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Impact of physical and psychosocial factors on disability caused by lumbar pain amongst fishing sector workers

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Abstract
Functional disability due to lumbar pain should be considered from the biopsychosocial model. There is inconclusive evidence as to whether the key determining factors in this form of disability are psychosocial or physical. Our aim is to identify variables that cause functional disability due to lumbar pain amongst shellfish gatherers in Galicia by means of a cross-sectional survey. Participants (N = 929) completed a self-administered, paper-based questionnaire including sociodemographic and lifestyle issues, as well as the nature of the lumbar pain, the presence of musculoskeletal pain in other regions of the body, the Roland-Morris Disability Questionnaire (RMDQ) and SF-36. Univariate examination, ROC curve and logistic regression analyses were performed. Most of these workers are women (98.7 %), with a mean age of 50.6 years. The point-prevalence of lumbar pain stands at 65.5 %. The RMDQ mean was 4.9 (SD = 4.7). In the logistic regression analysis, the variables associated with disability (RMDQ > median) were age (OR = 1.04), physical exercise (OR = 0.57), pain intensity (OR = 1.16), the number of regions of musculoskeletal pain (OR = 1.24) and mental health (SF-36) (OR = −0.95). Functional disability is determined by the physical nature of the pain and mental health attributes, although the former has a greater impact. In decreasing order of importance, functional disability is attributable to the presence of lower back pain, the number of regions of musculoskeletal pain, the intensity of that pain and age. Regular physical exercise and better mental health have a protective effect on disability.

Keywords
Back pain Musculoskeletal diseases Occupational health Disability evaluation

Introduction

Lower back pain (LBP) is one of the most common musculoskeletal complaints in industrialised nations. There is clear evidence that between 60 and 80 % of workers experience lumbar pain related to their labour activity at some time in their lives. Furthermore, LBP is a pervasive disorder with a substantial impact on workers' functional status [1, 2]. Although pain and disability often go together, they are not the same. This finding is known as the "*pain-disability paradox*" and should be interpreted from a biopsychosocial model. In this sense, an individual's degree of functionality is determined not only by pain, but also by a wide range of biological, psychological and social factors [3]. The links between disability and psychosocial factors [4, 5] and between disability and physical factors (e.g. the degree or extension of the pain) [6, 7] have been the object of previous studies. However, the evidence as to whether it is psychosocial or physical factors that are principally responsible for this disability is inconclusive.

Although numerous epidemiological studies continue to consider LBP as localised pain, it is equally true that many others [8–10] have shown that the majority of people suffering LBP also experience pain in other regions of the body and that this musculoskeletal comorbidity has a major impact on their functional status.

When carrying out studies into LBP, scientific literature extensively recommends the application of both the Roland-Morris Disability Questionnaire (RMDQ) [11], which measures functional disability caused by lumbar pain, and the Medical Outcomes Study 36-item Short-Form Health Survey (SF-36) [12], which measures the functional status and emotional well-being of the individual [13].

Shellfish gathering is described as "the undertaking of extraction activities, carried out on foot or from a boat (…), using selective and specific methods for the capture of one or more species of molluscs (…) for commercial purposes". Shellfish gathering by foot is an activity carried out mainly by female individuals, being minimal the presence of male workers. It is a job with a high physical workload involving in particular, forced postures (one of the most frequently adopted postures is that of forward

flexion of the trunk, either from a standing or from a kneeling position), the manual handling of loads and repetitive movements. They use tools similar to those employed in agriculture, but adapted for use in the water. They are manual workers who, in general, have a low level both of education and income. They are self-employed and belong to a special group within the Spanish National Insurance System, the "Special Regime for Sea Workers", one third of which is funded by the state, due to the special hardships associated with the type of work they perform [14, 15].

Although evidence reveals that psychological and physical factors are associated with disability in people with LBP, less is known about this relationship in non-clinical settings, and to our knowledge, no information regarding this connection amongst this group of workers has been published. The aim of this study is to analyse the role that demographic, lifestyle and psychological factors (Mental Health in the SF-36) as well as certain physical factors (intensity, location and generalisation of pain) play in predicting functional disability caused by lumbar pain amongst a group of blue collar workers.

