Determinants of “return to work in good health” among workers with back pain who consult in primary care settings: a 2-year prospective study

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Received: 27 December 2005 / Revised: 13 April 2006 / Accepted: 15 June 2006 / Published online: 26 July 2006
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Abstract Many factors have been linked to return to work after a back pain episode, but our understanding of this phenomenon is limited and cross-sectional dichotomous indices of return to work are not valid measures of this construct. To describe the course of “return to work in good health” (RWGH—a composite index of back pain outcome) among workers who consulted in primary care settings for back pain and identify its determinants, a 2-year prospective study was conducted. Subjects ($n = 1,007$, 68.4%) were workers who consulted in primary care settings of the Quebec City area for a nonspecific back pain. They

completed five telephone interviews over 2 years (follow-up = 86%). Analyses linking baseline variables with 2-year outcome were conducted with polytomous logistic regression. The proportion of “success” in RWGH increased from 18% at 6 weeks to 57% at 2 years. In women, persistent pain, pain radiating to extremities, increasing job seniority, not having a unionized job, feeling that the physician did listen carefully and increasing fear-avoidance beliefs towards work and activity were determinants of “failure” in RWGH. In men, decreasing age, cigarette smoking, poor self-reported health status, pain in the thoracic area, previous back surgeries, a non-compensated injury, high pain levels, belief that job is below qualifications, likelihood of losing job, job status, satisfaction with health services and fear-avoidance beliefs towards work were all significant. RWGH among workers with back pain receives multiple influences, especially among men. In both genders, however, fear-avoidance beliefs about work are associated with failure and high self-efficacy is associated with success.

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Keywords Back pain · Cohort studies ·
Return to work · Risk factors

Introduction

Back pain stands among the most frequent reasons for physicians’ office visits [22, 40, 60], constitutes the main cause of work absence and occupies the sixth rank among health problems that generate the highest direct medical costs in America [29]. Based on estimates calculated in Sweden, the Netherlands and the United Kingdom [58, 81], the total annual cost of back pain in

Canada is likely to stand between 11 and 23 billion dollars (CND). With such a pedigree, back pain, in the majority of cases a self-limiting condition, has become an important research target. Because of its high frequency and associated costs, effective interventions have an important potential for improving the health of populations and freeing large amounts of society's financial resources.

Although many factors have been linked with return to work after a back pain episode, our understanding of this phenomenon is very limited. Also, while return to work is a pertinent index of back-related disability among workers, cross-sectional dichotomous indices of return to work are not valid measures of the occupational outcome of back pain because return to work is often followed by recurrences of work absence. Baldwin et al. have identified four mutually exclusive patterns of return to work among injured workers: success on first attempt to return to work, failure without any attempt to return, several attempts ending by a successful return to work and several attempts ending by a failure to return to work [3, 14, 46]. In the majority of previous studies, however, the outcome variable was a cross-sectional dichotomous measure of return to work, time off work, or duration of financial compensation.

The present study aimed at (1) describing the 2-year course of "return to work in good health" (RWGH—a composite index of back pain outcome) among workers who consult in primary care settings for back pain with at least 1 day of work absence and (2) identifying the determinants of RWGH among these subjects.

Materials and methods

Study design

We conducted a prospective cohort study with repeated measurements 6 and 12 weeks, 1 and 2 years after the baseline interview. This was preceded by a qualitative study in which two focus groups composed of ten subjects with severe back pain were completed, in order to identify determinants of a satisfactory occupational outcome of back pain from the patients' perspective, allowing to enrich the list of potential determinants.

Study settings

Subjects were recruited in seven major primary care settings of the Quebec City area: four emergency rooms of large hospitals and three family medicine units, all having medical teaching responsibilities.

Participants

Eligible subjects were workers aged 18–64 years who consulted for back pain of any duration in one of the participating settings between 06/1999 and 09/2000 (not necessarily a first visit). They had to have been absent from their regular job because of back pain ≥ 1 day at time of consultation. Patients with a condition other than back pain that could affect their work capacity (pregnancy and serious co-morbidity), whose pain was limited to the cervical spine, and patients with any specific condition (spinal tumors or infections, vertebral fractures, systemic disease, referred visceral pain and cauda equina syndrome) were excluded. Patients who consulted for back pain were contacted by telephone by a medical archivist who checked their eligibility for the study and sought their participation. Those who accepted were sent the informed consent form by mail, to sign and return, and were later called by trained interviewers.

Data collection

Data was collected through structured telephone interviews that documented socio-demographic, socio-economic, behavioral, anthropometric, clinical, occupational, psychosocial and psychological variables, and the utilization of health services for back pain. Clinical information was drawn from study participants' medical files by a single member of the research team. All measures and structured interviews were conducted in French.

