relatively stable over time. This result differs from the study of Grotle et al. [8] which compared acute and chronic LBP patients. In their study, a significant lower fear avoidance was present in the acute group than among patients with chronic LBP. On the other hand, Grotle et al. also found significant lower distress in the acute group compared to the chronic group. This corresponds to the findings in our study where emotional distress (HSCL25) was significantly worse in the chronic group compared to the acute group. These findings are supported in a review article that concluded that psychological distress was significantly higher in chronic LBP patients and was an increased risk of chronicity [15]. Long-term LBP may contribute to increased distress due to uncertainties, and long-lasting pain in itself can be mentally hard to cope with.

In our study, lumbar mobility was significantly more restricted only in the acute stage compared to patients in the chronic stage, and indicates that restricted lumbar mobility may be primarily a problem in the acute stage of LBP. Acute LBP may induce guarding movements and thus transitory restricted lumbar mobility, as patients with time may realise that more normal movements necessarily does not make a difference to their pain experience. In other words, they may have as much a coping factor as a biomechanical problem. Other studies has found restricted lumbar movement also in subacute and chronic LBP patients [37].

In our study, patients on sick-leave scored significantly poorer on all outcome measures, except for lumbar mobility, compared to patients still working (Table 2). These results correspond to findings in two studies [20, 21]. Both studies indicated that patients on sick-leave had significantly more pain, poorer function and higher emotional distress than persons with similar complaints still working. In a study of pregnant women with lower back and/or pelvic related pain, significant correlations were also reported between pain, function, occupational stress and sick-leave [20]. As mentioned earlier, a person's ability to stay at work despite of an aggravated condition depends on several factors. Some studies found that many patients sick-listed due to LBP had no clinical findings and this proportion increased along with increased periods of absenteeism. At the same time there was an increased proportion of psychological and social problems among chronic LBP patients [10, 19].

In our study the number of sick-listed patients (*n*=42) was smaller than those still working (*n*=99) and this may affect the conclusive power when comparing those working versus not. Although ≥40 in each group should be a sufficient number to get informative knowledge with adequate statistical strength about a sample, according to de Vet and co-authors [35], no sample size calculation prior to start of the study still weakens its statistical power.

The correlation analysis showed that fear avoidance beliefs were moderately associated with sick-leave in LBP patients, followed by pain and function which all had a significant association to sick-leave. Mental distress had a low correlation ($r$=.-22) although significant association to sick-leave (Table 3). These findings correspond with the trial of Trinderup and Fisker who concluded that high fear avoidance beliefs about work are associated with continuous sick-leave after one year [10]. In our material also the regression analysis showed that fear avoidance together with pain and function were associated with sick-leave, although they together only explained about 25% ($R^2$) of sick-leave, and fear alone explained

17% (table 4). We must bear in mind that the remaining 75% of the variability of sick-leave is due to variables not yet considered, and reminds us of the multidimensional aspects of becoming sick-listed. Interestingly, lumbar mobility had no association or influence on sick-leave in our study.

In this study, the area under the ROC curve showed that fear avoidance discriminated most between those on sick-leave versus working (Figure 1), with a cut-off value of FABQ of 23.5, indicating that scores above this increased the likelihood of being sick-listed (Table 5). A former study estimated cut-off values for work participation for the FABQ subscales Activity and Work to be >14 and >29 respectively [38]. A sum score of these two cut off values would give a mean score of 21.5.

Pain, function and mental distress also discriminated significantly between those on sick-leave versus working. Cut-off values were 4.4 (0-10) for NPRS and 10.5 for RMDQ. This corresponds well to characteristics in a recent systematic review, where visual analogue scale values (0-100) for participants with long-lasting LBP were between 36.9 and 48.9 and RMDQ-scores were between 8.3 and 13.8 (most were around 10.5) [39]. HSCL25 discriminated significantly between sick-leave and working, and our result corresponds to the result of a study of Ask where the median score of HSCL25 for fully sicklisted LBP patients was 1.45, although this did not discriminate significantly regarding those working [21]. For clinicians it may be helpful to know the cut-off values for commonly used outcome measures that indicate increased risk for becoming sick-listed. Patients at risk usually need a different treatment approach in order to better cope with their LBP and avoid chronicity.

