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Original article

Predictors of return to work after multidisciplinary rehabilitation program for patients with chronic low back pain

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ABSTRACT

Introduction. – Patients with chronic low back pain face functional, psychological, social and professional difficulties. Multidisciplinary rehabilitation programs (MRP) can be an effective treatment to help these patients to improve their condition and return to work.
Objective. – To determine baseline predictors for return to work after an MRP for patients with chronic low back pain struggling to maintain their job.
Methods. – A monocentric cohort study was conducted. Patients who had followed a MRP between January 2015 and December 2020 were included. The program consisted of physical activities and different workshops inspired by behavioural therapy, at full time during one month. Pain, lifestyle, history of the disease, function, psychosocial characteristics were evaluated at baseline. Return to work at different possible time point after the MRP was collected. A bivariate and a multivariate analysis were performed to evaluate which factors were associated with return to work.
Results. – Overall, 251 patients were included. Professional status, duration off work, intensity of low back pain, self-perceived disability, fear-avoidance beliefs at work were associated with return to work after the MRP on bivariate analysis. Having worked in the past 6 months and the absence of high fear-avoidance beliefs at work at baseline were associated with return to work on multivariate analysis.
Discussion. – This study suggests that patients with chronic low back pain and professional difficulties need to be included quickly in a MRP, with specific attention to beliefs about pain.

1. Introduction

Low back pain (LBP) is the leading cause of years lived with disability worldwide and therefore represents a major public health issue [1]. The point prevalence of LBP is estimated at 11% [2], and 65% of patients who experience acute LBP may still have pain at 1 year [3]. The high cost of LBP is due to loss of productivity of affected workers and high consumption of healthcare [4]. Chronic LBP (CLBP) is a complex and multidimensional pathology, involving biophysical, psychological, social and genetic factors [5]. Patients may have to deal with functional disability, psychological and social issues [5]. Many people with CLBP may also have difficulties remaining at work [5].

Multidisciplinary rehabilitation programs (MRPs) have been developed for managing CLBP [6]. These programs involve several healthcare providers in the same place (e.g., rheumatologists, physiotherapists, psychologists, pain specialists). They involve physical activities with at least one other treatment modality such as patient education or cognitive behavioural therapy [6]. However, the paradigms for managing LBP have evolved over the last decades [7], which may have changed the content of these programs. Some programs were inspired by "back schools" at their beginning [8]. Patient education via back schools was based on biomechanical factors, and the content emphasized "right postures and gestures". Regardless, back schools had limited effectiveness [9], and their paradigm was challenged [10]. In addition, the fear–avoidance model, developed over the last 30 years and improved several times, has influenced the management of LBP. This model proposes that for certain patients, fear of pain leads to avoidance behaviour, the consequences of which result in the persistence of pain

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[11]. Practitioners working in MRPs may now give priority to the use of reassurance and gradual exposure, inspired in particular by cognitive-behavioural therapies [12] rather than education from back schools.

MRPs can last several days for several weeks [13,14]. These programs are an effective option for improving pain and function as compared with other treatment options such as standard care, surgery or waiting list [6]. However, as a time- and resource-consuming treatment option, they are designed for patients who are off work and have psychosocial risk factors such as emotional difficulties, maladaptive beliefs and behaviours, or conflict with employers [15,16]. Guidelines recommend these programs as third-line treatments when standard care fails (e.g., counselling, exercises, drugs) [14–17].

Current research has focused on improving the selection of patients for MRPs by identifying predictors of efficacy of an MRP [13,18]. Given the costs and constraints of these programs, determining baseline predictors of a return to work is an important challenge for optimising the inclusion of patients. Some studies have examined predictors of functional improvement after an MRP, finding that psychological factors (e.g., anxiety, depression, catastrophism or avoidance behaviour) at the beginning of an MRP can predict function after the MRP [13]. To our knowledge, only two studies have described predictors of a return to work after an MRP [8,19]; the studies differed in content (duration of the program, professional involved), and most of the data are more than 20 years old. Given the limited number of existing studies, their old data and the evolution of paradigms, new studies on the predictors of MRPs are required.

The main objective of this study was to identify baseline predictors of a return to work after an MRP for patients with CLBP. The secondary objective was to explore patient evolution during a program.