The independent variables for this study were those mentioned by the participants of the focus groups and those identified from the existing literature (the complete list of constructs measured is presented in Appendix). The baseline interview lasted about 45 min. The follow-up interviews documented only variables that could have changed since the last interview (thus, excluding socio-demographic characteristics, for instance).

Back-related functional limitations were measured using the original 24-item Roland–Morris Disability Questionnaire, that assesses changes in function due to back pain as of "today" [63]. The original score, ranging between 0 and 24, was transformed into a percentage; for instance, 12 positive answers over 24 corresponded to a 50% score. Higher scores corresponded to more important functional limitations.

Pain levels (current pain, worst pain in the past 6 months and average pain of the past 6 months) were measured with an 11-point numerical rating scale ranging from 0 (no pain) to 10 (worst pain imaginable) [9, 72].

The Fear-Avoidance Beliefs Questionnaire (FABQ) was used to measure fear-avoidance beliefs towards activity and work [45, 89].

Items drawn from the Symptom Checklist-90 Revised [24] were used to measure depression and somatization symptoms in the past month. These subscales have been used successfully in several previous back pain studies [25, 26, 28, 56, 69].

Psychological demands and decision latitude at work were measured with the Karasek's Job Content Questionnaire [11, 48]. The cut-off scores used, 9 for psychological demands and 70 for decision latitude, correspond to the medians among all study subjects and among all workers of the Province of Quebec [23]. These two variables were considered separately in analyses, and in conjunction, to reproduce Karasek's model of job strain.

Social support at work was measured with the modified work APGAR [6] used in several other back pain studies [35, 61, 91].

Two items drawn from the questionnaire developed by Siegrist were used to measure effort/reward imbalance at work [57, 70].

Back pain diagnoses were documented from the patient's files and according to the classification proposed by Spitzer [2, 71].

Characteristics of the patient-physician encounter were measured using 13 questions drawn from Cherkin et al. [17] and Von Korff et al. [86].

Pain coping strategies were documented with seven items drawn from the Pain Coping Strategies Questionnaire [64].

Dramatization of diagnosis was measured with 4 yes/no items adapted from Cedraschi et al. [16].

A self-efficacy questionnaire was developed especially for this study, according to Bandura's guidelines [4], to measure the subject's perception of his or her capacity to do his or her regular work despite some specific obstacles (e.g., pain, lack of support from colleagues, etc.).

Health Locus of Control was assessed with the questionnaire developed by Wallston, Wallston and DeVellis [73, 90].

Self-reported physical demands of the job measured included sitting and standing, forward and lateral trunk flexion, rotation of the trunk, manipulation of charges, efforts made with tools, lifting or transportation of persons and whole body vibrations. Physical strength required by the job was measured with two questions (frequency: range 1–4 and weight: range 1–11) and an index was composed by multiplication of these scores.

When a French translation of an instrument was not available, Vallerand's double inverse translation

method [78] was applied, and inconsistencies were discussed among investigators until a consensus was reached.

Details of the instruments used with their psychometric characteristics have been published elsewhere and are available online: (<http://www.cmaj.ca/cgi/content/full/172/12/1559/DC1>) [27].

Outcome measure

RWGH is a composite index of the occupational outcome of back pain that takes into account the occupational status, functional limitations, and number of days of work absence since the medical consultation. This variable has four categories (success, partial success, failure after attempt and failure) that were inspired by the work of Baldwin et al. [3], and are presented in Table 1. Work absence data were self-reported. However, a validation study was conducted with data obtained directly from the employers of 40 volunteers. The type 1 intraclass coefficient correlating both sets of information was 0.97 (95% CI: 0.93–0.98) for the number of days of modified work and 0.99 (95% CI: 0.998–1.00) for the number of days off any work.

Statistical analyses

Descriptive analyses were conducted to identify the main baseline characteristics of subjects and document the evolution of RWGH. Explicative analyses linking variables measured at baseline with 2-year outcome were conducted with polytomous logistic regression, that allows to consider the outcome variable in four categories. In these analyses, the "success" category was always considered the reference group. Bivariate analyses were first conducted to identify crude associations, that were quantified with odds ratios (OR) and their 95% confidence interval (95% CI). Independent variables statistically associated with RWGH in bivariate analyses ($P \leq 0.05$) were entered altogether in a multivariate model, using a forward stepwise approach with a 0.15 threshold for entry and a 0.10 threshold for exit. Potential confounders were identified from the literature and known or postulated direction of associations. Confounding was judged on the basis of a change of at least 20% in the odds ratio of at least one independent variable in a model.