Method

Design overview

This is a cross-sectional survey of workers in the fishing sector in Galicia (Northwest Spain). Data collection for the study was conducted between January 2008 and February 2009. Selection criteria required participants to be shellfish gatherers that voluntarily took part in a workshop on preventive physiotherapy and excluded all of those who did not wish to participate in the study. Informed written consent was obtained from the subjects, and the study was approved by the ethical review board (ERB) of the Autonomous Region of Galicia (CEIC, ID number 2009/298). The research carried out is in compliance with the Helsinki Declaration.

Setting and participants

The study took into account all the Fishermen's Guilds in the Autonomous Region of Galicia where shellfish gathering activities are carried out on foot. This includes a total of 44 Guilds, representing a total population of 3,970 workers in Galicia alone, 93.95 % of whom are women [16]. The sample was taken using voluntary participation in a workshop of preventive physiotherapy, and the exclusion criterion was the desire not to take part in the study. In order to encourage participation in this workshop, the research team produced material to publicise it (posters and a DVD), containing details of the aims of the workshop and the actions required of those shellfish gatherers wishing to take part. This information was included for the first time at the "International Conference on Prevention and Safety Measures in Shallow-water Fishing" and the Technical Session of the "European Musculoskeletal Disorders Week". Both events were held in Galicia in 2007 and included participation by the Presidents of the Women's Shellfish Gatherers' Associations. In order to publicise these workshops more widely, Galician fishing promotion agents from each area where shellfish is gathered delivered materials to the members of each association and reached an agreement on the date, place and time when the workshops would be held, in order to guarantee maximum attendance, and whereby a maximum of 20 people would take part in each session. A total of 929 employees and 34 fishermen's guilds participated in the study. Figure 1 shows a flow chart describing the numbers of total shellfish gatherers per area and the number of participants in the study for each area. This sample size allowed us to estimate the parameters of interest with a certainty rate of 95 % ($\alpha = 0.05$) and an accuracy of ±3.2 %.

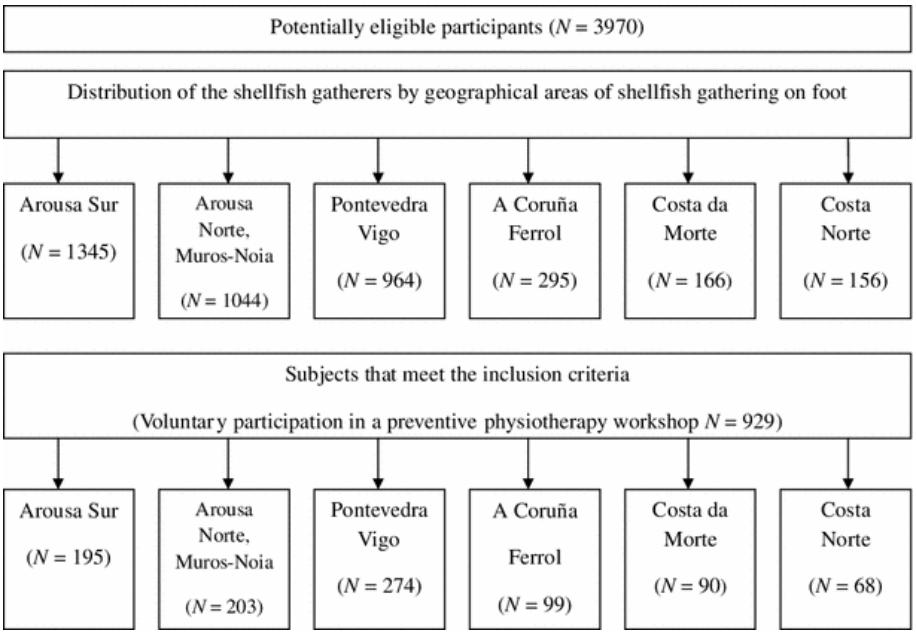

Fig. 1. Flow diagram for participant recruitment

Measures

A self-administered, paper-based questionnaire was distributed by the researchers during the physiotherapy workshop explaining the purpose of the research and clarifying any queries participants had. The dependent variable is functional disability caused by lumbar pain, and the independent variables are demographic and lifestyle factors, comorbidity, mental health and certain musculoskeletal pain characteristics.

