Clinical Study

Catastrophization, fear of movement, anxiety, and depression are associated with persistent, severe low back pain and disability

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Abstract

BACKGROUND CONTEXT: Psychological characteristics are important in the development and progression of low back pain (LBP); however, their role in persistent, severe LBP is unclear.

PURPOSE: To investigate the relationship between catastrophization, depression, fear of movement, and anxiety and persistent, severe LBP, and disability.

STUDY DESIGN/ SETTING: One-year prospective cohort study.

PATIENT SAMPLE: Participants were selected from the SpineData registry (Denmark), which enrolls individuals with LBP of 2 to 12 months duration without radiculopathy and without satisfactory response to primary intervention.

OUTCOME MEASURES: Psychological characteristics, including catastrophization, depression, fear of movement, and anxiety, were examined at baseline using a validated screening questionnaire. Current, typical, and worst pain in the past 2 weeks were assessed by 11-point numeric rating scales and an average pain score was calculated. Disability was measured using the 23-item Roland-Morris Disability Questionnaire.

METHODS: Participants completed baseline questionnaires on initial presentation to the Spine Center (Middelfart, Denmark), and follow-up questionnaires were sent and returned electronically. Statistical analysis involved multivariable Poisson regression to investigate the association between psychological factors and the number of episodes of severe pain or disability. This study received no direct funding.

RESULTS: Of the 952 participants at baseline, 633 (63.4%) provided data 1 year later. Approximately half of the participants reported severe LBP (n=299, 47.2%, 95% confidence interval [CI] 43.3%−51.2%) or disability (n=315, 57.6%, 95% CI 53.3%−61.8%) at a minimum of one time point, and 14.9% (n=94, 95% CI 12.2%−17.9%) and 24.3% (n=133, 95% CI 20.8%−28.1%) experienced severe LBP or disability at two time points, respectively. Multivariable Poisson regression showed a relationship between catastrophization, depression, fear of movement, and anxiety and a greater number of time points with severe LBP and disability, after adjusting for age, gender, body mass index, and duration of symptoms. However, when all psychological factors were added to the regression model, only catastrophization and depression remained significantly associated.

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CONCLUSIONS: This study showed that persistent, severe LBP, and disability is common in a secondary care population with LBP and is associated with a variety of psychological risk factors, in particular catastrophization and depression, highlighting the importance of considering these factors in the design and evaluation of outcomes studies for LBP.   © 2020 Elsevier Inc. All rights reserved.

Introduction

Low back pain (LBP) is the most common cause of disability globally [1] and is associated with a huge socioeconomic burden [2]. Although cases of LBP tend to resolve within a few months, persistence and recurrence are common [2,3], and prior recurrence is a strong predictor of future episodes [4]. The severity of LBP and its associated disability also varies, with some people experiencing only mild discomfort and minimal limitation to their function, whereas others are highly disabled by severe pain, restricting their involvement in family, work, and social activities [2]. Moreover, health and social problems associated with persistent LBP become complex and include addiction to prescribed medications, such as opioids [5,6], and psychosocial issues, including depression and social isolation [7]. To develop effective treatment and prevention strategies, modifiable risk factors for persistent, severe LBP, and disability need to be identified.

LBP is conceptualized according to a biopsychosocial model [7] and it is widely accepted that psychological factors significantly contribute to an individual's experience of LBP. Systematic reviews have found catastrophizing and depression to be associated with worse outcomes from LBP and disability [8−11]; however, there is limited evidence to support a relationship between both anxiety and fear of movement and LBP [12−14]. Thus, evidence for an association between psychological factors and LBP is broadly accepted, but there is mixed evidence for specific, individual factors [7]. Furthermore, our understanding about the role of psychological factors in persistent cases of severe LBP and disability is limited.

This study aimed to determine whether the psychological factors of catastrophization, depression, fear of movement, and anxiety are associated with persistent, severe LBP, and disability. We hypothesized that all of the psychological characteristics would show an association with persistent, severe LBP, but that some factors may play a greater role.