2. Methods

2.1. Study design

We conducted a retrospective monocentric cohort study in the rheumatology department of Pitié-Salpétrière hospital in Paris, France. Data were collected between January 2015 and December 2020 and analysed in 2023.

2.2. Population

All patients who were included in the MRP of the Pitié-Salpétrière rheumatology department were screened for inclusion in this retrospective cohort study. Inclusion criteria were (1) CLBP and (2) professional difficulties due to CLBP ($\geq$ 1 month work absenteeism due to CLBP within the year preceding inclusion or current sick leave due to CLBP with a medium-term plan to return to work). Exclusion criteria were (1) not in the labour market (retired, students in initial training, stay-at-home mother or father) and (2) not attending at least 3 weeks of the program.

2.3. Protocol

During the first and last days of the program, patients underwent a clinical interview, physical examination, and physical tests and completed a psychosocial self-questionnaire. The program had a duration of 4 weeks: 5 days per week and 6 hours per day. The multidisciplinary healthcare team consisted of trainers in physical activities, physiotherapists, a rheumatologist, a pain physician, an occupational therapist, a psychomotor therapist, a psychologist, a social worker and a dietician. The program consisted of physical activities and exercises (stretching, muscular strengthening, cardio training, motor-control, balneotherapy, adapted physical activities), patient education (pathophysiology of the spine, neurophysiology of pain, healthy eating, low-stress gestures and postures) and specific workshops (detailed program content is in Supplementary material). Groups of 4 to 5 patients performed the activities. At the patient's request or the team's suggestion, individual dietetic, psychological or social care was possible.

A systematic follow-up was scheduled at 1, 3 and 6 months. Patients were encouraged to pursue physical activities and resume a professional activity.

2.4. Collected data

We collected data for analysis from the initial medical examination, physical tests and self-questionnaire: demographic data, information about lifestyle, professional status, history of the disease, clinical characteristics, pain intensity (visual analogue scale [VAS]) [20], range of motion (fingertip-to-floor distance) [21], muscle endurance (Sorensen and Shirado tests) [22,23], psychosocial health risk factors at work (Karasek questionnaire) [24], anxiety and depression (Hospital Anxiety and Depression scale [HAD]) [25], functional disability self-perceived (Oswestry Disability Index [ODI]) [26], fear–avoidance behaviours and patient's beliefs related to their pain (Fear-Avoidance Beliefs Questionnaire [FABQ]) [27,28], catastrophizing (Pain Catastrophizing Scale [PCS]) [29] and Patient Acceptable Symptom State [30].

2.5. Outcome

For the main outcome, we collected the patient's effective work (part or full time) at the last follow-up. The last follow-up refers to the last time the patient came to the hospital for the systematic follow-up at 1, 3 or 6 months or during the subsequent follow-up. If the patients had never returned to the hospital, we tried to contact them by phone call three times, and if we were unable to reach them by phone call, we considered the data as missing.

2.6. Statistical analysis

Results are described with means and SD for quantitative variables with normal distribution, medians and interquartile range for quantitative variables with non-normal distribution, and number and percentage for categorical variables. Description of the sample was made. Baseline characteristics of patients with and without follow-up were compared.

For our secondary objective, exploratory analyses were carried out using paired Student's *t*-tests or Wilcoxon to compare pain, physical performances and psychosocial score before and at the end of the program.

We performed a bivariate analysis, comparing baseline characteristics of patients who returned and did not return to work at last follow-up. We explored the association between baseline variables and a return to work, testing both continuous and categorical coded variables whenever possible. We performed two sensitive analyses: a bivariate analysis comparing baseline characteristics of patients who returned to work and those who did not return to work at 6-month follow-up and a bivariate analysis without patients who completed the program close to the COVID-19 pandemic (the last quarter of 2019 and the year 2020). We used the Student *t*-test for variables with a normal distribution and the Wilcoxon test otherwise for quantitative variables and Chi^2 test for categorical variables.