This study is cross-sectional and therefore one can only investigate and compare the mean scores and the associations between the selected outcomes, and it says nothing about causality or the direction of an association. The duration of LBP may be caused by high mental distress, or prolonged symptoms may cause higher distress, and the poor outcome scores among sick-listed may as well be the result rather than the cause of sick-leave. Self-reporting forms might be questioned about the lack of control whether the participants fully understand the questions, or whether the sequence of questions may affect the answers. On the other hand, all forms used in this study are thoroughly validated and commonly in use in LBP research. The forms are applicable in a daily clinical setting, and they all measure issues/outcomes that can be affected by adequate therapy. We therefore chose to focus on these outcome measures in this study, well knowing that there are many other aspects which may influence symptoms in patients with LBP.

*Clinical implications*: The results of our study support arguments that fear avoidance beliefs are associated with work status, and mental distress is a factor that is associated with chronic LBP. These factors together with pain and function have to be emphasized in the treatment of LBP patients in all stages of symptom duration, both in order to hinder transition from the acute/subacute phase into the chronic phase, and as a factor in avoiding sick-leave. Clinicians should be aware and tailor their treatment accordingly when they meet patients with outcomes values above cut-off. The results are supported by recent research that indicate that contemporary LBP treatment has to contain patient pain education in order to reduce fear avoidance and distress [4], and the view that changing pain related knowledge in itself can reduce pain and improve function in LBP patients [40]. However, our findings may question the need for excessive focus on measurement of lumbar mobility, as this only was transitory, and with no measured difference whether patients were on sick-leave or working. Knowledge about cut-off values between those on sick-leave and working can be useful in clinical work.

Conclusion: In this study different duration of LBP was not associated to the outcome scores, except for lumbar mobility and mental distress. Patients on sick-leave had significantly worse self-reported fear, pain, function and distress, compared to those working.

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**Table 1.** Background characteristics in patients with acute, subacute and chronic low back pain (LBP). Comparison between groups with ANOVA. Mean raw scores and standard deviation (SD) are listed, and confidence interval (CI) for mean of all.

| | Acute LBP<br>*n*=50<br>Mean (SD) | Subacute LBP<br>*n*=40<br>Mean (SD) | Chronic LBP<br>*n*=51<br>Mean (SD) | ANOVA<br>p-value | 95% CI for<br>mean of all<br>*N*=141 |
|---|---|---|---|---|---|
| Men/women (n) | 23/27 | 19/21 | 29/22 | | |
| Age | 45.4 (10.5) | 50.3 (10.0)* | 43.9 (13.5) | 0.030 | 47.1 to 48.2 |
| Pain (NPRS) | 4.1 (1.2) | 4.3 (1.5) | 4.4 (2.0) | n.s. | 4.0 to 4.5 |
| Function (RMDQ) | 10.5 (4.6) | 9.8 (3.8) | 9.4 (4.6) | n.s. | 9.2 to 10.6 |
| Lumbar mobility (mScober) | 4.6 (1.6)** | 5.0 (1.6) | 5.7 (1.7) | 0.007 | 4.8 to 5.4 |
| Fear avoidance (FABQ) | 18.9 (11.8) | 25.0 (13.3) | 22.6 (13.4) | n.s. | 19.8 to 24.1 |
| Distress (HSCL25) | 1.4 (0.3) | 1.5 (0.4) | 1.6 (0.5)** | 0.004 | 1.4 to 1.6 |

*p<0.05, **p<0.01, difference between groups using one-way ANOVA with Bonferroni

**Table 2.** Comparing LBP patients categorized into sick-listed (*n*=42) versus those working (*n*=99) with independent t-test, listing mean raw scores, standard deviation (SD) and *p*-values of difference between the two groups and 95% confidence interval (CI)

| | Sick-listed<br>*n*=42<br>Mean (SD) | Working<br>*n*=99<br>Mean (SD) | *P*-value of difference between groups | Mean difference | 95% confidence interval of the difference |
|---|---|---|---|---|---|
| Men/women (n) | 23/19 | 48/51 | 0.499 | | |
| Age | 46.9 (12.0) | 44.8 (11.3) | 0.353 | -2.0 | -6.3 to 2.3 |
| Pain (NPRS) | 5.2 (1.7) | 3.9 (1.4) | <0.001*** | 1.4 | 0.8 to 1.9 |
| Function (RMDQ) | 12.4 (3.5) | 9.0 (4.6) | <0.001*** | 3.5 | 2.0 to 5.0 |
| Lumbar mobility (mSchober) | 4.7 (1.8) | 5.3 (1.6) | 0.052 | -0.6 | -1.2 to 0.01 |
| Fear avoidance (FABQ) | 30.2 (13.9) | 18.4 (10.9) | <0.001*** | 11.8 | 7.5 to 16.1 |
| Distress (HSCL25) | 1.6 (.4) | 1.4 (.4) | 0.01** | 0.2 | 0.1 to 0.3 |