Analyses were conducted separately for men and women, because effect modification by gender had been reported in the literature [3, 54] and confirmed in

Table 1 Definition of “return to work in good health”

Category	Definition
Success	At regular work ^a at time of interview and Functional limitations $\leq 30\%$ ^b and Number of days of absence from regular work since last interview ≤ 5 or 7 ^c
	OR
	Other situation unrelated to back pain (e.g., became homemaker by choice)
Partial success	PS1 At regular work at time of interview and Functional limitations $\leq 30\%$ and Number of days of absence from regular work since last interview > 5 or 7 days
	OR
	PS2 At regular work at time of interview and Functional limitations $> 30\%$ and Number of days of absence from regular work since last interview ≤ 5 or 7 days
	OR
	PS3 At regular work at time of interview and Functional limitations $> 30\%$ and Number of days of absence from regular work since last interview > 5 or 7 days
Failure after attempt	Absent from regular work at time of interview because of back pain and at least one attempt to return to regular work during follow-up
Failure	Absent from regular work at time of interview because of back pain and no attempt to return to work yet

^aRegular work: work performed before index medical consultation

^bFunctional limitations measured with the Roland–Morris Disability Questionnaire

^c5 days between index consultation and 6-week interview, 5 days between 6- and 12-week interviews, 7 days between 12-week and 1-year interviews, 7 days between 1- and 2-year interviews

our analyses. The absence of collinearity among variables of the final models was verified with a collinearity diagnostic procedure [5]. The models’ lack-of-fit was checked with the Wald test [43]. In multivariate analyses, we minimized the instability of estimates by re-categorizing subgroups with similar odds ratios. Agreeing with Rothman [66], we have not corrected our results for multiple comparisons.

Results

A total of 1,007 subjects (68.4% of those eligible) participated in the baseline interview, conducted on

average 3 weeks after the index consultation. Of them, 92% ($n = 923$) completed the 6-week follow-up, 90% ($n = 907$) completed the 12-week follow-up, and 91% ($n = 913$) and 86% ($n = 864$) completed the 1- and 2-year follow-ups, respectively. Details of reasons for non-participation have been published elsewhere [27].

Patients who completed the study were more often female than eligible patients who did not participate ($P = 0.006$) and those lost to follow-up ($P = 0.009$). There were no statistical differences on age, however ($P = 0.18$ and 0.37). Subjects lost to follow-up were less educated ($P = 0.04$), had a lower annual personal income ($P = 0.03$), reported higher pain ($P = 0.02$) and functional limitations levels ($P = 0.03$), had higher levels of fear-avoidance beliefs towards work ($P = 0.02$) and a lower level of self-efficacy in returning to work ($P = 0.02$) than participants. Both groups were similar as to the site and type of pain.

Selected demographics and patient characteristics are presented in Table 2. The majority of participants were male (58.5%) and the mean age was 39 years (SD: 10.6).

Most subjects (77.8%) reported a recurrent or persistent back pain problem at baseline interview. The pain was mostly situated in the lumbar and lumbosacral areas. More than half of the participants (56.4%) reported pain radiating to the arms or legs. Almost 30% had had some financial compensation for back pain in the past.

Almost half the participants held a unionized job. The mean number of years at the job was 7.5 (SD: 8.3). Overall, the physical strength required by the job was moderate (mean: 18.1; SD: 12.2). Over 91% of the participants were moderately or completely satisfied with their job.

Figure 1 shows the 2-year evolution of RWGH among participants. Most important changes in RWGH occurred within 12 weeks of the consultation, at which time over 50% of subjects were in the “success” category (compared to 18% at 6 weeks). However, at 2 years, almost 25% were in the “partial success” group and close to 20% were still in the “failure after attempt(s)” and “failure” groups.

Many baseline variables were associated with the 2-year outcome in bivariate analyses. Among women, multivariate analyses identified persistent pain, pain radiating to arms or legs, increasing job seniority, not having a unionized job, feeling that the physician did listen to her carefully and increasing fear-avoidance beliefs towards work and activity as significant determinants of “failure” in RWGH at 2 years (Table 3). In men, significant variables were decreasing age, cigarette smoking, poor self-reported health status, pain in

Table 2 Selected characteristics of the study subjects ($n = 1,007$)