For the main analysis, we performed a multivariate analysis to determine which characteristics at baseline were statistically associated with a return to work at last follow-up. For this purpose, we used a logistic regression model. We estimated odds ratios (ORs)

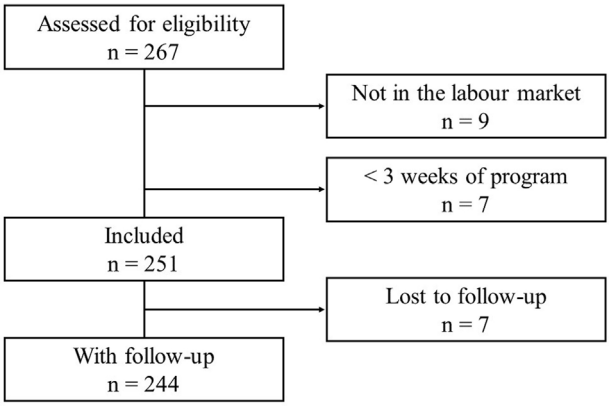

Fig. 1. Flow chart of patients with chronic low back pain who followed a multidisciplinary rehabilitation program at Pitié-Salpétrière hospital from January 2015 to December 2020.

and 95% confidence intervals (CIs). The explained variable was the return to work at the last follow-up. Quantitative explanatory variables were age (years), duration of LBP (months), pain intensity in the low back (VAS), pain intensity in the leg (VAS), range of movement (fingertip-to-floor distance in centimeters), and muscle endurance (Sorensen and Shirado tests, in seconds). Binary explanatory variables were sex, work status in the last 6 months (off work or working), sport practice, smoking, previous low back surgery, presence of social isolation or tension at work (Karasek questionnaire) [24], symptoms of anxiety or depression (HAD score > 10/21) [25], having a severe disability (ODI score > 60/100) [26], high baseline fear–avoidance behaviours and patient beliefs related to their pain (FABQ Activity score > 15/24; FABQ Work score > 34/42) [28], and high catastrophizing (PCS score > 29/52) [31]. The variables were chosen a priori to avoid overfitting. Continuous variables were binary coded to facilitate interpretation of the results. Missing data were considered missing at random and were imputed: categorical data by using a proportional odds model and quantitative data by using predictive mean matching. One imputed dataset was used for data analysis. Sensitivity analyses were performed at 6-month follow-up with imputed data.

$P < 0.05$ was considered statistically significant. All statistical tests involved using R 4.2.1.

2.7. Ethical and legal considerations

According to French law, this study is an observational usual-care study. All patients were informed that their data could be used for statistical analysis and they could withdraw their consent at any time. This study was declared to the data police officer of the hospital, and registered on 5 April 2022 (No. 20220405180932).

2.8. Role of the funding source

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

3. Results

3.1. Population description

Over the study period, 267 patients had completed the program and 16 were excluded (Fig. 1). Among the 251 patients included, 7 were lost to follow-up after the end of the MRP. The population included 57% women; the mean age was 41 years and median onset of symptoms 20 months. Overall, 86% of patients were unemployed or on sick leave, with a median duration off work of 9 months before the MRP. The median last follow-up was 6 months after the end of the MRP (mean: 17 ± 20 months). Baseline characteristics are in Table 1.

Table 1
Baseline characteristics of patients with chronic low back pain who followed a multidisciplinary rehabilitation program at the Pitié-Salpétrière between January 2015 and December 2020.