Methods

Study participants and procedures

We conducted a nested cohort study within the Danish SpineData registry. Patients with LBP presenting for a new episode of care at the Spine Centre of Southern Denmark were enrolled in the registry unless they declined to participate. Of the 35,466 patients presenting to the center from January 2011 to July 2014, only 3,552 (10%) declined to be involved, resulting in 31,914 (90%) recruited to the registry. The administration and recruitment processes for the registry have been described in detail previously [15]. The Spine Center is a tertiary care facility and to be eligible for referral patients must have nonspecific LBP of 2 to 12 months duration and not report radiculopathy or satisfactory response to primary interventions. Serious pathology such as fracture, cancer, or infection is ruled out before presentation at the Spine Center. Patients at the Spine Center receive a variety of treatments, including both surgical management and conservative interventions, such as massage, physiotherapy, and chiropractic treatment, with many patients receiving more than one treatment. The current study included patients that presented between September 2013 and October 2014, completed the Spine-Data questionnaire at baseline and 1-year follow-up, and had a lumbar spine magnetic resonance image taken within 30 days of presentation. According to Danish law, the study did not require ethical approval from the Region of Southern Denmark Human Research Ethics Committee (HREC) (letter of exemption is available in Danish from the authors on request) and was exempt from ethical review by the Monash University HREC (Project number: CF15/3054 -2015001289). All patients provided written informed consent for the use of their data (Danish Data Protection Agency, doc.nr. 2008-58-0035-15/22513).

Measures

Data on age, gender, height (cm), and weight (kg) were collected at baseline. Body mass index (BMI, kg/m^2) was calculated from height and weight measurements. The onset of low back symptoms was reported by patients at baseline, and the date of the initial presentation to the Spine Center was also recorded. Symptom duration before presentation was calculated as the time from symptom onset to initial consultation. Participants were asked whether they had a previous history of spinal surgery for LBP, as well as several questions regarding their employment, including how they would rate their level of work satisfaction on a scale from 0 to 10 (with higher scores indicating greater work satisfaction).

Psychological factors

Participants responded to a brief seven-item, psychological screening questionnaire, with two items relating to each of catastrophization, fear of movement and depression, and one item to anxiety. The screening index was developed for the Spine Data registry and has been validated in Danish and Australian cohorts [16]. Each item consists of an 11-point Numeric Rating Scale (NRS, 0−10) on which participants indicate the extent to which a particular statement or question applies to them (Table 1). All psychological domain scores were dichotomized based on published, validated cut-off values (≥7/10 for catastrophization, fear of movement and depression, and ≥2/10 for anxiety) [16]. Participants were required to score above the cut-off values on both depression questions to have depression [16]. The two questions relating to catastrophization and fear-avoidance were each averaged to give a single score and these average scores were then dichotomized [16].

LBP intensity and disability

LBP intensity and disability were assessed at baseline and 1-year follow-up. Current, typical, and worst pain in the past 2 weeks were assessed by 11-point NRS (0−10) and the average score was calculated [17]. Average pain was dichotomized for each time point (ie, baseline and 1-year follow-up), with a score of ≥7/10 being considered severe [18], and participants were grouped according to whether they had severe pain at neither, one or both time points. Those participants with pain at two time points were considered to have persistent LBP.

Disability from LBP was assessed by the 23-item Danish language Roland-Morris Disability Questionnaire [19]. Baseline and follow-up scores were dichotomized with ≥14/23 being considered severe [20] and, similar to the pain scores, participants were grouped according to whether they had no severe disability, or severe disability at one time point or both time points (ie, persistent disability).

Statistical analysis

Participant characteristics were reported based on the number of time points at which participants reported

severe LBP or disability. To determine whether continuous variables were normally distributed, we visually inspected histograms of these data. Demographic, psychological, pain and disability data were compared between those who did and did not return for follow-up. Baseline values for age, BMI, average LBP intensity, and disability were compared using two-tailed, unpaired *t* tests, symptom duration, and work satisfaction were compared using a Kruskal-Wallis test, and gender proportion, history of spinal surgery for LBP, and psychological characteristics were examined using a chi-square test, and 95% confidence intervals were calculated. In addition, the same statistical tests were used to compare demographic, psychological, pain and disability variables between pain and disability groups.