*p<0.05, **p<0.01, ***p<0.001

**Table 3.** Correlations, measured by Pearsons *r,* between all outcome measures in all patients (*n*= 141)

| | Work | NPRSm | RMDQ | mSchober | FABQ | HSCL25 |
|---|---|---|---|---|---|---|
| Work | | -.39** | -.37** | .16 | -.42** | -.22* |
| NPRSm | | | .44** | .01 | .44** | .39** |
| RMDQ | | | | -.28** | .39** | .39** |
| mSchober | | | | | .13 | .15 |
| FABQ | | | | | | .40** |

* Correlation is significant at the 0.05 level, ** Correlation is significant at the 0.01 level

**Table 4.** Stepwise linear regression, using work as dependent variable and different outcome measures as independent variables, in patients with LBP (*n*=141), reporting intercept (constant), beta (B), R and $R^2$ and significant *p*-values*.

| | Intercept constant | B | R | $R^2$ |
|---|---|---|---|---|
| Model 1: FABQ | 1.025 | -.42 | .42 | .17*** |
| Model 2: FABQ<br>NPRS | 1.251 | -.30<br>-.26 | .48 | .23*** |
| Model 3: FABQ<br>NPRS,<br>RMDQ | 1.331 | -.26<br>-.20<br>-.18 | .50 | .25*** |

p***<0.001

Variables with p>0.05 are not listed

**Table 5.** Discriminative validity for the different outcome measures in patients with LBP comparing those working (n=99) versus those on sick-leave (n= 42), calculated with Receiver Operating Characteristic Area, listing Area Under the Curve (AUC), p-value, 95% confidence interval (CI), sensitivity and specificity, and cut-off value

| | AUC | Sign.b | 95% CI Lower - upper bound | Sensitivity | Specificity | Cut-off value |
|---|---|---|---|---|---|---|
| FABQ | .760 | .000 | .67-.85 | .69 | .71 | 23.5 |
| NPRS | .735 | .000 | .64-.87 | .69 | .63 | 4.4 |
| RMDQ | .722 | .000 | .63-.81 | .69 | .60 | 10.5 |
| HSCL25 | .646 | .006 | .55-.74 | .53 | .59 | 1.45 |
| Schobers | .398 | .057 | .29-.50 | .48 | .34 | 4.5 |

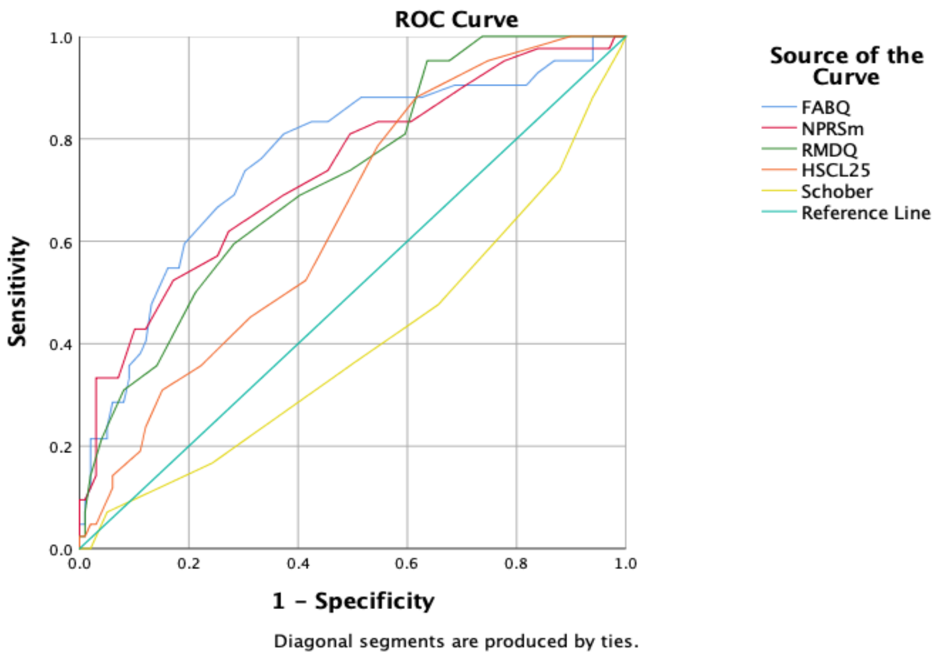


**Figure 1**. ROC curve analysis to examine the ability of the different outcome measures to discriminate between participants who were working (*n*=99) versus those who were on sick-leave (*n*=42). Work status (not working=0) was used as reference line.