Variables	Overall ($n = 251$)[a]	NA (%)
Female	143 (57.0)	0.0
Age (years)	41.76 (± 8.96)	0.0
Professional status		
Sick leave	158 (62.9)	0.0
No job	58 (23.1)	
Actively working	35 (13.9)	
Lifestyle		
In couple	143 (67.8)	15.9
Duration off work (months)	9.00 [3.00, 17.00]	5.6
Working in the past 6 months	99 (41.8)	5.6
Sport	60 (26.0)	8.0
Smoking	78 (33.2)	6.4
History of the disease		
Onset of symptoms (months)	20.00 [12.00, 48.00]	0.8
Work accident	102 (63.7)	36.3
History of lumbar surgery	55 (21.9)	0.0
Stage 3 analgesic	14 (5.6)	0.0
Pain		
VAS low back (0–100)	54.72 (± 20.18)	0.8
VAS leg (0–100)	42.00 [19.00, 60.00]	0.8
Physical performances		
Fingertip-floor distance (cm)	19.50 [9.00, 34.75]	0.4
Sorensen (s)	38.00 [18.00, 70.00]	0.8
Shirado (s)	57.00 [30.50, 115.50]	0.0
Karasek		
Isolation strain	66 (29.6)	11.2
Job strain	26 (11.7)	
No job strain	131 (58.7)	
HAD		
HAD – Depression (0–21)	8.83 (± 4.16)	1.2
Certain symptoms of depression	85 (34.3)	1.2
Doubtful symptoms of depression	66 (26.6)	
No symptoms of depression	97 (39.1)	
HAD – Anxiety (0–21)	10.17 (± 4.08)	1.2
Certain symptoms of anxiety	106 (42.7)	1.2
Doubtful symptoms of anxiety	77 (31.0)	
No symptoms of anxiety	65 (26.2)	
ODI (0–100)	41.61 (± 13.64)	1.2
Minimal disability	24 (9.7)	1.2
Moderate disability	17 (6.9)	
Severe disability	106 (42.7)	
Crippled	100 (40.3)	
Bed-ridden	1 (0.4)	
FABQ – Work (0–42)	29.00 [18.00, 37.00]	5.6
FABQ work–high fear-avoidance beliefs	73 (30.8)	5.6
FABQ – Activity (0–24)	14.00 [9.00, 20.00]	4.4
FABQ activity – high fear-avoidance beliefs	103 (42.9)	4.4
PCS	27.32 (± 12.83)	8.4
High catastrophizing	95 (41.3)	8.4
PASS – Satisfied	69 (28.0)	2.0
Return to work at last follow-up	123 (50.4)	2.8
Duration until last follow-up	6.00 [6.00, 24.00]	2.8
Return to work at 6 months	87 (50.3)	31.1

VAS: Visual Analogic Scale; s: seconds; cm: centimetres; COMI: Core Outcome Measured Index; HAD: Hospital Anxiety and Depression; ODI: Oswestry Disability Index; FABQ: Fear-Avoidance Belief Questionnaire; PCS: Pain Catastrophizing Scale; PASS: Patient Acceptable Symptom State.

[a] Mean (± standard deviation) or *n* (%) or median [1st quartile, 3rd quartile].

Baseline characteristics of patients with ($n = 244$) or without ($n = 7$) follow-up after the MRP did not significantly differ after correction for alpha risk inflation in the context of multiple comparisons (Supplementary material).

3.2. Patient evolution during the MRP

Characteristics of the 251 patients at the beginning (T0) and end (T4) of the MRP are in Table 2. Median lumbar pain intensity (VAS

Table 2
Comparison of bio-psychosocial characteristics between baseline (T0) and the end of the program (T4) months for patients with chronic low back pain who followed a multidisciplinary rehabilitation program at the Pitié-Salpétrière between January 2015 and December 2020.

Variable	T0[a]	T4[a]
Pain		
VAS low back (0–100)	59.00 [41.00, 70.00]	48.00 [20.00, 65.00]***
VAS leg (0–100)	42.00 [19.00, 60.00]	39.00 [10.00, 60.00]
Physical performances		
Fingertip-floor distance (cm)	19.50 [9.00, 34.75]	9.00 [0.00, 22.50]***
Sorensen (s)	38.00 [18.00, 70.00]	75.00 [45.00, 112.25]***
Shirado (s)	57.00 [30.50, 115.50]	104.00 [57.00, 180.00]***
HAD – Depression (0–21)	9.00 [6.00, 12.00]	6.00 [4.00, 9.25]***
HAD – Anxiety (0–21)	10.00 [7.00, 13.00]	9.00 [6.00, 12.00]**
ODI (0–100)	41.61 (± 13.64)	33.61 (± 15.02)***
FABQ – Work (0–42)	29.00 [18.00, 37.00]	26.00 [13.00, 36.00]
FABQ – Activity (0–24)	14.00 [9.00, 20.00]	7.00 [2.00, 12.25]***
PCS (0–52)	27.50 [17.25, 38.00]	16.00 [8.00, 32.00]***

VAS: Visual Analogic Scale; s: seconds; cm: centimetres; COMI: Core Outcome Measured Index; HAD: Hospital Anxiety and Depression; ODI: Oswestry Disability Index; FABQ: Fear-Avoidance Belief Questionnaire; PCS: Pain Catastrophizing Scale; PASS: Patient Acceptable Symptom State.
*$P < 0.05$.
[a] Mean (± standard deviation) or median [1st quartile, 3rd quartile].
** $P < 0.01$.
*** $P < 0.001$.

