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Illness perceptions as an independent predictor of chronic low back pain and pain-related disability: a prospective cohort study

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Abstract

Objectives To investigate whether illness perceptions, measured with the Brief Illness Perception Questionnaire, are an independent predictor of chronic low back pain and pain-related disability at 12 weeks.
Design A prospective, observational cohort study.
Setting 26 outpatient primary care physiotherapy practices throughout the Netherlands.
Participants Acute nonspecific low back pain patients between the age of 18 and 60 years, with or without radiating pain, and a pain-free episode of at least three months before onset.
Interventions Standard physiotherapy care according to Dutch clinical practice guidelines.
Outcome measure Chronic low back pain defined as pain ≥3/10 on the Numeric Pain Rating Scale and as pain-related disability ≥19/70 on the Pain Disability Index measured after 12 weeks.
Results Two hundred and four people with acute nonspecific low back pain completed both assessments. In the multivariable analyses, adjusted for pain intensity, disability, duration, radiating pain, depressed mood, associations of illness perceptions were OR 1.04 (95% CI: 1.01 to 1.08) for pain and 1.04 (95% CI: 0.99 to 1.09) for pain-related disability.
Conclusions Illness perceptions independently predicted chronic low back pain but not pain-related disability at 12 weeks. The added predictive value of illness perceptions was relatively low.

Keywords: Perception; Low back pain; Prognosis; Risk; Chronic pain; Physiotherapy

Introduction

According to the Common Sense Model of self-regulation (CSM), cognitive representations of a health threat, i.e., illness perceptions, are accountable for an individual's behavioural response to that threat [1]. The CSM of illness perceptions covers five cognitive dimensions: identity, timeline, consequences, cause, and cure or control [1,2]. These five dimensions reflect how patients perceive their illness and characterise their view on it, in terms of its cause, expectations

Abbreviations: CBT, Cognitive Behavioral Treatment; 4DSQ, Four-Dimensional Symptom Questionnaire; ALBP, acute low back pain; IPQ-B, Brief Illness Perception Questionnaire; CLBP, chronic low back pain; LBP, low back pain; NPRS, Numeric Pain Rating Scale; OR, odds ratio; PDI, Pain Disability Index.

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about recovery, the condition itself, and how to formulate their coping behaviour [1].

International clinical practice guidelines for low back pain, emphasise assessing and addressing psychological factors [3,4]. According to these recommendations, a cognitive behavioural approach as part of a multidisciplinary approach is advised [5,6].

In a longitudinal prospective cohort study, illness perceptions of patients with low back pain were weakly to moderately associated with pain and physical function [7]. In patients with acute low back pain (ALBP), however, the value of illness perceptions to predict chronic low back pain (CLBP) and pain-related disability is unknown [8]. We hypothesised that in patients with ALBP, illness perceptions are a prognostic factor for delayed recovery or the development of chronic low back pain (CLBP). Therefore, our research question was: Are illness perceptions an independent predictor of CLBP and related disability in patients with ALBP presenting in primary care physiotherapy?

Methods

Study design, participants and setting

The Medical Ethics Committee (METC) of the University of Groningen reviewed the study procedures and decided that, within the Dutch regulations, formal ethical approval was not needed (registration number M15.169564). Standard Ethical and Data Protection Regulations were adhered to. Informed consent was obtained from all participants. A longitudinal prospective cohort study design with two measurement occasions was conducted with recruitment in primary care physiotherapy practices throughout the Netherlands. Participants were all patients with acute nonspecific low back pain. A longitudinal multi centre prospective cohort study was conducted including patients with ALBP seeking care at one of 26 participating primary care physiotherapy practices randomly spread throughout the Netherlands. This study was classified as a Phase II confirmatory study to establish the independent prognostic value of illness perceptions in patients with ALBP [9]. The STROBE statement and the TRIPOD checklists were used to report the study [10].

The first contact was with the physiotherapist who collected the data of all patients attending the baseline assessment (t1) within one week after initial contact (t0) with the practice. All baseline questionnaire data were collected before history taking and physical examination. Patients were reassessed 12 weeks after baseline (t2) to assess outcomes on pain and pain-related disability. Physiotherapists were instructed to avoid information that could influence patients' illness perceptions. Between t1 and t2, standard care physiotherapy was carried out according to the Dutch clinical practice guideline for low back pain comprising CBT-informed care. In patients with ALBP, all interventions were focused on staying active. During the treatment period, no co-interventions or investigations occurred [4]. Confidential records were stored in a secure area with limited access. Encoded data were entered in an encrypted electronic database; therefore, anonymity and confidential input of data were guaranteed. Prior to participation, the study protocol was explained to patients verbally and in writing.