Univariate and multivariable Poisson regression models were used to determine whether psychological variables were associated with the number of time points at which severe LBP and disability were reported. Two multivariable models were used, with the first adjusting for age, gender, BMI and symptom duration, and the second adjusting for age, gender, BMI, symptom duration and all other psychological variables. The distribution of symptom duration was skewed, so this variable was log transformed before use in the multivariable analyses. The same models were run using negative binomial regression to check for over dispersion, but the results were identical so Poisson regression was deemed appropriate.

Post hoc analyses

In addition to the primary analysis, we conducted subgroup analyses to explore whether the association between psychological factors and severe pain and disability differed between those with and without a history of spinal surgery for LBP, depression, and work dissatisfaction. History of spinal surgery was examined as a binary variable based on a simple yes/no response, depression was defined using the same method as in the primary analysis, and work satisfaction was dichotomized as low/high based on the median value for the cohort (2/10). Participant characteristics, including psychological domain scores and pain and disability levels, were presented for each subgroup and

Table 1
Validated screening questions for catastrophization, fear of movement, anxiety, and depression for individuals with chronic low back pain

Psychological domain	Items	Screening questions/statements*
Catastrophization	Catastrophization 1	When I feel pain, it's terrible and I feel it's never going to get any better.
	Catastrophization 2	When I feel pain, I feel I can't stand it anymore.
Fear of movement	Fear of movement 1	Physical activity might harm my back.
	Fear of movement 2	I should not do physical activities which (might) make my pain worse.
Anxiety	Anxiety	Do you feel anxious?
Depression	Depression 1	During the past month have you often been bothered by feeling down, depressed or hopeless?
	Depression 2	During the past month have you often been bothered by little interest or pleasure in doing things?

* Participants respond to the screening questions/statements on a 0 to 10 numeric rating scale with higher scores indicating a worse psychological status. Where psychological domains were formed from two items, the scores were averaged. All psychological domain scores were dichotomized for analysis, with a cut-off value of ≥7/10 used for catastrophization, fear of movement, and depression, and a cut-off value of ≥2/10 used for anxiety [16].

multivariable analyses were conducted using the multivariable model 1 described in the primary analysis.

Results

Of the 952 participants recruited at baseline, 633 (66.4%) provided data at 1-year follow-up. The cohort had a mean (±SD) age and BMI of 44.5±9.9 years and 26.9± 5.0 kg/m², respectively, and 54% were female. Participants who had complete baseline and follow-up data had a higher mean age (45.8±9.5 years vs 42.1±10.3 years, p<.01), higher mean baseline disability score (13.7±5.3 vs 12.5± 6.0, p<.01), shorter median (interquartile range [IQR]) symptom duration (0.65 [2.7] years vs 1.1 [4.3], p<.01), and a higher proportion were women (67.5% female vs 61.3% male, p<.05) than those that had incomplete data. However, there were no differences in the mean BMI (27.0±5.1 vs 26.7±4.7, p>.05), mean baseline pain score (5.9±2.2 vs 5.9±2.2, p>.05), median work satisfaction score (2 [3] vs 2 [3] p>.05), or proportion with a history of surgery for LBP (10.2% vs 8.0%, p>.05), or psychological characteristics (catastrophization 20.6% vs 16.9%, p>.05, fear of movement 21.0% vs 20.0%, p>.05, anxiety 74.6% vs 74.2%, p>.05 and depression 17.2% vs 20.2%, p>.05) between those with complete data and those without.

Participant characteristics based on the number of time points with severe LBP

Of the 633 participants, 334 (52.8%, 95% CI 48.8% −56.7%) did not have severe pain at either baseline or follow-up, 205 (32.4%, 95% CI 28.8%−36.2%) had severe pain at one time point, and 94 (14.9%, 95% CI 12.2% −17.9%) had severe pain at both time points (Table 2). There was no difference across pain groups in mean (±SD) age (no severe LBP 45.9±9.6 years, severe LBP at one time point 45.8±9.2, severe LBP at two time points 45.4± 9.8, p>.05), proportion of women (57.5%, 53.7%, 60.6%, p>.05), and median (IQR) work satisfaction (1[3], 2[4], 1 [5], p>.05), or symptom duration (median (IQR): 0.61 [1.9] years, 0.59 [2.6], 1.1 [4.7], p>.05). However, there were differences between the pain groups in mean (±SD) BMI (26.3±4.6 kg/m², 27.7 ±5.1, 28.1±6.3, p<.05), as well as a greater percentage of individuals with a previous history of surgery for LBP in those with severe pain at one and two time points (14.9%, 16.5%) compared with those with no severe LBP (5.5%; Table 2). In addition, there was an increasing percentage of individuals reporting catastrophization (6.7%, 23.6%, 39.8%), fear of movement (12.8%, 24.6%, 37.2%), anxiety (70.0%, 78.3%, 80.7%), and depression (10.0%, 27.4%, 42.5%) from those without severe LBP compared with those with severe LBP at two time points (Table 2, Fig. 1).