0–100) changed significantly from 59 at T0 to 48 at T4 ($P < 0.001$). Median function score (ODI 0–100) changed significantly from 41 (severe disability) to 33 (moderate disability) ($P < 0.001$). Median depression score (HAD Depression 0–21) changed significantly from 9 ("doubtful symptoms") to 6 ("no symptoms") ($P < 0.001$). Although the median subscore of fear and avoidance beliefs in daily activities (FABQ Activity 0–24) changed significantly from 14 at T0 to 7 at T4 ($P < 0.001$), the subscore of these beliefs in work activities (FABQ Work 0–42) did not change significantly, from 29 to 26 ($P = 0.112$).

3.3. Bivariate analysis of predictors of return to work

At last follow-up, 50% of patients (123 of 244) had returned to work after the MRP. Patient professional status was associated with a return to work ($P < 0.001$) as were a shorter duration off work ($P < 0.001$) and having worked in the past 6 months ($P < 0.001$). Return to work was associated with lower intensity of back pain (VAS), lower self-perceived disability (ODI), lower score of fear–avoidance beliefs at work (FABQ Work) and the absence of high fear–avoidance beliefs at work ($P < 0.05$) (Table 3). No other associations were found, such as depression and high catastrophizing (Fig. 2).

Sensitivity analysis of return to work at 6 months showed the same proportion of patients returning to work (50%, 87 of 173). Return to work at 6 months was associated with the following characteristics at inclusion: professional status, duration off work, having worked in the past 6 months, lower intensity of LBP, lower score of fear–avoidance beliefs at work (FABQ Work) and absence of high fear-avoidance beliefs at work ($P < 0.05$). Contrary to the analysis at last follow-up, a return to work at 6 months was associated with shorter onset of symptoms and lower intensity of leg pain ($P < 0.05$) but not lower self-perceived disability (ODI) (Supplementary material).

Sensitivity analysis of a return to work at last follow-up without patients who completed the program close to the COVID-19 pandemic gave similar results (Supplementary material).

3.4. Multivariate analysis of predictors of return to work

The probability of a return to work at last follow-up was increased with working in the past 6 months (OR: 2.41 [95% CI: 1.37–4.30], $P = 0.002$) and decreased with high baseline fear–avoidance beliefs at work (OR: 0.48 [95% CI: 0.24–0.93], $P = 0.033$) (Table 4). The same results were found on sensitivity analysis at 6-month follow-up.

4. Discussion

The main objective of this study was to identify baseline predictors of return to work after an MRP for patients with CLBP. The probability of returning to work after an MRP was decreased with being off work more than 6 months before the MRP and high baseline fear–avoidance beliefs at work.

These results have implications for daily practice. For CLBP patients with difficulties maintaining their job, psychosocial risk factors, and previous treatment with insufficient efficacy, early inclusion in an MRP seems relevant. This finding is consistent with two other studies [8,19]. The first study showed that duration on sick leave predicted a return to work [8]. The second study showed that more than 6 months off work before a program reduced the probability of being at work 1 year after a rehabilitation program [19]. Our analyses also showed that the FABQ Work score (interpreted as fear–avoidance beliefs at work) predicted return to work after an MRP. This finding is consistent with the literature on the importance of pain interpretation and coping behaviour in functional recovery [13]. The FABQ Work score was also one of the only variables that did not improve over the course of the program. However, the FABQ Activity score evolved over the course of the program and did not predict return to work. These results may seem contradictory, but the FABQ Work score may not be representative of patients' beliefs. Indeed, the unidimensionality of the FABQ questionnaire has been questioned [32]. The measure could be more revealing of the patient's work-related expectations than beliefs linked to fear and avoidance [32]. In this hypothesis, patients' work itself would be the main barrier, not beliefs. An alternative hypothesis would be that interventions aimed at modifying work-related fear and avoidance beliefs may not be sufficiently effective. In this case, a component could be added to the program to target this poor prognostic factor. It could be a specific intervention inspired by cognitive and behavioural therapies.

Other cognitive and emotional variables, such as anxiety, depression or catastrophizing, did not appear to affect the probability of returning to work. However, some studies suggest that depressive symptoms for example can sometimes exclude one from inclusion in a program [33]. Our results show that patients with certain symptoms of depression have the same chance of a return to work and can therefore be included in these programs.