Variables (Baseline interview)	{Missing values}		
	$n(\%)$	Or	Mean (SD)
Age (18–64 years)		{0}	38.7 (10.6) Md = 39.0
Gender		{0}	
Men	589(58.5)		
Women	418(41.5)		
Education completed		{24}	
Primary school	186(18.9)		
Secondary school	327(33.3)		
Community college	305(31.0)		
University	165(16.8)		
Body mass index (BMI)		{27}	
< 27 kg/m ²	682(69.6)		
≥ 27 kg/m ²	298(30.4)		
Cigarette smoking		{17}	
Current smoker	388(39.2)		
Ex-smoker	282(28.5)		
Never smoked	320(32.3)		
Type of back pain		{5}	
One-time	222(22.2)		
Recurrent	458(45.7)		
Persistent	322(32.1)		
Site of pain		{54}	
Cervico-thoracic	17(1.8)		
Thoracic	166(17.2)		
Thoraco-lumbar	69(7.2)		
Lumbar	533(56.2)		
Lumbosacral/sacral	161(16.9)		
Multiple	7(0.7)		
Pain radiating to the arms or legs		{85}	
Yes	520(56.4)		
No	402(43.6)		
Number of years since first back pain		{4}	8.7 (8.9) Md = 6.0
Previous financial compensation for back pain		{19}	
Yes	294(29.8)		
No	694(70.2)		
Unionized job		{18}	
Yes	450(45.5)		
No	539(54.5)		
Job seniority (years)		{19}	7.5 (8.3)
Workload index (frequency × effort) (0–44)		{21}	18.1 (12.2)
Job satisfaction		{16}	
Not at all	38(3.9)		
Very low	47(4.7)		
Moderately	341(34.4)		
Completely	565(57.0)		
Symptoms of depression (0–4)		{21}	1.45 (0.91)
Symptoms of somatization (0–4)		{21}	1.07 (0.83)
Self-efficacy (0–100)		{89}	49.5 (23.3)

the thoracic area, previous back surgeries, a non-compensated injury, high pain levels, belief that job is below qualifications, likelihood of losing job, job status,

satisfaction with health services and fear-avoidance beliefs towards work (Table 4).

Determinants of “partial success” and “failure after attempt” are also presented in Tables 3 and 4, where a strong protective effect of increasing self-efficacy for “partial success” can be noticed for both genders.

Discussion

Summary of findings

This study highlights the complex nature of the occupational consequences of back pain and the numerous factors that contribute to its development. It reminds us that, from an occupational perspective, there is a critical point in the natural history of back pain around 12 weeks after the index consultation, and that almost 25% still experience important functional limitations and recurrences of work absence. These results also support profound gender differences regarding the mechanisms that determine return to work, and stress the role of fear-avoidance beliefs and self-efficacy towards return to work among the main determinants of the occupational consequences of back pain.

Interpretation of results

We have identified in this study an important effect modification of gender: RWGH is a different phenomenon in men than in women. It seems to be more complicated in men, where socio-economic factors, possibly linked with the traditional role of “bread winner” come into play. Few studies on the topic have presented stratified results by gender. Our results in this regards concur with those of Macfarlane et al. [54], who have identified different psychosocial and psychological determinants of back pain outcomes among men and women. There are many possible explanations for this result, one of which being a difference in source of social support: while for men social support would come first from the spouse, for women it is more likely to be found outside the couple, so there may be more incentives to go back to work [41]. Also, for men, a solicitous spouse may contribute to prolong complaining and delay return to work [33]. Several studies have also shown important gender differences in psychosocial demands of work [47] and pain perception [10].

Our results also demonstrate one more time that the natural history of back pain is not linear. Von Korff and Saunders [87], have shown that the natural history

Fig. 1 Evolution of “return to work in good health” among the study participants

of back pain is more complex than the continuum “acute—sub-acute—chronic” supposes, that recurrences are frequent, that about 33% of patients continue to present moderate or intense pain intermittently or continuously and that about 20% of them continue to have important functional limitations in the long term. Our results are very consistent with those reported in primary care [20], among workers of the general population [83], and among compensated workers [65].

Back pain is a recurrent condition, a characteristic that cross-sectional, dichotomous measures of return-to-work do not capture. Using RWGH offered the possibility to identify some variables that could be monitored among workers with back pain who go back to work but are at high risk of “partial success”, to offer them individualized interventions geared at maintaining them at work.

Because of the many determinants of RWGH identified, of the modifying effect of gender, and of the nature of the dependent variable we have used, the interpretation of results is quite complex. Figures 2 and 3 present the results of multivariate analyses schematically, which allows an easier identification of the most important effects. One can then see that among women, some characteristics of the relation with the physician and fear-avoidance beliefs towards activity are modifiable factors with a generalized effect on RWGH. Figure 2 also allows to identify the variables on which to intervene to prevent recurrences of absence

from work and diminish the functional limitations in female workers who return to work (“partial success”): FAB-activity, relation with the physician, functional limitations, satisfaction of health services and social support at work.

Among men, several modifiable variables had an impact only on “partial success”: financial problems because of back pain, functional limitations, physical demands of work, pace of work, teaching of body mechanics and symptoms of depression (Fig. 3).