Roland-Morris Disability Questionnaire (RMDQ)

The RMDQ is a self-administered questionnaire that assesses functional disability related to lumbar pain. It is one of the most highly recommended and commonly used scale in both clinical and research spheres [17]. It is also the preferred instrument for use in those persons mild to moderately affected by LBP [13]. It is a quick, simple and intuitive questionnaire that can be completed individually. The score ranges from 0 (no functional disability) to 24 (severe functional disability) points. The higher the score, the greater the degree of functional disability. The measure offers excellent reliability, validity and responsiveness [18]. We used the Spanish version of the RMDQ [19].

Demographic factors and comorbidity

The workers were asked to detail their sociodemographic characteristics and answer questions on their lifestyle (smoking, physical activity during leisure time—minimum 30 min/3 times per week) and on comorbidity. Comorbidity was ascertained by 6 dichotomised questions about rheumatic disorders, depressive syndrome, diabetes, neoplasms, back surgery and other conditions.

Medical Outcomes Study 36-item Short-Form Health Survey (SF-36)

The SF-36 is made up of 36 items that assess health across 8 dimensions. These dimensions may be reduced to 2 scores (i.e. physical and mental component summary (MCS) scores). In order to measure workers' mental health, we used the Mental Health dimension (MH) and the MCS of the SF-36. SF-36 Mental Health is a measure that captures how persons perceive their mental health, including depression, anxiety, conduct control and general well-being, and shares close ties with the Hospital Anxiety and Depression Scale (HADS) components in spine disease [20]. The lowest score corresponds to permanent feelings of anguish and depression and the highest score to a constant sense of calm and happiness. All 8 health domain scales contribute to the assessment process in the MCS, although the key factors are Vitality, Social Functioning, Role-Emotional and Mental Health. The SF-36 has been used in a

considerable number of studies into LBP [21–23]. For the purpose of our study, we used the Spanish version 2, which is currently recommended, as well as the standard version that records health status during the final 4 weeks [24, 25]. The psychometric characteristics of the SF-36 have been studied extensively and have been found to be reliable, valid and sensitive in their both original and Spanish versions [25, 26].

Low back and musculoskeletal pain

Musculoskeletal pain was assessed by means of the following question: Where do you *regularly* have pain? The options included multiple answers relating to 11 different body regions. To obtain an overall picture of concurrent MSP in the whole body, the original eleven anatomical sites were later combined to make up five larger anatomical areas [27]: neck, shoulder or higher part of the back; lower part of the back; elbow or wrist/hand; hip or knee; and leg or ankle/foot. A total score of the number of painful sites was also calculated. If the participants experienced pain in any of the regions, they were asked to specify the intensity on the Verbal Numerical Scale (VNS) [28]. For VNS, the worker was asked to "score" her/his pain between 0 representing "no pain" and 10 representing "the worst pain imaginable".

Data analysis

Descriptive statistics were used to present the basic features of the participants. Means, standard deviations (SD), medians and ranges were computed for variables rated on a continuous scale, and absolute value, percentage and 95 % confidence interval (CI) for categorical variables.

To compare means, Student *t* test or Mann–Whitney *U* test were performed depending on which was more appropriate, after verifying normality with the Kolmogorov–Smirnov test. Correlations between variables were computed with correlation coefficients (Spearman's Rho). Roland-Morris disability scores were dichotomised according to the median values (RMDQ > 3), and the scores 0 versus ≥1. ROC (receiver operative characteristic) curves were calculated to predict disability (RMDQ > median). In order to control variables that could result in confusion, a logistic regression analysis was performed.

The regression models were in turn repeated, replacing the Mental Health variable for the MCS of the SF-36.

All statistics were computed using the SPSS for Windows version 17 (SPSS, Chicago, IL, USA).

Results

The descriptive characteristics of the subjects included in the study are shown in Table 1. The mean age of the workers was 50.6 years (SD = 8.8, range = 18–69 years), and the sample is predominantly female (98.7 % women). The mean duration of employment as shellfish gatherers was 21.8 years (SD = 13.0). The most frequently reported comorbidity was rheumatic disorders (17.2 %) and depressive syndrome (16.1 %). The prevalence of *regularly* perceived lumbar pain was 65.5 %, and the mean pain intensity score was 6.1 points (SD = 1.8, range = 2-10 points). The median of pain site localisations was 3 sites (range = 0–11 sites).