Table 3
Main bivariate analysis of factors associated with return to work at the last follow-up for patients with chronic low back pain who followed a multidisciplinary rehabilitation program at the Pitié-Salpétrière between January 2015 and December 2020.

Variables	No return to work[a] (n = 121)	Return to work[a] (n = 123)
Female	69 (57.0)	69 (56.1)
Age (years)	42.10 (± 9.34)	41.58 (± 8.64)
Professional status		
Sick leave	74 (61.2)	77 (62.6)
No job	43 (35.5)	15 (12.2)***
Actively working	4 (3.3)	31 (25.2)***
Lifestyle		
In couple	67 (65.0)	72 (71.3)
Duration off work (months)	12.00 [6.00, 21.00]	5.00 [0.00, 11.00]***
Working in the past 6 months	35 (30.4)	63 (54.8)***
Sport	24 (21.6)	33 (29.2)
Smoking	45 (38.5)	32 (28.8)
History of the disease		
Onset of symptoms (months)	21.00 [12.00, 48.00]	18.00 [11.00, 52.50]
Work accident	53 (65.4)	43 (58.9)
History of lumbar surgery	28 (23.1)	26 (21.1)
Stage 3 analgesic	7 (5.8)	6 (4.9)
Pain		
VAS low back (0–100)	57.34 (± 20.46)	51.79 (± 19.78)*
VAS leg (0–100)	45.00 [20.00, 62.00]	40.00 [15.00, 60.00]
Physical performances		
Fingertip-floor distance (cm)	20.00 [11.00, 34.00]	18.00 [8.00, 33.00]
Sorensen (s)	34.00 [16.00, 72.50]	42.00 [21.00, 68.00]
Shirado (s)	62.00 [31.00, 120.00]	52.00 [31.00, 114.50]
Karasek		
Decision latitude (0–96)	68.00 (± 12.18)	69.77 (± 12.67)
Psychological demands (0–36)	25.48 (± 4.78)	25.10 (± 4.06)
Social support (0–32)	21.96 (± 4.76)	22.78 (± 4.78)
Iso strain	33 (32.4)	28 (24.6)
Job strain	15 (14.7)	11 (9.6)
No job strain	54 (52.9)	75 (65.8)
HAD – Depression (0–21)	9.21 (± 3.91)	8.32 (± 4.37)
Certain symptoms of depression	41 (33.9)	39 (32.5)
Doubtful symptoms of depression	36 (29.8)	30 (25.0)
No symptoms of depression	44 (36.4)	51 (42.5)
HAD – Anxiety (0–21)	10.32 (± 3.96)	10.05 (± 4.26)
Certain symptoms of anxiety	50 (41.3)	53 (44.2)
Doubtful symptoms of anxiety	41 (33.9)	34 (28.3)
No symptoms of anxiety	30 (24.8)	33 (27.5)
ODI (0–100)	43.41 (± 14.45)	39.29 (± 12.62)**
Minimal disability	17 (14.2)	6 (5.0)
Moderate disability	6 (5.0)	11 (9.1)
Severe disability	50 (41.7)	55 (45.5)
Crippled	46 (38.3)	49 (40.5)
Bed-ridden	1 (0.8)	0 (0.0)
FABQ – Work (0–42)	32.00 [23.00, 38.00]	25.00 [15.00, 33.00]**
FABQ work–high fear-avoidance beliefs	41 (36.9)	26 (21.8)*
FABQ – Activity (0–24)	14.00 [9.00, 20.00]	15.00 [9.00, 19.00]
FABQ activity – high fear-avoidance beliefs	48 (41.4)	50 (42.7)
PCS (0–52)	28.21 (± 12.79)	26.28 (± 12.69)
High catastrophizing	45 (42.9)	47 (39.8)
PASS – Satisfied	33 (27.5)	35 (29.4)

VAS: Visual Analogic Scale; s: seconds; cm: centimetres; COMI: Core Outcome Measured Index; HAD: Hospital Anxiety and Depression; ODI: Oswestry Disability Index; FABQ: Fear-Avoidance Belief Questionnaire; PCS: Pain Catastrophizing Scale; PASS: Patient Acceptable Symptom State.