Because our results show a strong association between cigarette smoking and “failure” in RWGH among men, and since the multiple adverse effects of smoking on health are well known, workplace interventions aiming at reducing cigarette smoking could have important impacts on work absence. Cigarette smoking has been so often found to be associated with back pain frequency and consequences in the literature, that this relationship, although still unexplained, is considered to be causal [37]. The more plausible mechanism would work through reduced blood supply to vertebral structures, which would become more susceptible to mechanical stress [30, 42]. Recent studies have identified cigarette smoking as a risk factor of the persistence of back-related disability one year after a medical consultation in primary care (OR: 2.1; 95% CI: 1.0–4.3) [74] and of retirement from employment because of back pain in the general population (OR: 1.4; 95% CI: 1.2–1.7) [38].

Table 3 Determinants of return-to-work in good health at 2 years in women (n=369)

Variables	Adjusted odds ratios (CI 95%)			
	Success (n = 200) ^a	Partial success (n = 98)	Failure after attempt (n = 48)	Failure (n = 23)
Sociodemographic/health behavior factors				
Age (years)		1.12 (1.07–1.18) ^b	1.07 (1.00–1.14) ^b	1.06 (0.96–1.18)
Clinical factors				
Self-reported type of episode				
One-time		1.00	1.00	1.00
Recurrent		2.95 (1.00–8.79) ^b	2.19 (0.42–11.40)	8.24 (0.49–138.05)
Persistent		3.92 (1.23–12.49) ^b	8.80 (1.67–46.27) ^b	32.36 (1.93–542.80) ^b
Average pain level/past 6 months (0–10)				
0–4		1.00	1.00	1.00
5–10		1.95 (0.78–4.87)	39.63 (3.29–477.50) ^b	6.93 (0.62–77.38)
Radiation of pain to upper or lower limb				
Yes		2.91 (1.21–7.03) ^b	1.56 (0.47–5.18)	9.99 (1.00–100.28) ^b
No		1.00	1.00	1.00
Functional limitations (RMDQ–10 units)		1.25 (1.04–1.51) ^b	1.25 (0.95–1.65)	0.98 (0.65–1.49)
Occupational factors				
Social support at work (WA – unit) ^c		8.18 (2.48–26.93) ^b	2.13 (0.37–12.16)	4.76 (0.43–52.13)
Job seniority		1.02 (0.97–1.08)	1.01 (0.93–1.09)	1.18 (1.04–1.35) ^b
At least one day of sick-leave permitted without medical certificate				
Yes		0.56 (0.17–1.86)	0.15 (0.04–0.64) ^b	0.39 (0.04–3.97)
No		1.00	1.00	1.00
Unionized job				
Yes		0.95 (0.42–2.16)	0.42 (0.12–1.39)	0.05 (0.00–0.56) ^b
No		1.00	1.00	1.00
Frequency of efforts using tools				
Never or sometimes		1.00	1.00	1.00
Often or constantly		2.55 (0.84–7.74)	12.22 (2.60–57.31) ^b	4.36 (0.56–33.86)
Health care services				
“Dr listened to you carefully” (0–10)				
0–5		0.30 (0.12–0.76) ^b	0.15 (0.03–0.64) ^b	0.06 (0.01–0.60) ^b
6–10		1.00	1.00	1.00
Satisfaction with health care services (current episode)				
Totally satisfied		1.00	1.00	1.00
Moderately satisfied or poorly satisfied or totally unsatisfied		4.56 (1.85–11.23) ^b	0.48 (0.13–1.76)	2.59 (0.36–18.65)
Psychological factors				
Fear-avoidance beliefs—activity (unit)		1.36 (1.07–1.75) ^b	1.94 (1.27–2.95) ^b	1.98 (1.01–3.89) ^b
Fear-avoidance beliefs—work (unit)		0.88 (0.62–1.23)	1.07 (0.66–1.74)	3.01 (1.14–7.91) ^b
Self-efficacy (10 units)		0.89 (0.73–1.10)	0.69 (0.51–0.91) ^b	0.72 (0.43–1.19)

^aReference category; the other three categories are compared to the reference category in a single model, but one at a time

^bSignificant at the 5% level

^cA high score corresponds to a low level of social support

In men and women, fear-avoidance beliefs about work count among the most important modifiable determinants of “Failure” in RWGH, suggesting that preventive interventions should target this variable. Several recent studies have identified strong associations between fear-avoidance beliefs towards work and the future occupational status of workers affected by acute, subacute and chronic back pain [21, 36, 52, 59]. Individual [8, 85] and community [12, 13] interventions that aim to change fear-avoidance

beliefs in patients with back pain have been found useful, although more research is needed on interventions.