Relationship between psychological characteristics and the number of time points with severe LBP

Both univariate and multivariable analyses, with adjustment for age, gender, and BMI, symptom duration, showed that catastrophization, fear of movement, anxiety, and depression were positively associated with the number of time points with severe LBP (Table 3). The effect size was largest for catastrophization (multivariable 1: risk ratio [RR] 2.3, 95% CI 1.8−2.8, p<.01) and smallest for anxiety (RR 1.4, 95% CI 1.1−1.7, p=.02). When adjustment was added for all other psychological factors, the association remained significant for catastrophization (multivariable 2: RR 1.6, 95% CI 1.2−2.2, p<.01), fear of movement (RR 1.3, 95% CI 1.0−1.7, p=.03), and depression (RR 1.5, 95% CI 1.1−1.9, p≤.01, Table 3).

Table 2

Characteristics of participants who reported no, one, or two time points of severe low back pain at baseline and 1-year follow-up

	No severe low back pain	Severe low back pain at either baseline or follow-up	Severe low back pain at both baseline and follow-up
n (%)	334 (52.8)	205 (32.4)	94 (14.9)
Age (y), mean (SD)	45.9 (9.6)	45.8 (9.2)	45.4 (9.8)
Females, n (%)	192 (57.5)	110 (53.7)	57 (60.6)
BMI (kg/m²), mean (SD)	26.3 (4.6)	27.7 (5.1)	28.1 (6.3)
Symptom duration (y), median (IQR)	0.61 (1.9)	0.59 (2.6)	1.1 (4.7)
Previous history of surgery for LBP, n (%)	18 (5.5)	30 (14.9)	15 (16.5)
Work satisfaction, median (IQR)	1 (3)	2 (4)	1 (5)
Catastrophization, n (%)	22 (6.7)	47 (23.6)	35 (39.8)
Fear of movement, n (%)	42 (12.8)	48 (24.6)	32 (37.2)
Anxiety, n (%)	231 (70.0)	155 (78.3)	71 (80.7)
Depression, n (%)	33 (10.0)	54 (27.4)	37 (42.5)

LBP, low back pain; SD, standard deviation; BMI, body mass index; IQR, interquartile range.

Current, typical, and worst pain in the past 2 weeks were scored on the visual analogue scale (VAS). Average pain was calculated, with severe pain defined as an average score of ≥7/10 [18]. People were defined as having a positive screening test if they scored above ≥7/10 for catastrophization, fear of movement or depression, or ≥2/10 for anxiety, according to published criteria [16].
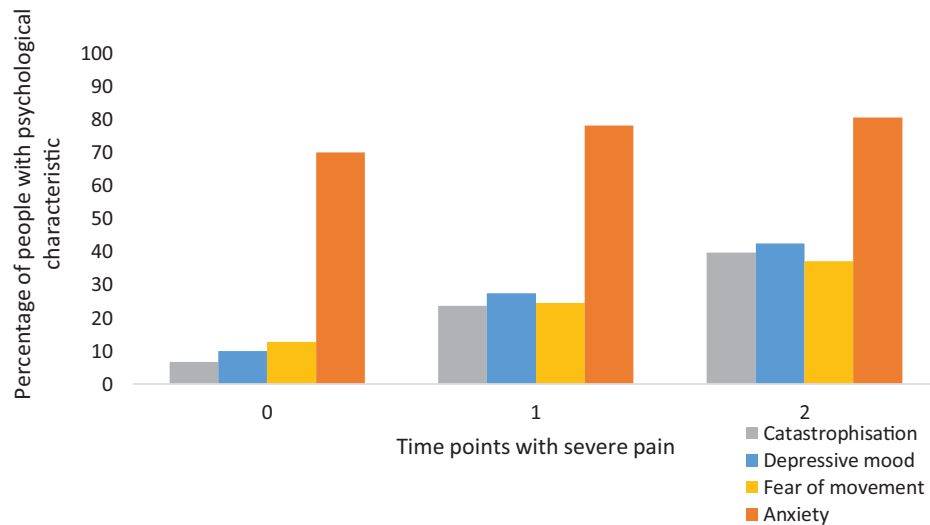
Fig. 1. The percentage of individuals with a positive screening test for each psychological factor across no, one or two time points of severe low back pain.