[a] Mean (± standard deviation) or n (%) or median [1st quartile, 3rd quartile].

* $P < 0.05$.

** $P < 0.01$.

*** $P < 0.001$.

We found an ability to work rate of 50% after the MRP as compared with 14% before the program. Hence, the program is effective regarding professional issues. The proportion of return to work after MRP varies from 55% to 90% worldwide [8,34]. However, the proportion of return to work for programs in France seems to be less than 70% [8]. The high rate of unemployment and the health and benefit system could play a role [34]. Only 50% of our patients returned to work, but our sample had a higher duration off work and a low rate of lost to follow-up as compared with other studies [8,13,19]. The meta-analysis by Kamper et al. showed no statistical or clinical difference between an MRP and usual care in proportion of return to work [6]. Insofar as these programs were specifically designed to help patients who struggle to maintain their jobs, these results raise questions. Indeed, these programs seem to present limited benefit as compared with usual care on this criterion, and the target population for these programs is the population with worse prognosis, as our main result showed. Several factors could explain the difficulties in improving the return to work. The lack of intervention in the workplace or of interaction with the various workplace actors in the continuity of the program could be a bar-

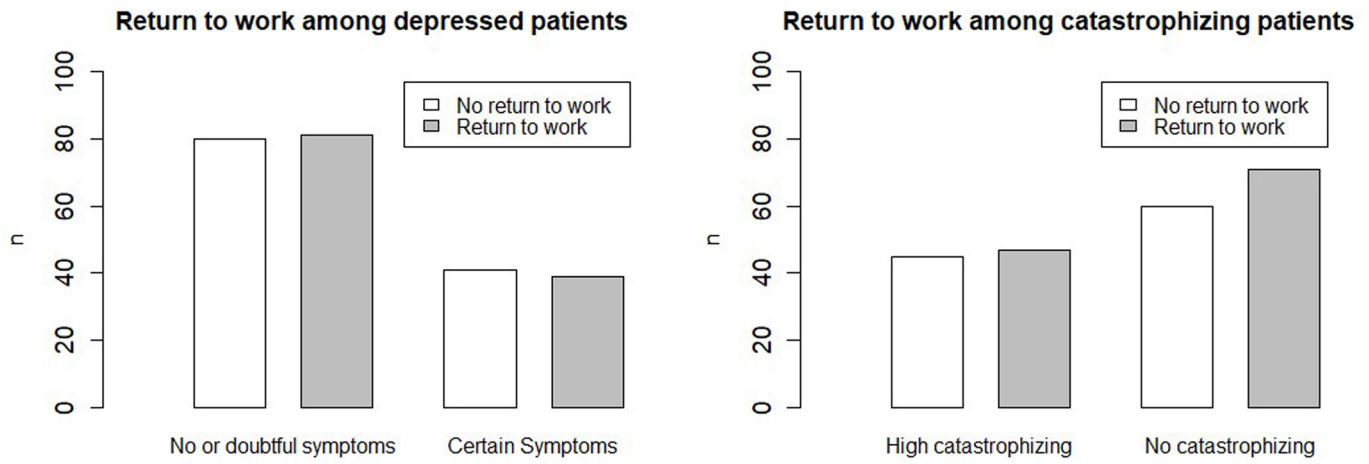

Fig. 2. Comparison of return to work at last follow-up among depressed or catastrophizing patients with chronic low back pain who followed a multidisciplinary rehabilitation program at Pitié-Salpétrière hospital from January 2015 to December 2020.

Table 4
Multivariate analyses of predictors of return to work at last follow-up and at 6 months on imputed data for patients with chronic low back pain who followed a multidisciplinary rehabilitation program at the Pitié-Salpétrière between January 2015 and December 2020.