Most multivariate associations we have observed are in the expected direction. Some associations are however less intuitive. Increasing age, for instance, seems to have a direct effect for women (for “partial success” and “failure after attempt”), but to have a protective effect on “failure” among men. This difference may be attributable to the traditional role of “bread winner”

Table 4 Determinants of return-to-work in good health at 2 years in men ($n = 491$)

Variables	Adjusted odds ratios (CI 95%)			
	Success ^a ($n = 287$)	Partial success ($n = 110$)	Failure after attempt ($n = 53$)	Failure ($n = 41$)
Sociodemographic/health behavior factors				
Age (years)		1.01 (0.97–1.06)	1.01 (0.95–1.07)	0.88 (0.80–0.97) ^b
Smoking habits				
Smokers		1.54 (0.70–3.41)	1.34 (0.36–4.98)	16.68 (2.66–104.58) ^b
Ex-smokers		1.28 (0.53–3.09)	1.61 (0.45–5.86)	5.12 (0.73–36.12)
Never smoked		1.00	1.00	1.00
Current financial problems (because of back pain)				
Yes		0.33 (0.12–0.85) ^b	0.73 (0.18–2.99)	5.18 (0.93–28.89)
No		1.00	1.00	1.00
Clinical factors				
Self-reported health status				
Excellent or very good		1.00	1.00	1.00
Good		0.96 (0.46–1.98)	1.41 (0.49–4.04)	0.79 (0.16–3.89)
Fair or poor		3.08 (1.01–9.42) ^b	0.22 (0.03–1.72)	8.20 (1.14–58.75) ^b
Self-reported type of episode				
One-time		1.00	1.00	1.00
Recurrent		4.13 (1.33–12.85) ^b	4.67 (0.71–30.86)	0.84 (0.11–6.74)
Persistent		4.34 (1.31–14.34) ^b	9.33 (1.30–66.73) ^b	2.43 (0.32–18.56)
Site of pain				
Thoracic or cervico-thoracic		1.23 (0.51–2.94)	0.77 (0.19–3.03)	7.00 (1.19–41.21) ^b
Thoraco-lumbar/lumbar/sacral		1.00	1.00	1.00
Previous surgeries for back pain				
0		1.00	1.00	1.00
≥ 1		6.49 (1.64–25.65) ^b	1.61 (0.16–16.41)	13.05 (1.40–121.43) ^b
Compensated work injury (WCB)				
Yes		1.24 (0.56–2.74)	0.61 (0.19–1.92)	0.07 (0.01–0.47) ^b
No		1.00	1.00	1.00
Current pain level (0–10)				
0–4		1.00	1.00	1.00
5–10		1.87 (0.85–4.12)	0.39 (0.10–1.50)	5.22 (1.00–27.20) ^b
Functional limitations (RMDQ-10 units)		1.22 (1.03–1.45) ^b	1.18 (0.88–1.58)	0.96 (0.65–1.42)
Occupational factors				
Workload index (unit) (frequency × intensity of effort)		1.04 (1.00–1.08) ^b	1.01 (0.96–1.07)	0.98 (0.91–1.04)
Effort–reward imbalance— occupation is below qualifications				
Highly agree or agree		0.97 (0.45–2.09)	5.64 (1.89–16.89) ^b	4.02 (1.05–15.37) ^b
Disagree or highly disagree		1.00	1.00	1.00
Likelihood of losing job—next 2 years				
Very likely		2.07 (0.63–6.79)	6.90 (1.54–30.96) ^b	12.52 (1.95–80.21) ^b
A bit likely or unlikely or very unlikely		1.00	1.00	1.00
Working pace (0–10)				
0–6		1.00	1.00	1.00
7–10		0.35 (0.17–0.73) ^b	1.03 (0.29–3.64)	0.56 (0.14–2.22)
Job status at baseline				
Completely off-work		0.98 (0.47–2.06)	0.80 (0.25–2.55)	1.01 (0.19–5.44)
Modified duties		1.42 (0.47–4.31)	4.95 (0.95–25.74)	11.53 (1.45–91.63) ^b
Regular job		1.00	1.00	1.00
Health care services				
Perception that the evaluation of the Dr is accurate (0–10)				
0–4		0.82 (0.26–2.61)	8.35 (1.59–43.85) ^b	2.91 (0.36–23.31)
5–7		1.54 (0.64–3.74)	3.98 (1.02–15.55) ^b	1.20 (0.17–8.28)
8–10		1.00	1.00	1.00
Dr relieved any concerns about the cause of back pain (0–10)				
0–3		2.77 (0.95–8.09)	1.39 (0.34–5.76)	1.37 (0.18–10.72)
4–7		4.18 (1.45–12.05) ^b	0.78 (0.16–3.97)	2.00 (0.25–16.02)