The participant characteristics of those with and without a history of spinal surgery for LBP, depression, and work dissatisfaction are presented in Supplementary Tables 1 to 3. When examining individuals who had a history of spinal surgery for LBP, multivariable analyses showed that the association between psychological factors and severe pain may be similar to those with no history of spinal surgery (Supplementary Table 4). This was with the exception of the results for anxiety, which suggested that those with a history of spinal surgery may have a higher risk of anxiety associated with severe pain (RR: 2.48, 95% CI 0.97, 6.36) compared with those with no surgical history (RR 1.24, 95% CI 0.95, 1.62). We found a similar result when we investigated individuals that reported depression. Although multivariable analyses suggested that the association between psychological factors and severe pain was similar between those with and without depression (Supplementary Table 6), the results indicated that those with depression may have a higher risk of anxiety associated with severe pain (RR 2.48, 95% CI 0.97, 6.36) than those without depression (RR 1.24, 95% CI 0.95, 1.62). These findings suggest that future studies should examine the role of anxiety either as a risk factor or outcome for severe pain in individuals with a history of surgery or depression.

Participant characteristics based on the number of time points with severe low back disability

Disability data were available for 547 participants at baseline and follow-up, of which 232 (42.4%, 95% CI 38.2%−46.7%) reported no severe disability, 182 (33.3%, 95% CI 29.3%−37.4%) experienced one time point with severe disability and 133 (24.3%, 95% CI 20.8%−28.1%) reported two time points with severe disability (Table 4). There was no difference across these groups in mean (±SD) age (no severe disability 45.1±10.2 years, one time point with severe disability 45.0±9.4, two time points with severe disability 47.4±8.7, p>.05), proportion of women (57.8%, 58.8%, 55.6%, p>.05) or median (IQR) work satisfaction (2[3], 2[3], 2[5] p>.05). However, mean BMI was significantly lower in those without severe disability than those with severe disability at one or two time points (25.5±4.0 kg/m², 28.1±5.2, 28.0±6.0, p<.05), and median (IQR) symptom duration was shorter in those with severe low back disability at one time point than both other categories (0.79 [2.4] years, 0.48 [1.6], 0.88 [4.1], p<.01). In addition, the percentage of individuals with a previous history of surgery for LBP was greater in those without severe disability at both time points (20.2%) compared with those with no severe disability (5.2%) and severe disability at one

Table 3

Poisson regression analyses examining the relationship between psychological factors and the number of time points with severe low back pain

	Univariate RR (95% CI)	p Value	Multivariable model 1 * RR (95% CI)	p Value	Multivariable model 2† RR (95% CI)	p Value
Catastrophization	2.23 (1.80, 2.78)	<.001	2.25 (1.81, 2.80)	<.001	1.63 (1.23, 2.15)	<.001
Fear of movement	1.75 (1.40, 2.20)	<.001	1.77 (1.40, 2.21)	<.001	1.31 (1.03, 1.68)	.031
Anxiety	1.34 (1.04, 1.72)	.021	1.35 (1.05, 1.74)	.020	1.09 (0.84, 1.42)	.52
Depression	2.07 (1.68, 2.57)	<.001	2.07 (1.68, 2.57)	<.001	1.47 (1.13, 1.94)	<.001

RR, risk ratio; 95% CI, 95% confidence interval.
* Multivariable model 1 adjusted for age, gender, body mass index, and symptom duration.
† Multivariable model 2 adjusted for age, gender, body mass index, symptom duration and all other psychological factors.