Table 1. Descriptive characteristics of the shellfish gatherers (*N* = 929)

Variable	*N*	% (95% CI)	Mean ± SD	Median	Range
Sociodemographic variables					
Age in years	926		50.64 ± 8.8	52	18–69
Gender					
Females	917	98.7 (97.7–99.3)			
Males	12	1.3 (0.7–2.3)			
Years working as shellfish gatherers	918		21.8 ± 13.0	20	0–56
Lifestyle characteristics					
Smoking (yes)	160	17.3 (14.9–19.9)			
Cigarettes/day (number)	150		12.5 ± 8.1	10	1–40
Physical activity during leisure time[a] (yes)	420	45.3 (42.1–48.6)			
Comorbidity (*self-report*)					
Rheumatic disorders (yes)	159	17.2 (14.8–19.8)			
Depressive syndrome (yes)	149	16.1 (13.8–18.6)			
Diabetes (yes)	33	3.6 (2.5–5.0)			
Neoplasms (yes)	26	2.8 (1.9–4.1)			
Back surgery (yes)	9	1.0 (0.5–1.9)			
Other diseases (yes)	276	29.8 (26.9–32.8)			
MSP localisation according to anatomical area groupings					
Neck/shoulders/higher back	764	82.4 (79.8–84.8)			
Lower back	607	65.5 (62.3–68.5)			
Elbow/wrist/hand	473	51.0 (47.8–54.3)			
Hip/knee	449	48.4 (45.2–51.7)			
Leg/ankle/foot	318	34.3 (31.3–37.5)			

CI confidence interval, *SD* Standard deviation, *MSP* musculoskeletal pain
[a]Physical activity during leisure time (minimum 30 min/3 times per week)

The mean Roland-Morris disability score was 4.9 (SD = 4.7) points, the median 3, whilst the point range varied between 0 and 23 (Fig. 2). The most frequent functional disability variables were as follows: “I change position frequently to try to make my back feel comfortable” (68.2 %); “I don’t sleep so well because of my back” (37.8 %) and “I find it difficult to turn over in bed because of my back” (37.2 %).

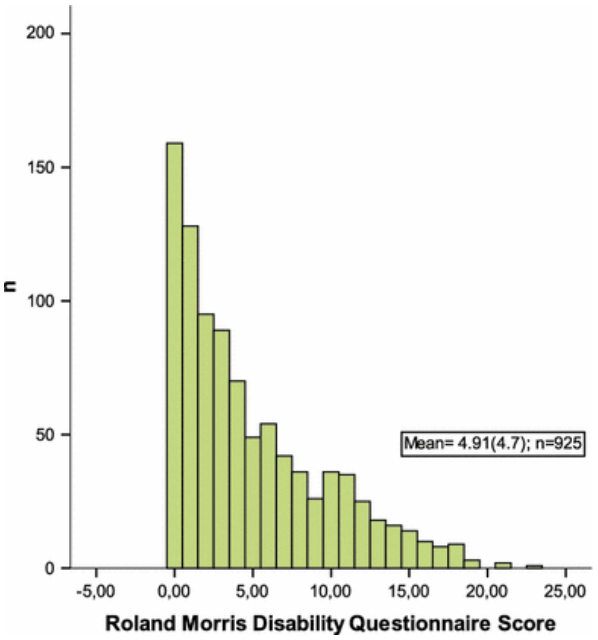

Fig. 2. Distribution of the shellfish gatherers in accordance with the Roland-Morris Disability Questionnaire [Roland-Morris Disability Questionnaire. Scores ranged from 0 (no disability) to 24 (severe functional disability)] scores

The univariate analysis (Table 2) revealed that functional disability is greater amongst women (RMDQ score) than men (4.9 compared to 3.2), although the difference is not statistically significant. Smokers scored lower than non-smokers (4.1 vs. 5.1, $P = 0.03$), and shellfish gatherers with rheumatic disorders and depressive syndromes obtained higher scores on the RMDQ than those without this comorbidity (7.8 vs. 4.3, $P \leq 0.001$ and 7.1 vs. 4.5, $P \leq 0.001$, respectively). Those participants with MSP in any of the 5 anatomical region studies have a higher degree of functional disability than the shellfish gatherers without MSP in these regions ($P \leq 0.001$).

