

HEALTH SERVICES RESEARCH

The Correlation Between Pain, Catastrophizing, and Disability in Subacute and Chronic Low Back Pain

*A Study in the Routine Clinical Practice of the Spanish National Health Service*Francisco M. Kovacs, MD, PhD,*† Jesús Seco, MD, PhD,†‡ Ana Royuela, MSc,†§¶
Andrés Peña, MD, PhD,|| Alfonso Muriel, MSc,†§¶ and The Spanish Back Pain Research Network**Study Design.** Correlation between variables measured with previously validated instruments.**Objective.** To explore the association between catastrophizing and disability in patients treated for subacute or chronic low back pain (LBP) within routine clinical practice in Spain.**Summary of Background Data.** The influence of psychological variables on LBP-related disability in Southern Europe is different to the one in the Anglo-Saxon and Northern European cultural environments. In Spanish LBP patients, the influence of fear avoidance beliefs on disability is negligible, and catastrophizing does not mediate the improvement of disability caused by active education. The association between catastrophizing and disability is unknown.**Methods.** Thirty-three clinicians working for the Spanish National Health Service in 6 primary care and 8 specialty centers, recruited 1461 patients seeking care for subacute and chronic LBP. Patients were assessed only once. A linear regression model was developed to assess the percentage of the variance of disability explained by gender, age, chronicity status, severity of LBP, severity of referred pain (referred pain down to the leg), catastrophizing, eligible for workers' compensation (yes/no), failed back surgery (yes/no), radiologic findings, and treatments.**Results.** Correlations among LBP, referred pain down to the leg, disability, and catastrophizing were moderate, but significant. Thestrongest one was between disability and catastrophizing ($r = 0.520$). Catastrophizing explained 28% of disability, whereas severity of LBP only 3%. Global adjusted R^2 of the model was 0.387. There was an association between some radiologic findings and treatments, and slightly higher levels of disability.**Conclusion.** In Southern European subacute and chronic LBP patients, catastrophizing correlates with disability and explains approximately one-fourth of its variance. Further studies should assess its value as a prognostic factor in subacute and chronic patients.**Key words:** low back pain, disability, catastrophizing, correlation, routine clinical practice. **Spine 2011;36:339–345**

Non-specific or common low back pain (LBP) is defined as pain between the costal margins and the inferior gluteal folds, usually accompanied by painful limitation of movement and eventually associated with referred leg pain.¹ Diagnosing common LBP implies that the pain is not related to conditions such as fractures, spondylitis, direct trauma, or neoplastic, infectious, vascular, metabolic, or endocrine-related processes.¹

LBP costs society approximately 1.7% of the Gross Domestic Product every year.² It is considered subacute when it lasts for more than 2 weeks,³ and chronic when it lasts over 3 months.⁴ Subacute and chronic patients represent a minority of cases but generate more than 70% of the total costs.⁵

Disability is the main cause of social costs and loss of quality of life associated with LBP.^{1,3,5,6} LBP-related disability is influenced by pain severity and duration,^{3,6} as well as by an array of psychological variables. Among the latter, fear avoidance beliefs (FAB) and catastrophizing are 2 of the most studied ones.^{7–36}

Most studies conducted in the Anglo-Saxon and Northern European cultural environments, have shown that FAB and catastrophizing exert a major influence on LBP-related disability.^{7–30} However, studies conducted in Southern European have shown otherwise.^{31–36} FAB do influence the duration of LBP-related sick leave in Spanish patients,³¹ but their influence on disability is negligible, both in the elderly and in acute, subacute, and chronic patients seeking care for LBP.^{32–35} The influence of catastrophizing on disability is also negligible

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in the elderly,³⁴ and in LBP patients it does not mediate the improvement of disability caused by education on active management (*i.e.*, promoting to keep as physically active as possible, and avoiding bed rest).³⁶ However, the association between catastrophizing and disability among Spanish LBP patients is unknown.

Therefore, this study was designed to explore the association between catastrophizing and LBP-related disability, in patients treated for subacute or chronic LBP in the routine clinical practice of the Spanish National Health Service.

MATERIALS AND METHODS

Subjects

The study was performed in 14 Health Care Centers from 7 different regions in Spain. All Centers were involved in the Spanish Back Pain Research Network. Of total, 12 belonged to the Spanish National Health System (SNHS), and 2 to not-for profit Foundations working for the SNHS. Participating Centers included 6 primary care centers and 8 specialty centers in rehabilitation, neuroreflexotherapy, orthopedic surgery, and rheumatology.