Inclusion and exclusion criteria

Inclusion criteria were patients with age between 18 and 60 years; ALBP of <6 weeks duration with or without radiating pain; and pain-free at least three months before onset of current back pain episode.

Exclusion criteria were the presence of any neurological signs which may indicate a radiculopathy or patients who were diagnosed with a specific medical cause of low back pain such as lumbar spinal stenosis, current malignancy, spondyloarthropathy, osteoporosis, spondylolisthesis, infection or systemic disease, and patients with previous lumbar spine surgery.

Data collection

Data collection was carried out from January 2016 to March 2016 and from January 2017 to March 2017. Prior to physical examination and standard care, the self-reported measures were obtained in a standardised sequence in a separate room and physiotherapists were instructed to avoid patients giving any information about their back pain by that time. When questionnaire items were left blank, participants were asked to complete these without influencing their response. Two days before baseline assessment, each participant was contacted via email or telephone as a reminder.

Measures

Illness perceptions were measured with the brief eight-item Illness Perception Questionnaire (IPQ-B), an ordinal scale from 0 (minimum) to 10 (maximum) reflecting cognitive perceptions: timeline; personal and treatment control; identity; coherence; concern and emotions. The IPQ-B is a suitable instrument for measuring patients' perceptions in patients with ALBP, whereby a higher score reflects more negative perceptions of low back pain [11]. The IPQ-B has been systematically evaluated and in many different illness outcomes the most predictive items were consequences, timeline, identity, and control [6]. Five prognostic factors considered as 'established' factors for predicting CLBP were also measured: (1) pain intensity (Numeric Pain Rating Scale (NPRS) 0−10); (2) pain-related disability (Pain Disability Index (PDI) 0−70); (3) duration of LBP (weeks); (4) radiating pain (lumbosacral, proximal to the knee, distal from the knee); and (5) depressed mood (Four-Dimensional Symptom Questionnaire (4DSQ) 0–12) [12,13]. For these established factors, there is evidence that they increase the risk of CLBP and they were forced in the multivariate anal-

ysis irrespective of their univariate association with both outcomes [14–16]. At 12 weeks, dependent variables pain and pain-related disability were assessed as both outcomes which were dichotomised: CLBP (yes/no) was defined as NPRS ≥ 3/10 and pain-related disability (yes/no) was defined as PDI ≥ 19/70 [17].

Data analysis

It was expected to find a prevalence of 30% in the population of patients in the ALBP population who are at risk for developing CLBP with a dichotomous endpoint [18,19]. Using this estimate, the a priori sample size calculation revealed, with a significance level of α 0.05 and power of 0.80, that at least 190 participants would be required. A maximum of five variables were included in the model to prevent over-fitting.

Univariate logistic regression analysis was performed to estimate the independent, unadjusted association of illness perceptions with presence of pain at 12 weeks, defined as NPRS ≥ 3/10, and pain-related disability defined as PDI ≥ 19/70 at 12 weeks. Subsequently, multivariate models were produced in which the association of illness perceptions for predicting LBP status at 12 weeks was adjusted for effects of the five established prognostic factors. All predictors except 'radiating pain' were entered into the models as continuous variables.

Nagelkerke's R^2 was calculated as a measure of explained variance.

Associations between illness perceptions and both outcomes were calculated as beta (β) coefficients, odds ratios (ORs) with 95% confidence interval (CI), and *P*-values. Significance level for all analyses was set at $\alpha = 0.05$.

All analyses were performed using IBM SPSS Statistics v. 26.0.

Results

From 301 patients who were admitted to primary care with LBP, 69 were excluded due to not matching inclusion criteria, seven declined to participate, and 21 were lost to follow-up. Two hundred and four patients had complete datasets and were eligible for participation and inclusion in our analysis (Fig. 1). There were no missing data on predictors and outcomes.

Table 1 presents the baseline characteristics of the study sample.

Table 2 presents twenty most common causal factors.

In Table 2, the twenty most common causal factors derived from the three open text items in the IPQ-B are presented ($n = 428$). Each participant may mention three factors. Other causal factors have been mentioned rarely to be inserted in Table 2. The following specific diseases are mentioned (all once): Fibromyalgia, Influenza, Hepatitis-B, Cancer, Scheuerman disease, Rheumatoid arthritis, Scoliosis, Hallux valgus.