Table 4
Characteristics of participants who reported no, one, or two time points of severe low back disability at baseline and 1-year follow-up

	No severe disability	Severe low back disability at either baseline or follow-up	Severe low back disability at both baseline and follow-up
n (%)	232 (42.4%)	182 (33.3%)	133 (24.3%)
Age (y), mean (SD)	45.1 (10.2)	45.0 (9.4)	47.4 (8.7)
Females, n (%)	134 (57.8)	107 (58.8)	74 (55.6)
BMI (kg/m^2), mean (SD)	25.5 (4.0)	28.1 (5.2)	28.0 (6.0)
Symptom duration (y), median (IQR)	0.79 (2.4)	0.48 (1.6)	0.88 (4.2)
Previous history of surgery for LBP, n (%)	12 (5.2)	17 (9.4)	26 (20.2)
Work satisfaction, median (IQR)	2 (3)	2 (3)	2 (5)
Catastrophization, n (%)	8 (3.5)	34 (18.7)	48 (36.4)
Fear of movement, n (%)	24 (10.5)	37 (20.4)	39 (30.0)
Anxiety, n (%)	154 (66.4)	143 (78.6)	106 (80.9)
Depression, n (%)	14 (6.1)	46 (25.4)	48 (36.4)

LBP, low back pain; SD, standard deviation; BMI, body mass index; IQR, interquartile range.

Disability was assessed on the 23-item Danish language RMDQ. Severe disability was defined as a score of ≥14/23 [20]. Individuals were defined as having a positive screening test if they scored above ≥7/10 for catastrophization, fear of movement, or depression, or ≥2/10 for anxiety, according to published criteria [16].

time point (9.4%). The percentage of individuals with catastrophization (3.5%, 18.7%, 36.4%), fear of movement (10.5%, 20.4%, 30.0%), anxiety (66.4%, 78.6%, 80.9%), and depression (6.1%, 25.4, 36.4%) increased from those without severe disability to those with severe disability at both time points (Table 4 and Fig. 2).

Relationship between psychological factors and the number of time points with severe low back disability

There was an association between all psychological characteristics and the number of time points with severe disability in both univariate and multivariable analysis, after adjusting for age, gender, BMI, and symptom duration

(Table 5). Similar to the results for severe LBP, the effect size was largest for catastrophization (multivariable 1: RR 2.2, 95% CI 1.8−2.7, p<.01) and smallest for anxiety (RR 1.5, 95% CI 1.2−1.9, p<.01). In the second multivariable analysis, which adjusted for all psychological factors as well as age, gender, BMI, and symptom duration, the association between both catastrophization and depression, and severe disability from LBP remained significant (catastrophization RR 1.7, 95% CI 1.3−2.2, p<.01; depression RR 1.3, 95% CI 1.0−1.7, p=.02).

When examining individuals who had a history of spinal surgery for LBP, multivariable analyses showed that the association between psychological factors and severe disability is similar to those without a history of spinal surgery
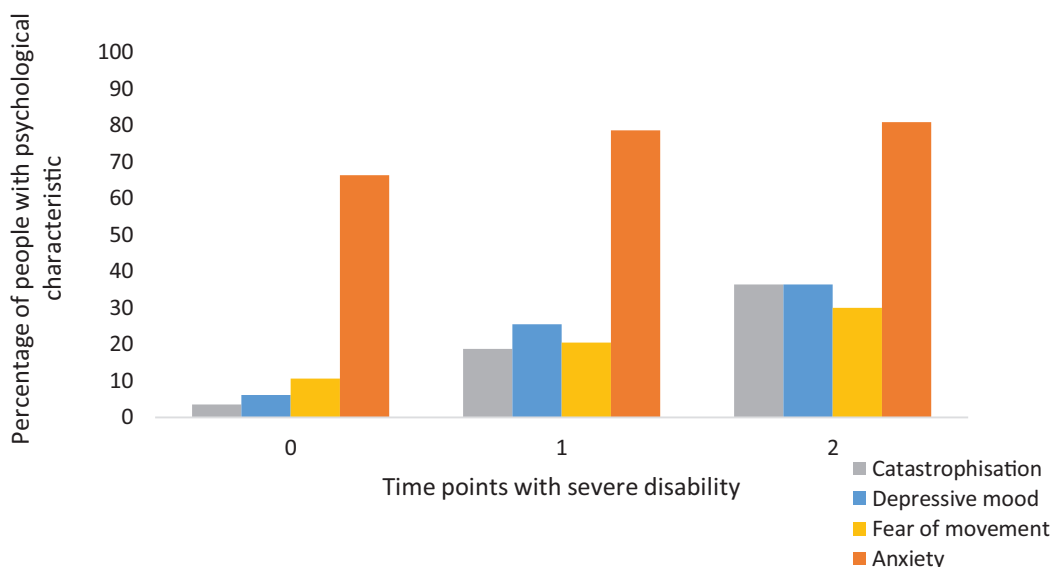