Inclusion criteria were seeking care for subacute or chronic LBP, with or without leg pain, in a participating center, and being able to read Spanish. Exclusion criteria were refusal to sign the informed consent, leaving unanswered a questionnaire assessing any of the variables, treated or untreated central nervous system impairment, pain due to direct trauma, diagnoses of inflammatory diseases (*e.g.*, rheumatoid arthritis or Bechterew disease), cancer or fibromyalgia, signs suggesting fibromyalgia (defined as diffuse pain with unexplained fatigue or sleep disturbances), criteria for referral for surgery, or reasons for suspecting a potential systemic disease where the appropriate diagnostic tests had not ruled that possibility out. Criteria for referral for surgery were defined as potential nerve root compression complying with criteria for surgery (progressive motor deficit lasting 6 weeks or more, sphincter impairment of neurologic cause, or disabling sciatic pain lasting 6 weeks or more, caused by a compromised nerve root demonstrated by magnetic resonance imaging), or symptomatic spinal stenosis (defined as claudication unrelated to peripheral vascular disease with evidence of stenosis on magnetic resonance imaging or computed tomography scans).¹ Criteria for suspecting a potential underlying systemic disease were defined as “red flags” (oncologic disease during the previous 5 years, constitutional symptoms—unexplained weight loss, fever, chills, history of intravenous drug use, or immunocompromised host).^{1,37–39}

Patients having undergone unsuccessful spine surgery (“failed back surgery”) and those with “red flags” in which appropriate test procedures had ruled out systemic diseases, were invited to participate in the study.

The observational design of this study excluded potential ethical concerns regarding the sample size being too large. Therefore, sample size was established at 1500, taking into account the number of variables to be included in the regres-

sion model, and that previous studies suggested that the potential effect of catastrophizing in Spanish subjects, if any, was small.^{34–36}

Procedure

The study protocol was approved by the Ethical Committees of the participating Hospitals and institutions.

Between November 20, 2006, and July 19, 2009, physicians working in the participating centers screened patients for inclusion and exclusion criteria. They explained study’s characteristics to eligible patients and asked them to sign the corresponding informed consent. Those who signed it were included in the study.

For this study, patients were only assessed once. They completed all the self-administered questionnaires on their own, in the absence of health care staff or third parties. Once completed, the questionnaires were collected by auxiliary personnel not related to the study. Data were introduced into a database at a central coordination office by 2 administrative assistants, who double-checked that the data introduced coincided with ratings on the questionnaires.

Variables

Patients were asked to complete questionnaires with data on gender, age (date of birth), duration of current pain episode (days), and working status (classified as “eligible for workers’ compensation benefits”—*i.e.*, working, on sick leave or disabled-, or “not eligible”—students, housewife, unemployed, retired). They were also asked to rate the intensity of LBP, referred pain down to the leg (LP), LBP-related disability, and catastrophizing. Pain intensity was measured with a 10-cm visual analog scale (VAS, for which 0 = no pain and 10 = worst possible pain).⁴⁰ LBP-related functional disability was measured using the validated, Spanish version of the Roland-Morris questionnaire (RMQ),⁴¹ in which disability is scored from 0 to 24 points (better to worse). Catastrophizing was measured using the catastrophizing subscale of the validated Spanish version of the Coping Strategies Questionnaire, in which patients’ use of catastrophizing strategies to cope with pain is scored from 0 (no use) to 36 (maximum possible use of those strategies).⁴² Those variables were assessed by the patients on their own, with no influence from the clinical or research staff involved in this study.

Recruiting physicians provided data on patients’ radiologic findings (unknown—patients who had not undergone imaging procedures, no findings, disc degeneration, facet joint degeneration, scoliosis, spondylolisthesis, spondylosis, annular tear, disc protrusion, disc herniation, >1 cm difference in leg length, lumbarization of S1, sacralization of L5, lumbar hyperlordosis, lumbar hypolordosis, other radiologic findings), history of failed back surgery related to current episode (yes/no), and patients’ treatments (drugs—NSAIDs, steroids, muscle relaxants, other drugs, physiotherapy or rehabilitation, neuroreflexotherapy intervention, surgery, other).