Table 2. Mean score of the Roland-Morris Disability Questionnaire according to various covariables

Variable	Scores of RMDQ[a]		
	N	Mean ± SD	*P*
Gender			0.15
Females	914	4.9 ± 4.7	
Males	11	3.2 ± 4.3	
Smoking			0.03
Yes	158	4.1 ± 4.1	
No	767	5.1 ± 4.9	
Physical activity during leisure time			0.24
Yes	419	4.7 ± 4.7	
No	506	5.1 ± 4.8	
Rheumatic disorders			≤0.001
Yes	159	7.8 ± 5.5	
No	766	4.3 ± 4.3	
Depressive syndrome			≤0.001
Yes	149	7.1 ± 5.5	
No	776	4.5 ± 4.5	
Diabetes			0.19
Yes	33	6.2 ± 5.4	
No	892	4.9 ± 4.7	
MSP localisation according to anatomical area groupings			
Neck/shoulders/higher back			≤0.001
Yes	764	5.3 ± 4.8	
No	161	3.2 ± 4.1	
Lower back			≤0.001
Yes	607	5.8 ± 4.9	
No	318	3.2 ± 3.8	
Elbow/wrist/hand			≤0.001
Yes	472	5.8 ± 5.0	
No	543	4.0 ± 4.3	
Hip/knee			≤0.001
Yes	448	6.6 ± 5.2	
No	477	3.3 ± 3.7	
Leg/ankle/foot			≤0.001
Yes	318	6.8 ± 5.2	
No	607	3.9 ± 4.1	

Calculated with Student *t* test or a Mann–Whitney *U* test
SD standard deviation, *MSP* musculoskeletal pain, *RMDQ* Roland-Morris Disability Questionnaire
[a]Scores ranged from 0 (no disability) to 24 (severe functional disability)

Likewise, we observed that Roland-Morris disability scores show a positive correlation with the age, years worked, pain intensity and number of regions with MSP, and a significantly negative one with Mental Health and the MCS of the SF-36 (Table 3). The highest Spearman's Rank Correlation corresponds to the number of regions with MSP ($r = 0.50$) and the lowest to the number of years worked in shellfish gathering ($r = 0.23$). The Areas Under the Curve (ROC curves) values to predict disability are also shown in Table 3. The highest value corresponds to number of regions with MSP variable.

Table 3. Correlation between Roland-Morris disability scores and different variables and Area Under the Curve (AUC) to predict disability (RMDQ)

Variable	*N*	Spearman's Rho correlation coefficient	*P*	AUC[a]
Sociodemographic variables				
Age in years	923	0.25	≤0.001	0.614
Years working as shellfish gatherers	916	0.23	≤0.001	0.599
VNS—pain (0–10)	921	0.46	≤0.001	0.708
Number of sites with MSP	924	0.50	≤0.001	0.727
Health related quality of life (*SF-36*)				
Mental health (MH)	925	−0.36	≤0.001	0.680
Mental component summary (MCS)	923	−0.29	≤0.001	0.645

Correlation coefficients (Spearman's Rho) for Roland-Morris disability scores and sociodemographic, characteristics of musculoskeletal pain and SF-36 scores (MH and MCS)
AUC area under the curve (ROC curves) to predict disability (Roland-Morris disability scores >3), *RMDQ* Roland-Morris Disability Questionnaire, *VNS* Verbal Numerical Scale (0–10), *MSP* musculoskeletal pain, *SF-36* Medical Outcomes Study 36-Item Short-Form Health Survey questionnaire

The logistic regression model for predicting functional disability based on a score higher than the median (RMDQ > 3) (Model 1) is shown in Table 4. This model identifies the variables with an independent effect on predicting disability caused by lumbar pain as age, physical exercise, the presence of lumbar pain, the degree of intensity of this pain, the number of regions with MSP and the Mental Health dimension of the SF-36. In addition, Table 4 (Model 2) shows the logistic regression model for predicting any form of disability (RMDQ ≥ 1). This model identifies the predictive variables as age, the presence of lumbar pain, the degree of intensity of this pain and the Mental Health dimension of the SF-36.