Variables	RTW at last follow-up	RTW at 6 months
	OR (95% CI)	OR (95% CI)
Age (years)	0.99 (0.96, 1.03)	0.99 (0.95, 1.04)
Gender: female (ref: male)	0.68 (0.38, 1.22)	0.73 (0.32, 1.62)
In couple (ref: no couple)	1.16 (0.62, 2.17)	1.08 (0.48, 2.44)
Duration of low back pain (months)	1.00 (1.00, 1.01)	1.00 (0.99, 1.00)
Work in the past 6 months (ref: no)	2.41 (1.37, 4.30)**	5.77 (2.67, 13.2)***
Sport practice (ref: no)	1.25 (0.66, 2.41)	1.42 (0.61, 3.38)
Smoking (ref: no)	0.65 (0.36, 1.16)	0.63 (0.28, 1.39)
Past low back surgery (ref: no)	0.97 (0.48, 1.95)	1.00 (0.35, 2.84)
VAS – Low back pain (0–100)	0.99 (0.97, 1.00)	0.98 (0.96, 1.01)
VAS – Leg pain (0–100)	1.00 (0.99, 1.01)	0.99 (0.98, 1.01)
Fingertip-floor distance (cm)	0.99 (0.98, 1.01)	1.01 (0.98, 1.04)
Sorensen (s)	1.00 (0.99, 1.01)	1.00 (0.99, 1.01)
Shirado (s)	1.00 (0.99, 1.00)	1.00 (0.99, 1.00)
Karasek – Iso or job strain (ref: no job strain)	0.66 (0.37, 1.17)	1.03 (0.47, 2.25)
HAD – certain symptoms of depression (ref: no or doubtful)	1.11 (0.57, 2.17)	1.31 (0.51, 3.42)
HAD – certain symptoms of anxiety (ref: no or doubtful)	1.37 (0.70, 2.71)	1.31 (0.53, 3.32)
ODI – Severe or more disability (ref: minimal or moderate)	0.82 (0.43, 1.57)	1.24 (0.51, 3.03)
FABQ work – high fear-avoidance beliefs (ref: no)	0.48 (0.24, 0.93)*	0.12 (0.04, 0.33)***
FABQ activity – high fear-avoidance beliefs (ref: no)	1.50 (0.83, 2.76)	2.11 (0.91, 5.11)
PCS – High catastrophization (ref: no)	0.92 (0.45, 1.85)	0.94 (0.36, 2.49)
PASS – Satisfied (ref: unsatisfied)	0.84 (0.44, 1.62)	1.20 (0.49, 2.92)

RTW: return to work; LFU: last follow-up; OR: odd ratio; CI: confidence interval; VAS: Visual Analogic Scale; s: seconds; cm: centimetres; HAD: Hospital Anxiety and Depression; ODI: Oswestry Disability Index; FABQ: Fear-Avoidance Belief Questionnaire; PCS: Pain Catastrophizing Scale; PASS: Patient Acceptable Symptom State.

* $P < 0.05$.

** $P < 0.01$.

*** $P < 0.001$.

rier [35]. However, an MRP continues to provide better results for other outcomes such as pain and function as compared with other therapies [6].

Our work has some limitations. First, we did not collect some variables of interest such as comorbidities and type of work. However, previous studies examining these factors did not show an association with return to work [8,19,36]. We had to deal with some missing data and one third of the patients not attending the 6-month follow-up. Hence, we conducted and presented two analyses, at 6 months and at the patient's last follow-up. The coding of continuous variables as binary variables in our multivariate analyses may have led to loss of information. However, we chose this coding in order to clarify the interpretation. To transform our variables, we used cut-offs found in the literature.

Our study has several strengths to reinforce the existing literature. First, our sample size was 251 patients, which is larger than that in most available studies [8,13,19,36]. Also, the proportion of patients lost to follow-up was relatively low as compared with other studies [8,19,36].

Several predicting factors, such as patient's coping strategies and feelings of self-efficacy, could be taken into account for further studies [37,38]. Variables further detailing patients' working conditions could also enrich these analyses. Our study focused on initial patient characteristics that predicted a return to work. Changes over the course of the program that predict the return to work could be analysed. These changes could represent the impact of the program on the return to work. Analyses weighted by a propensity score, taking into account the pre-program probability of returning to work given the initial characteristics, could be used. Mediation analyses could also be of interest.

5. Conclusion

In conclusion, our study showed that not having worked for more than 6 months before a rehabilitation program and high base-

line fear and avoidance beliefs related to pain at work decreased the probability of returning to work after an MRP. Addressing these fear and avoidance beliefs and early inclusion of patients off work due to LBP could improve the effectiveness of these programs.

Disclosure of interest

The authors declare that they have no competing interest.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.jbspin.2024.105840.

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