Analysis

Absolute and relative frequencies were calculated for categorical variables. For continuous variables, mean and standard deviation (SD) were calculated.

Simple correlations between the scores of the different scales were obtained through Spearman correlation coefficient.

A linear regression model was developed to assess the factors explaining the variance of disability. Disability was the dependent variable and the maximal model included gender, age, chronicity (subacute, chronic), severity of LBP (VAS), severity of LP (VAS), catastrophizing (CSQ), eligibility for workers' compensation (yes/no), failed back surgery (yes/no), radiologic findings (disc degeneration, disc annular tears, disc protrusion, disc herniation, facet joint degeneration, scoliosis, spondylolisthesis, spondylolysis, difference in leg length, lumbarization of S1, sacralization of L5, hyper or hypolordosis, or other radiologic findings), and treatments undergone (drugs—NSAID, steroids, muscle relaxants, other, physiotherapy or rehabilitation, neuroreflexotherapy, surgery).

Collinearity of the maximal model was evaluated using the criteria proposed by Belsley.⁴³ A backward elimination strategy was used, so that the variable with the highest *P* value not significant at the 0.05 level was excluded at each step. The order of the variables to assess the change of the model in *R*² was determined by standardized coefficients.³² Model selection of variables was validated by bootstrapping.⁴⁴ The normality of residuals was assessed graphically and through the Kolmogorov-Smirnov test.⁴⁵ Goodness of fit of the model was assessed through the adjusted *R*².

The SPSS statistical package for Windows, version 17 (SPSS Inc., Chicago, IL) and Stata 10.0 was used for statistical analysis.

RESULTS

Thirty-three clinicians recruited 1500 patients, and 39 were excluded for leaving unanswered questionnaires on LBP (2 patients), LP (17 patients), RMQ (10 patients), CSQ (7 patients), or workers' compensation coverage (4), with 1 patient having left 2 questionnaires unanswered. Therefore, 1461 patients were included in the study.

Patients' characteristics are shown in Table 1. Most were women (63%) and their mean age was 52.5 years. The mean LBP severity was 6.7 VAS points, despite the fact that most patients (72%) were taking drugs (especially NSAIDs and muscle relaxants). A total of 1121 (76.7%) patients reported referred pain down to the leg, with a mean severity of 6.2 VAS points. Mean disability was 12.7 RMQ points, and mean catastrophizing score was 14.7 CSQ points.

Correlations among LBP, LP, disability, and catastrophizing are shown in Table 2. Correlations among all of those variables are moderate, but significant. The strongest correlation observed was between disability and catastrophizing (*r* = 0.520), while the weakest was between severity of LP and catastrophizing (*r* = 0.359).

Age had to be centered because of collinearity problems. The regression model showed that catastrophizing explained

TABLE 1. Patients Characteristics (n = 1461)

Variable	Patients (n = 1461)
Gender (male)*	541 (37.0)
Age (yr)†	52.5 (15.0)
Workers' compensation coverage*	
Yes (working, on sick leave, disabled)	845 (57.8)
No (students, household, retired, unemployed)	616 (42.2)
Chronicity (pain ≥90 days)*	1062 (72.7)
Drugs*	1055 (72.2)
NSAIDs	835 (57.2)
Corticoids	98 (6.7)
Miorrelaxants	286 (19.6)
Other drugs	140 (9.6)
Physiotherapy or rehabilitation*	187 (12.8)
Neuro-reflexotherapy*	1241 (84.9)
Surgery*	8 (0.5)
Failed back surgery	20 (1.4)
Radiological findings*	
Disc degeneration	904 (61.9)
Disc herniation	468 (32.0)
Facet joint degeneration	286 (19.6)
Scoliosis	100 (6.8)
Lumbar hypolordosis	111 (7.6)
Spondylolisthesis	65 (4.4)
Spondylolysis	33 (2.3)
Disc protrusion	31 (2.1)
Lumbarization of S1	15 (1.0)
Difference in leg length (>1 cm.)	14 (1.0)
Sacralization of L5	9 (0.6)
Annular tear	4 (0.3)
Other	10 (0.5)
LBP (VAS)†	6.7 (2.1)
LP (VAS) (n = 1121)†	6.2 (2.4)
Disability (RMQ)†	12.7 (5.7)
Catastrophizing (CSQ)†	14.7 (8.6)
*Frequency (%).	
†Mean (SD).	
LBP indicates severity of low back pain; LP, referred pain down into the leg (in the 1121 patients who had it); RMQ, Roland-Morris Questionnaire; CSQ, Coping Strategies Questionnaire; VAS, visual analog scale.	