Fig. 2. The percentage of individuals with a positive screening test for each psychological factor across no, one or two time points of severe low back disability.

Table 5
Poisson regression analyses examining the relationship between psychological factors and the number of time points with severe low back disability

	Univariate RR (95% CI)	p Value	Multivariable model 1 * RR (95% CI)	p Value	Multivariable model 2[†] RR (95% CI)	p Value
Catastrophization	2.08 (1.69, 2.55)	<.001	2.18 (1.77, 2.68)	<.001	1.69 (1.31, 2.19)	<.001
Fear of movement	1.55 (1.25, 1.92)	<.001	1.56 (1.25, 1.94)	<.001	1.19 (0.94, 1.50)	.15
Anxiety	1.41 (1.11, 1.77)	<.001	1.50 (1.18, 1.90)	<.001	1.26 (0.99, 1.62)	.06
Depression	1.89 (1.55, 2.30)	<.001	1.92 (1.57, 2.35)	<.001	1.34 (1.04, 1.72)	.02

RR, risk ratio; 95% CI, 95% confidence interval.
* Multivariable model 1 adjusted for age, gender, body mass index, and symptom duration.
† Multivariable model 2 adjusted for age, gender, body mass index, symptom duration, and all other psychological factors.

(Supplementary Table 5). This was also the case when we investigated individuals who reported depression, with the association between psychological factors and severe disability similar in those with and without depression (Supplementary Table 7).

Discussion

This 1-year, prospective cohort study found that catastrophization, fear of movement, depression, and anxiety were associated with persistent, severe LBP, and disability, after adjusting for age, gender, BMI, and symptom duration. Furthermore, after adjusting for all of the psychological factors, only catastrophization and depression remained significantly associated with reporting persistent, severe LBP, and disability. These findings suggest that a variety of psychological characteristics are risk factors for severe LBP and disability, but that catastrophization and depression are particularly important in high levels of persistent, severe pain, and disability, highlighting the need to consider these factors when examining outcome studies for LBP.

This study found almost half of the participants reported severe LBP (47.3%) or disability (57.6%), with 14.9% and 24.3% experiencing persistent, severe LBP, or disability, respectively. These data highlight that not only are high levels of pain and disability common in a secondary care population with LBP of at least 2 months duration, but that persistence of severe pain and disability is also a major problem. This is consistent with previous data which indicate that 35% of people with varying levels of LBP report persistence of their pain [3], and that previous episodes of LBP have been found to be the most consistent predictor of future episodes [21]. Moreover, it is recognized that persistent LBP is complex and can affect all aspects of an individual's life, including their family, social and work activities, which in turn can lead to psychosocial issues and reliance on addictive medications [5−7]. We found that of those individuals with severe, persistent LBP, 39.8% reported catastrophizing, 37.2% experienced fear of movement, and 80.2% and 42.5% suffered from anxiety and depression, respectively. The significant proportion of psychological comorbidities identified in this cohort highlights the need to consider a biopsychosocial approach to management of severe, persistent LBP in these individuals.

A range of different psychological factors, including catastrophization, fear of movement, anxiety, and depression, were found to be important risk factors for persistent, severe LBP, and disability. However, only catastrophization and depression were found to be independently associated with both severe LBP and disability. People who catastrophize were found to have 1.6 and 1.7 times the average number of time points with severe LBP and disability respectively, and depressed individuals had 1.5 and 1.3 times the average number of time points with severe pain and disability. Although these findings are consistent with systematic reviews which have found both catastrophizing [11] and depression to be associated with LBP [8−10], the reviews did not specifically examine the severity of the pain, or the relationship of these factors with disability. Moreover, there is a lack of longitudinal studies in the field [9], and limited use of validated cut-off values to ensure that meaningful levels of these psychological factors are examined [11]. The current study was longitudinal, used validated screening questions and cut-off values for all psychological factors, and investigated both severe pain and disability. The study findings show an association between psychological factors and the primary outcomes of LBP and disability and highlight the importance of considering these factors when designing and evaluating outcomes studies.