Table 4. Logistic regression models to predict disability caused by lumbar pain through the inclusion of a number of covariables

Variable	*B*	E.T.	*P*	Odds ratio (95 % CI)
Model 1 (*RMDQ* > 3)				
Gender	−0.07	0.77	0.93	0.93 (0.21–4.23)
Age	0.04	0.01	≤0.001	1.04 (1.02–1.07)
Years working as shellfish gatherers	0.00	0.01	0.56	1.00 (0.99–1.02)
Smoking (yes/no)	0.11	0.22	0.62	1.11 (0.73–1.71)
Physical activity during leisure time (yes/no)	−0.56	0.16	≤0.001	0.57 (0.42–0.79)
Rheumatic disorders (yes/no)	0.24	0.23	0.30	1.27 (0.81–1.97)
Lower back pain (yes/no)	0.71	0.20	≤0.001	2.03 (1.38–3.00)
Neck/shoulders/higher back pain (yes/no)	0.06	0.26	0.82	1.06 (0.64–1.77)
Elbow/wrist/hand pain (yes/no)	−0.02	0.20	0.90	0.98 (0.66–1.44)
Hip/knee pain (yes/no)	0.11	0.21	0.59	1.12 (0.74–1.68)
Leg/ankle/foot pain (yes/no)	0.13	0.22	0.56	1.14 (0.74–1.77)
VNS—pain (0–10)	0.15	0.03	≤0.001	1.16 (1.10–1.23)
Numbers of sites with MSP (0–11)	0.22	0.09	0.01	1.24 (1.05–1.47)
Mental health (SF-36)	−0.51	0.01	≤0.001	0.95 (0.94–0.97)
Constant	−1.58	1.02	0.12	0.21
Model 2 (*RMDQ* ≥ *1*)				
Gender	0.27	0.74	0.71	1.31 (0.31–5.53)
Age	0.03	0.01	0.04	1.03 (1.00–1.05)
Years working as shellfish gatherers	0.01	0.01	0.59	1.01 (0.99–1.02)
Smoking (yes/no)	−0.16	0.25	0.53	0.85 (0.52–1.40)
Physical activity during leisure time (yes/no)	−0.05	0.20	0.82	0.95 (0.64–1.42)
Rheumatic disorders (yes/no)	0.09	0.36	0.79	1.10 (0.55–2.20)
Lower back pain (yes/no)	0.74	0.26	0.005	2.10 (1.25–3.50)
Neck/shoulders/higher back pain (yes/no)	0.56	0.31	0.07	1.75 (0.95–3.23)
Elbow/wrist/hand pain (yes/no)	−0.03	0.27	0.92	0.97 (0.57–1.66)
Hip/knee pain (yes/no)	0.43	0.30	0.14	1.54 (0.86–2.75)
Leg/ankle/foot pain (yes/no)	0.24	0.32	0.45	1.27 (0.68–2.36)
VNS—pain (0–10)	0.20	0.04	≤0.001	1.22 (1.13–1.31)
Numbers of sites with MSP (0–11)	0.19	0.15	0.19	1.21 (0.91–1.62)
Mental health (SF-36)	−0.03	0.01	0.001	0.97 (0.95–0.99)
Constant	−0.62	1.13	0.58	0.54

Model 1 presents results of regression analyses for predicting disability (RMDQ > 3), and Model 2 presents results of regression analyses for predicting disability (RMDQ ≥ 1)
CI confidence interval, *RMDQ* Roland-Morris Disability Questionnaire, *VNS* Verbal Numerical Scale (0–10), *MSP* musculoskeletal pain

We repeated the models, but this time replacing the SF-36 Mental Health variable with the SF-36 MCS. In this case, the predictive variables remained unchanged.

Discussion

This study provides information concerning functional disability caused by lumbar pain amongst shellfish gatherers in Galicia and the determining factors.

There are no significant sociodemographic differences between participants and non-participants. Of the total population of shellfish gatherers, 94 % are women and 67 % are aged between 40 and 60 [16]. Our sample was also predominantly female (98 % are women), middle aged (51) and with a mean value of 22 years' experience in shellfish gathering.

The results indicated that this sub-group of blue collar workers have only slight functional disability despite the high incidence of lumbar pain (65.5 % claim to suffer regularly from lumbar pain). This finding, about the high prevalence of lumbar pain, is consistent with other studies about workers in the agricultural-farming-fishing sectors [29–31]. The factors associated with disability caused by lumbar pain were age, physical activity, lumbar pain, pain intensity, generalised pain (MSP in multiple regions) and poor mental health (SF-36 MH or MCS).