Table 4 continued

Variables	Adjusted odds ratios (CI 95%)			
	Success ^a (<i>n</i> = 287)	Partial success (<i>n</i> = 110)	Failure after attempt (<i>n</i> = 53)	Failure (<i>n</i> = 41)
8–10		1.00	1.00	1.00
Dr or other professional taught you how to work (0–10)				
0–5		2.05 (1.00–4.23) ^b	1.12 (0.38–3.26)	2.94 (0.57–15.31)
6–10		1.00	1.00	1.00
Satisfaction with health care services (current episode)				
Poorly satisfied or totally unsatisfied		0.80 (0.24–2.65)	0.89 (0.15–5.21)	0.03 (0.00–0.43) ^b
Moderately satisfied		1.26 (0.51–3.08)	1.59 (0.45–5.60)	0.21 (0.04–1.11)
Totally satisfied		1.00	1.00	1.00
Psychological factors				
Fear-avoidance beliefs—work (unit)		1.02 (0.75–1.38)	1.47 (0.90–2.38)	4.08 (1.76–9.44) ^b
Self-efficacy				
50–100%		1.83 (0.83–4.01)	0.21 (0.07–0.68) ^b	0.89 (0.19–4.22)
0–49%		1.00	1.00	1.00
Symptoms of depression (unit)		2.16 (1.26–3.70) ^b	1.32 (0.56–3.15)	0.41 (0.11–1.48)

^aReference category^bSignificant at the 5% level

adopted by many men, who would have a higher tendency to stay at work when retirement is approaching. This explanation is backed up by the comments of some of the participants to the focus groups.¹ In several previous studies, increasing age was associated with an adverse evolution of back pain [15, 31, 34, 44, 55, 74, 79]. Others have however concluded to an inverse (protective) effect of age [1, 18]. Only two studies have presented analyses stratified by gender [54, 84], as in the present study, and the results are not consistent.

Among men, we have found 14.3 times less “failure” when back pain was associated with a work-related accident declared to the WCB (OR: 0.07; 95% CI: 0.01–0.47). It is possible that this effect is the result of being taken in charge by a formal compensation institution and to the specific services it offers to injured workers.

Pace of work was inversely associated with “partial success” among men. It is possible that the perception of a high work pace by the worker is linked with more pressure that limits the possibility to take multiple sick leaves without important penalties.

Of all our results, some inverse associations with variables linked to health services utilization are certainly the most intriguing. For example, women who said that the doctor did not listen to them attentively while they summarized their back pain history (0–5 over 10) were found much more often in the “success” group. Among men, those who were less satisfied of the health services they received for their back pain were much less often in the “failure” group 2 years later (OR: 0.03; 95% CI: 0.00–0.43). It is possible that the fact for the patient to realize that the physician will not take charge of his/her problem is an incitation to return to work. This possibility has been mentioned by several patients in the focus groups.² Also, the fact for the physician to give more attention to the patient could be interpreted by the patient as a sign of the importance of his/her problem (an effect of dramatization [16] or catastrophizing) [76]. Both mechanisms could play altogether. Since our study included prevalent cases of severe and long-standing back pain, it is also possible that the true direction of these associations is reversed, i.e., patients with more severe or persistent problems would get more attention from their physician and would be more satisfied with health services. The impact of the characteristics of the relation of the back pain patient with the physician ought to be the subject of future research.

¹ “To stop working is to become poor” (man, horticulturalist). “You are forced to work to respect some economical standards” (man, horticulturalist). “You can’t stay at home. I have to take care of my family. Working is more rewarding than staying at home, even if you are sick” (man, worker in a paper mill). “Supervisors piss you off, it frustrates me; colleagues piss you off, make your life a living hell. When I retire in 2–3 years, I will still work, but in a much better environment” (man, wrapping clerk). “For me, my absence from work not only meant a loss of earnings, but also more debts and becoming poorer” (summary of 3–4 persons).

² “Physicians don’t take us seriously. When they do, they can’t help us” (summary of 3–4 persons). “Nobody will do it for you” (summary of 3–4 persons).

Fig. 2 Schematization of relations between variables of the final multivariate model among women and the 2-year “return to work in good health” categories. The “success” category constituted the reference group. Modifiable determinants are preceded by an asterisk (*). Risk factors are identified with (R), while protective factors are identified with (P)

Fig. 3 Schematization of relations between variables of the final multivariate model among men and the 2-year “return to work in good health” categories. The “success” category constituted the reference group. Modifiable determinants are preceded by an asterisk (*). Risk factors are identified with (R), while protective factors are identified with (P)

Self-efficacy, here defined as the perception of a person of his/her capacity to do his/her job despite impediments, was protective of ‘Failure after attempt(s)’

in the current study. Although this variable has been largely studied in relation with different health problems, it has not been considered often in the context of back pain, but has already been found a better predictor of future performance than pain or psychological distress among workers with chronic back pain [49, 50]. Self-efficacy has also been identified as an important modifiable determinant of return to work after other health problems, including myocardial infarction [32], and interventions that aimed at improving self-efficacy among subjects with chronic disease have been found useful [7, 53]. Self-efficacy could thus become an important target of specialized interventions among workers with back pain.