In the univariate analysis, illness perceptions were associated with pain at 12 weeks (OR 1.04 (95% CI: 1.00 to 1.07)) and when adjusted for the five established prognostic factors,

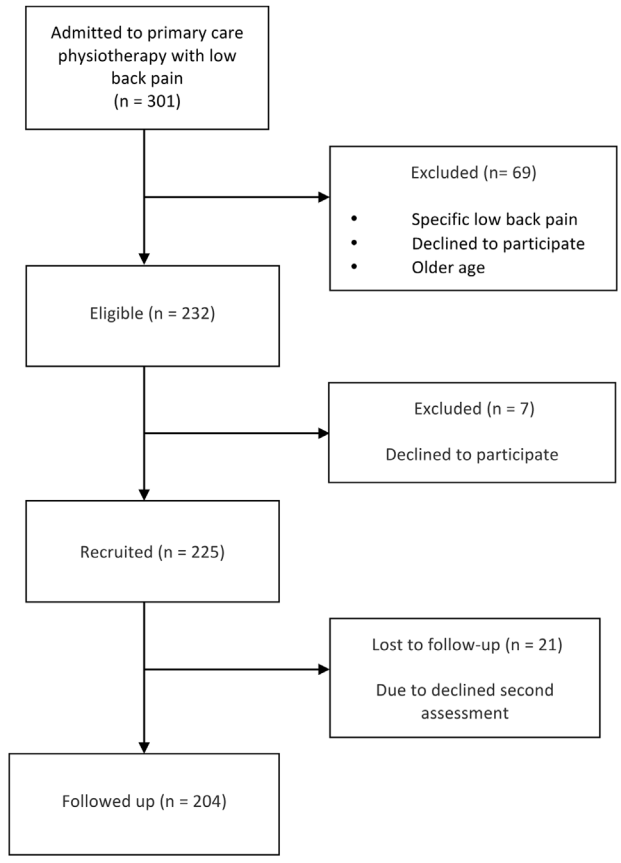

Fig. 1. Flow diagram.

Table 1
Demographics of patients with acute nonspecific low back pain.

Patients with acute nonspecific low back pain	$n = 204$
Age (y), mean (SD)	41.4 (2.4)
Gender (male/female %)	49/51
Recurrent n (%)	148 (73)
Duration in weeks, mean (SD)	2.8 (2.0)
Pain distribution	
- Lumbosacral region n (%)	152 (74)
- Proximal knee n (%)	42 (21)
- Distal knee n (%)	10 (5)
BMI kg/cm^2, mean (SD)	24.9 (6.9)
Illness perceptions, IPQ-B 0−80, mean (SD)	31.3 (11.2)
Pain, NPRS 0−10, mean (SD)	6.4 (1.7)
Greater than "very mild" pain ≥ 3/10 NPRS, n (%)	73 (36)
Pain-related disability, PDI 0−70, mean (SD)	24.7 (14.7)
Greater than "mild" disability ≥ 19/70 PDI, n (%)	35 (17)
Depressed mood, 4-DSQ mean (SD)	0.94 (2.4)

Abbreviations: BMI, body mass index; NPRS: Numeric Pain Rating Scale; PDI: Pain Disability Index; 4-DSQ: Four-Dimensional Symptom Questionnaire.

Table 2
The 20 most common causal factors according to patients* ($n = 428$).

Causal factors	*n*
Inactivity/sitting	60
Work/housework related	54
Stress related	48
Lifting/carrying	40
Poor posture	34
Overload–not specified	27
Sports	20
Wrong movement	16
Overweight	11
Weak muscles/core stability	10
Older age/degeneration	8
Lack of relaxation	7
Congenital	7
Fatigue	6
Stiffness	6
Persisting coping style	6
Prolonged standing	5
Bending	5
Cold	4
Don't know	4

*Each participant could report up to three factors.

association of illness perceptions was OR 1.04 (95% CI: 1.01 to 1.08) (Table 3).

In the univariate analysis, illness perceptions were associated with pain-related disability at 12 weeks (OR 1.05 (95% CI: 1.02 to 1.10)) and when adjusted, association of illness perceptions was OR 1.04 (95% CI: 0.99 to 1.09) (Table 4).

Higher pain intensity and depressed mood were also significantly associated with higher odds of chronic pain. The multivariate model explained 24% of the variance for outcome pain after 12 weeks, including 3% added by illness perceptions; for outcome pain-related disability these figures were 17% and 2%, respectively.

Discussion

Illness perceptions in patients with ALBP independently predicted pain and pain-related disability at 12 weeks. The addition of illness perceptions to five established prognostic factors contributed significantly to the prediction of pain at 12 weeks, implying that each one-point increase in score on the IPQ-B resulted in an increase of 3% for the risk of CLBP. In the multivariate analysis illness perceptions did not significantly contribute to the prediction of pain-related disability at 12 weeks.