The mean score on the RMDQ of almost 5 points (out of a maximum of 24) is lower in comparison with the results obtained in many other studies [7, 32–34] which obtained Roland-Morris scores of between 7 and 17 points. However, these scores correspond to patients that receive treatment for their lumbar pain, unlike our sample, where the vast majority are active workers. In the case of the shellfish gatherers, lumbar pain has the greatest impact on aspects such as remaining in the same posture over a period of time and resting in bed.

According to our results, those participants that carry out physical activity experience a lower degree of disability caused by lumbar pain. This finding was also observed by the authors of the most recent systematic review of this association in persons suffering from chronic lumbar pain [35]. However, given that our results were obtained from a cross section and that no causality can be inferred in this type of studies, it would appear to indicate that either physical activity prevents functional disability caused by lumbar pain or that those persons with the highest degree of disability caused by lumbar pain fail to carry out or have given up regular physical activity.

In our study, rather than analysing each of the possible factors that impact on disability caused by lumbar pain, we instead found that both physical (specifically the degree of intensity of pain and the number of regions with MSP) and psychological factors (such as depression, anxiety, conduct control and general well-being), assessed using the SF-36 Mental Health dimension, are capable of predicting disability. Nevertheless, the various statistical analyses we have carried out have also shown that the predictive value of physical factors is slightly higher than that of the psychological ones.

Our results contribute to the current debate, given that the evidence as to whether the principal factors that determine disability are physical aspects related to the degree of pain (e.g. intensity, duration or generalised nature) or psychological ones (e.g. depression, anxiety, etc.) is inconclusive. The analysis of studies that have used the RMDQ to assess functional disabilities has revealed the following:

Some authors have observed that both pain-related physical aspects and psychological factors predict functional disability [36, 37]. Woby et al. [37], for instance, report that pain intensity accounted for an additional 24 % and psychological factors accounted for an additional 22 % of the variance in disability (RMDQ) in patients with chronic low back pain.

Other authors consider psychological factors to be more predictive than severe pain [38, 39]. In a 4-year prospective study to monitor patients with lumbar pain, Burton et al. [38] found that the disability score was statistically significantly related to baseline depressive symptoms (22 % of the variance) and higher pain intensity (4 %).

Unlike the findings referred to above, a number of studies have identified only a weak correlation between psychological factors and functional disability [33].

Finally, certain studies reflect findings similar to ours, whereby both types of factors—physical and psychological—are predictive of disability, although the former rank amongst the most predictive [7, 32, 34, 40]. In the final multivariable regression models, Grotle et al. [7] showed that having widespread pain (also measured in our study in terms of the number of pain regions), was one of the strongest prognostic indicators for disability in patients with acute, sub-acute or chronic lumbar pain.

One of the potential limitations of the present study is that the participants were volunteers, so this bias in selection may have had some influence on results. Nevertheless, 77.3 % of fishermen's guilds participated in the study, and as we stated earlier, the profile of non-participants is similar to that of the sample in terms of gender and age. Of the total population of shellfish gatherers, 94 % are women and 67 % are aged between 40 and 60. Our sample was also predominantly female and middle aged. Another limitation to consider for interpretation of this study is related to unmeasured factors such as those related with the job. We have only studied the years worked, whilst other authors have focused their analysis on the employment status [7, 36] and employment characteristics [41]. In general, these factors have not demonstrated to be predictive factors of functional incapacity. Finally, the design used in this study is cross-sectional; therefore, causality of the associations cannot be established from the findings.

One of the strengths of our study is the use of validated questionnaires such as the RMDQ and SF-36 which are also highly recommended for persons with lumbar pain.

We propose that future research should consider the potential effect of musculoskeletal comorbidity on lumbar pain for two principal reasons. The first is that people suffering from lumbar pain often also experience musculoskeletal pain in other regions, and secondly, and as our results have shown, this has a major impact on disability. We also posit that functional disability caused by lumbar pain and its treatment should be considered and acted upon in accordance with the principles of the biopsychosocial model, given that certain physical characteristics of pain and aspects related to the individual's psychological sphere play a predictive role in this disability.

Conclusions

The results of this study show that functional disability caused by lumbar pain is determined by the pain-related physical characteristics and those related to mental health, although the former play a more predominant role. In decreasing order of importance, the determining factors observed are the presence of lumbar pain, the number of regions with musculoskeletal pain, pain intensity and age. Better mental health (MH of the SF-36) and regular physical activity have a protective impact on this disability.

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