The current study did not find clear evidence for an association between fear of movement or anxiety and the number of time points with severe LBP and disability, when adjustment was included for other psychological variables. This is consistent with systematic reviews which have found no evidence for an association between fear avoidance and measures of LBP and disability [13,14], and only an association with return to work outcomes in people with subacute LBP (defined as 4−12 weeks [13] and 6−12 weeks [14]), not chronic LBP (>12 weeks in both reviews). Similarly, a systematic review found that anxiety is not prognostic for LBP [12] and while a subsequent longitudinal study did find a combined depression/anxiety variable to predict more severe LBP and disability, it also tested the two variables individually finding no effects for anxiety [22]. Taken together, these results suggest that fear of movement and anxiety may play a key role in the early, subacute phases when beliefs guide the course of LBP and there is a risk of persistence, but may not be as important in

the later stages when the condition has become persistent, beliefs about LBP have been solidified and there is an understanding about the effect of activity on pain.

There is growing evidence to indicate that interventions, such as behavioral treatment, targeted at psychological factors are effective in the management of chronic LBP. Behavioral treatment, also referred to as cognitive behavioral treatment, is based on a multidimensional model of pain that includes physical, affective, cognitive, and behavioral components, and involves education about pain, how to identify pain-aggravating situations, the influence of thoughts and behavior, and role of coping strategies and relaxation and breathing on pain [23]. A recent systematic review for the American College of Physicians reaffirmed the results of an earlier Cochrane systematic review, which reported that behavioral treatments for LBP, including operant, respondent and cognitive behavioral therapy, are effective in reducing pain intensity, and respondent therapy is effective in reducing disability compared with usual care [23,24]. However, although these treatments were found to be effective for chronic LBP and disability compared with usual care in the short term (<6 months post-treatment), this was not the case over the intermediate to longer term [23], resulting in recommendations for a greater understanding of the psychological factors that have the strongest influence on a patient's experience of LBP. Moreover, the lack of evidence for behavioral treatments over the longer term may result from chronic, nonspecific LBP being considered a single entity, rather than a complex heterogeneous condition, in which only specific patient phenotypes with psychological comorbidities require behavioral treatment. We found catastrophization and depression to be independently associated with persistent, severe LBP, and disability in individuals with LBP in secondary care. These findings highlight the exciting potential for future studies to examine psychological outcomes throughout the treatment course to determine if early treatment of pain prevents the development of psychological problems, and conversely, if early treatment of psychological factors assists in resolving back pain in certain patient phenotypes.

A potential limitation of this study is the modest number of participants with data available at both baseline and follow-up (n=633, 66.4%). However, when baseline demographic characteristics were compared between those with and without outcome data at follow-up, there was no significant difference in patient characteristics, such as BMI, pain levels, history of spinal surgery for LBP, and psychological characteristics. Although we recruited individuals with LBP of 2 to 12 months duration, which includes patients with subacute and chronic LBP who are considered to have differing clinical courses and predictors of outcome, there is growing evidence from systematic review and large cohort studies to suggest that this is not the case [7]. A key strength of this study was its design: a large, prospective, cohort study with a 1-year follow-up of individuals with LBP. We used validated, clinically relevant measures, including the average of three NRS scales for pain intensity, the Roland-Morris Disability Questionnaire for low back-related disability and a screening questionnaire to assess psychological factors. In addition, we adjusted regression models for all psychological factors to determine the independent relationship of individual psychological factors with the number of episodes of severe LBP and disability.

Conclusions

This study showed that persistent, severe LBP, and disability are common in a secondary care population with LBP and are associated with a variety of psychological risk factors, in particular catastrophization and depression, highlighting the importance of considering these factors when designing and evaluating outcome studies for LBP.

Supplementary materials

Supplementary material associated with this article can be found in the online version at https://doi.org/10.1016/j.spinee.2020.02.002.

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