Research with a similar study design, focussing on the predictive value of illness perceptions in patients with ALBP, is lacking and this study fills an evidence gap. There is limited evidence of associations between illness perceptions and various musculoskeletal disorders including low back pain, although studies are not sufficiently comparable [7,20]. Foster *et al.* (2008) included patients with low back pain without making difference between acute and chronic pain and outcome was predicted six months after first consultation [7]. In their study it was identified that patients with more negative expectations, and beliefs that the pain will last a long time with serious consequences and less controllability, clinical outcome was poor, measured six months after first consulta-

Table 3
Logistic regression results for unadjusted and adjusted (independent) prognostic value of illness perceptions for chronic low back pain measured as pain intensity at 12 weeks, classified as Numerical Pain Rating Scale score ≥ 3/10.

Model	Variate	Pain		
		Bèta	Odds ratio (95% CI)	*P*-value
Unadjusted	Illness perceptions*	0.04	1.04 (1.00 to 1.07)	0.01
Adjusted	Illness perceptions*	0.04	1.04 (1.01 to 1.08)	0.03
	Pain	0.26	1.3 (1.1 to 1.6)	0.02
	Pain-related disability	−0.03	1.0 (0.95 to 0.99)	0.03
	Duration of low back pain	0.13	1.1 (0.98 to 1.3)	0.09
	Radiating pain	0.04	1.2 (0.65 to 2.0)	0.63
	Depressed mood	0.39	1.5 (1.2 to 1.8)	0.00

Table 4
Logistic regression results for unadjusted and adjusted (independent) prognostic value of illness perceptions for chronic low back measured as pain-related disability at 12 weeks, classified as a Pain Related Disability score ≥ 19/70.

Model	Variate	Pain-related disability		
		Bèta	Odds ratio (95% CI)	*P*-value
Unadjusted	Illness perceptions	0.05	1.05 (1.02 to 1.10)	0.01
Adjusted	Illness perceptions	0.04	1.04 (0.99 to 1.09)	0.09
	Pain	0.02	1.03 (0.79 to 1.33)	0.86
	Pain-related disability	0.01	1.01 (0.97 to 1.04)	0.71
	Duration of low back pain	0.02	1.02 (0.84 to 1.24)	0.83
	Radiating pain	−0.21	0.81 (0.39 to 1.66)	0.56
	Depressed mood	0.25	1.28 (1.11 to 1.48)	0.00

tion [7]. A recent study found evidence for patients' beliefs that their pain will last a long time to be prognostic for limitations in functioning at four and 12 months [14].

Although expected, pain duration at onset did not differentiate between patients. We believe the small variation (SD 2.0 weeks around mean 2.8) in this independent factor may be the reason for the lack of association with both pain and pain-related disability. Subsequent to that, no reinforcement or suppression of the other factors was observed when adding 'duration of pain' into the model, indicating any confounding effect was absent.

One strength of this study was its sample size, with relatively small loss to follow-up, deemed sufficient for multivariate analysis, and generalisability by using standard physiotherapy management in primary care throughout the Netherlands. In addition, a validated instrument for measuring illness perceptions was used with adequate psychometric properties in patients with ALBP and easy to use in clinical practice.

A limitation of the study results was that only complete cases were included in the analyses and imputation was not used. Assuming that all cases being a random selection of the data, we are confident that this has not affected the study results. Although the IPQ-B is deemed suitable for use in clinical practice, it may be questionned whether it adequately measures all cognitive representations involved. If so, this may have influenced our results. Following the results of this study, we recommend replication in other similar as well as different clinical settings encountering patients with ALBP.

Measuring and altering maladaptive illness perceptions to enhance the physiotherapeutic potential in clinical practice is a challenge. Reassuring patients about the medically non-serious character of ALBP and the favorable prognosis in the acute phase may be helpful to achieve this [21]. We believe that patients' awareness of illness perceptions might improve treatment outcomes and communication with their therapist. It also may change a bio-medical orientation into a more biopsychosocial orientation as is recommended in international guidelines [22]. In addition, using the IPQ-B is a way to improve communication about patients' pain perceptions and make it discussable [23]. Further prospective studies investigating the influence of illness perceptions on prognosis of low back pain are encouraged considering a similar timeline, and multiple interim measurements.

Conclusion

Illness perceptions in patients with ALBP independently predicted pain but not pain-related disability at 12 weeks in a model including pain intensity, pain duration, pain-related disability, radiating pain, and depressed mood. However, the added predictive value of illness perceptions was relatively low. Depending on whether pain or disability is the most important outcome for an individual patient, evaluation of illness perceptions can be considered.

Ethical approval: The Medical Ethics Committee (METC) of the University of Groningen (the Netherlands) reviewed the study procedures and decided that, within Dutch regulations, formal ethical approval was not needed (registration number M15.169564). Written informed consent was obtained from all participants. The authors declare that the procedure of the study was in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 and 2008. World Medical Association. Declaration of Helsinki (October 2008). http://www.wma.net/e/policy/b3.htm (accessed 16 August 2010).

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Conflict of interest: The authors state that there are no conflicts of interest.

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