28% of disability, and severity of LBP only 3% (Table 3). Global adjusted *R*² of the model was 0.387. Analysis of residuals showed the appropriateness of the model. To validate

TABLE 2. Correlation Analysis

	LP	RMQ	CSQ
LBP	0.501	0.395	0.372
<i>P</i>	0.000	0.000	0.000
LP		0.390	0.359
<i>P</i>		0.000	0.000
RMQ			0.520
<i>P</i>			0.000

LBP indicates severity of low back pain; LP, referred pain down into the leg (in the 1121 patients who had it); RMQ, disability as measured by the Roland Morris Questionnaire; CSQ, catastrophizing as measured by the Coping Strategies Questionnaire.

model selection, 1000 bootstraps samples were drawn and a backward strategy was applied. Table 3 shows frequency of inclusion of each variable.

DISCUSSION

These results show that, in subacute and chronic LBP patients treated in the routine practice of the Spanish National Health Service, there is a correlation between catastrophizing and disability, and that catastrophizing explains 28% of the variance of disability, whereas pain only explains 3%. This is the first study to identify a psychological variable, which is potentially relevant for disability in subacute and chronic LBP patients in Southern Europe.³²⁻³⁶

Previous studies had suggested that the influence of catastrophizing on disability was as negligible as the one of FAB among the Spanish elderly.³⁴ Differences in the characteristics of the subjects included in the current study may explain differences in results. In the previous study,³⁴ subjects were noninstitutionalized elderly subjects, with a mean age of 72 and a low CSQ score (median of 0 among those without LBP, and of 6 among those with LBP). It might make sense to assume catastrophizing is not relevant among generally healthy subjects of that age. Conversely, patients in the current study

were in working ages, only those seeking care for subacute and chronic LBP were included, and the mean CSQ score was approximately 15 (Table 1). Results from the current study show that, in this population, the maximum possible variation in catastrophizing is associated with a variation in disability that roughly corresponds to half its maximum possible value (Table 3).

Results from a previous randomized clinical trial on education on active management, conducted with LBP patients from the same cultural setting as the current one, showed that the improvement of catastrophizing does not mediate the improvement of disability.³⁶ These results do not contradict those from the current study, since the fact that catastrophizing correlates with disability and explains approximately one-fourth of its variance, does not necessarily imply that improving it would modify disability. For example, the association between catastrophizing and disability may be mediated by other psychological variables. In fact, the regression model only explains approximately 40% of the variance of disability (Table 3), and results from a recent study suggest that anxiety as a personality trait (“anxiety-trait”), and not as a state (“anxiety-state”), explains the association between catastrophizing and disability in Spanish chronic LBP patients treated in pain units (J. Morix *et al*, unpublished data).

LBP-related disability is the major cause for personal, social, and economic burdens associated with LBP.^{1,3,5,6} From the clinical point of view, results from previous studies suggest that catastrophizing is not a primary target for the treatment of disability in Spanish LBP patients (J. Morix *et al*, unpublished data).³⁶ However, results from the current study suggest that it would be suitable for further studies to assess the value of catastrophizing as a prognostic factor for the evolution of disability.

At the design phase, it was hypothesized that explanations given to the patients with regard to radiologic findings (disc degeneration, disc herniation, anular tears, *etc.*), might contribute to their degree of catastrophizing and disability. Therefore, the association between different radiologic findings and disability was explored. In this respect, the accuracy or

TABLE 3. Regression Analysis of Disability

	Coefficient (95% CI)	<i>P</i>	<i>R</i> ² Change	Frequency in Bootstrapping Validation*
CSQ	0.265 (0.235; 0.296)	0.000	0.280	1000
Age	0.072 (0.056; 0.088)	0.000	0.055	1000
LBP	0.359 (0.231; 0.488)	0.000	0.030	1000
LP	0.226 (0.145; 0.306)	0.000	0.013	1000
Miorrelaxants	1.330 (0.726; 1.934)	0.000	0.006	976
Neuro-reflexotherapy	0.960 (0.258; 1.661)	0.007	0.003	843
Lumbar hypolordosis	0.992 (0.082; 1.902)	0.033	0.002	663

Global adjusted *R*² of the model was 0.387.

*Frequency of first variable not included was 631.

CSQ indicates score on the Coping Strategies Questionnaire (values range: 0-36); LBP, severity of low back pain (values range: 0-10); LP, referred pain down into the leg (values range: 0-10); CI, confidence interval.

validity of the radiologic finding as a “diagnosis,” is irrelevant. Results show that the only radiologic finding associated with a slightly higher degree of disability, is “lumbar hypolordosis” (“rectification”). Surprisingly enough, no other radiologic findings (such as disc herniation or spondylolisthesis) are associated with the severity of disability (Tables 1, 3).

For the same reason, the potential association of different treatment methods with disability was also explored. Results show that prescription of muscle relaxants or referral to neuroreflexotherapy is associated with slightly higher degree of disability (Table 3). This finding probably reflects that both treatments are usually prescribed to patients who are more impaired. In fact, routine clinical practice in the SNHS is roughly consistent with recommendations from the current Spanish evidence based guidelines for LBP (J. Morix *et al*, unpublished data), which recommend muscle relaxants only when NSAIDs and analgesics have failed, and neuroreflexotherapy when deep-seated drug treatment, the episode lasts for more than 14 days.⁴⁶

Unsurprisingly, older age and more severe LBP or LP intensity are associated with slight increases in disability (Table 3).^{3,6,32–34} However, other variables which might have been expected to influence the degree of disability, have shown to have no effect. For example, this is the case for history of failed back surgery or coverage by workers’ compensation programs (in Spain, employees who are on sick leave or considered disabled because of LBP, can receive above 100% of their salary) (Table 3).

This study was conducted with subacute and chronic patients because at the design phase, it was hypothesized that if catastrophizing was to have any correlation with disability, it would be stronger in those patients, as compared to acute ones. Results show that, in subacute and chronic patients, chronicity status does not influence the relationship between catastrophizing and disability (Table 3). This is consistent with results from previous studies conducted with subacute and chronic Spanish LBP patients in which psychological variables were assessed.³⁶

Generalizability of these results should be discussed. The 7 Spanish regions in which this study was conducted represent most of the economic and cultural spectrum in the country. Patients were recruited in routine clinical practice, in primary and specialty centers belonging to, or working for, the Spanish National Health Service (SNHS). The SNHS is a public organization in which all health care services are provided free to every resident in Spain. Only a small minority of patients in the upper economic class seek health care in the private sector only. Physicians working for the SNHS have no restriction on the use of services (except for esthetic surgery or some dental procedures), and there is no incentive for referrals to specialists or indication for particular diagnostic tests or treatment methods. LBP-related clinical practice has shown to be roughly consistent within the SNHS.⁴⁷ Among the 1500 patients who were recruited, only 39 (2.7%) were excluded. These features suggest that these results are generalizable to subacute and chronic LBP patients treated within the SNHS.

Studies on the effect of psychological variables on LBP-related disability have led to different results in Northern

(Anglo-Saxon),^{7–30} and Spanish cultural environments.^{31–36} Therefore, further studies should assess the generalizability of these results to other cultural settings. It would be interesting to explore the association between catastrophizing and disability in other Latin-Mediterranean countries, or in patients from a Spanish cultural background living in Northern European or Anglo-Saxon countries.

In conclusion, this study shows that, in subacute and chronic LBP patients treated in the primary and specialty setting of the Spanish National Health Service, catastrophizing correlates with disability and explains approximately one-fourth of its variance. Further studies should assess the value of catastrophizing as a prognostic factor in subacute and chronic patients.

➤ Key Points

- ❑ A total of 1461 patients seeking care for subacute and chronic LBP in the Spanish National Health Service, were recruited in 6 primary care and 8 specialty centers across 7 regions representing most of the cultural and economic spectrum within the country. They were assessed only once.
- ❑ Correlations among LBP, pain referred down to the leg (LP), disability and catastrophizing were moderate, but significant. The strongest one was between disability and catastrophizing. Catastrophizing explained 28% of disability, whereas severity of LBP only 3%. Global adjusted R^2 of the model was 0.387.
- ❑ Catastrophizing is the first psychological variable to have shown a meaningful correlation with disability in subacute and chronic Spanish LBP patients. Further studies should assess its value as a prognostic factor for the evolution of disability in that cultural setting.

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