Schultz et al. [68], in a study of 192 compensated workers in British-Columbia, Canada, have found a direct bivariate association between union membership and return-to-work after a back pain episode: as in the current study (among women), people with a unionized job were more susceptible of going back to work than those with non-unionized jobs.

Our study findings suggest an increased risk of ‘failure’ with increasing job seniority among women. This may reflect that women in high level jobs have to juggle both with the stress of the job in addition to the stresses and hassles of family life. Current evidences about this association are contradictory [39, 44].

Our results are overall highly consistent with those of previous studies, despite several methodological differences. They remind us of the simultaneous involvement of multiple factors in determining the occupational status of workers with back pain [19, 44, 51, 62, 75, 77, 79, 80].

Strengths of the study

The strengths of this study include the mix of qualitative and quantitative techniques, the important sample size, the prospective design, repeated measures recorded at important time points in the natural history of the disease, the long-term follow-up, the high response rate, and the variety of constructs measured. Also important are the stratification of analyzes by gender and the use of polytomous logistic regression, an analytical approach that is better suited to the complexity of the problem. The fact that our subjects were workers with back pain from occupational and non-occupational origin offers a wider perspective on a problem which exact source, beyond administrative procedures, can only rarely be clearly identified. But above all, it is the use of RWGH, a more valid measure of the occupational outcome of back pain, that is the feature strength of this study.

Study limitations

The differences observed between the eligible subjects who did not participate to this study and those lost-to-follow-up, on the one hand, and participants, on the other hand, suggest that a selection bias may have affected our results. Since subjects lost-to-follow-up were at the same time more often exposed to some risk factors of RWGH and more limited in accomplishing their regular activities because of back pain, it is probable that the effect of such a trend would have been to underestimate the strength of some of the associations observed. However, given the low attrition rates (approximately 10% per wave), the effects are likely to be small.

Because of the time needed to identify subjects and obtain their consent to participate, there was a delay of about 3 weeks between the medical consultation and the baseline interview. Some measures, particularly functional limitations and pain, could have changed during this delay. The subjects could thus have been misclassified on some exposures. The impact of such a misclassification bias, most likely non differential, would be an underestimation of the strength of some of the associations observed [88].

In this study, we have put a special emphasis on collecting information on as many variables as possible that could affect the return to work of workers with back pain. Without pretending to have been exhaustive in this regard, we had information on many variables and could afford to adjust for the most important confounders. However, given the number of independent variables involved, residual confounding is always possible.

It is quite likely that numerous modifications of effect (i.e., ‘interactions’ between risk factors) contribute to the complex nature of back pain. Exploratory analyses of our data support this affirmation. However, taking several effect modifiers into account all at once is extremely difficult, notably because of sample size considerations and the small number of subjects in the “failure” group. These effects could thus only be studied piece by piece, an approach that has complementary drawbacks compared to the one we have used.

In several instances, the odds ratios estimated were unstable, as shown by large confidence intervals. The interpretation of the odds ratios must always take into account the confidence intervals. It is also important to remember that, when the outcome is frequent, as is the case here, odds ratios could not be interpreted as a relative risk, but only as a more general measure of association [67].

Often, in epidemiology, only subjects who are free of the disease under study are recruited in a prospective

cohort, so that only new (incident) cases are observed and that the direction of associations is unequivocal. However, for frequent and recurrent conditions like back pain, this approach is not especially appropriate, since about 20% of back pain patients consulting in primary care settings are “true” incident cases. A study of “true” incident cases would not only be time and resource-consuming, but it would most likely include a very highly selected group of quite homogeneous subjects, probably of younger age, and the external validity of the results would thus be limited.

This study has been conducted among workers with back pain, of occupational and non occupational origin, that affected their capacity to work for at least one day and necessitated a medical consultation in a primary care setting. Workers who consult in primary care settings are most likely to be different from those who do not consult or consult in a different setting. It is important to have these considerations in mind when generalizing our results [82].

Conclusion

This study has used successfully a new measure of the occupational outcome of back pain that provided an innovative insight into the occupational consequences of back pain. It has shown that RWGH among workers with back pain is a complex phenomenon with multiple influences, especially among men. In both genders, however, increasing fear-avoidance beliefs about work and lack of self-efficacy were found to be strongly associated with adverse outcomes. Since these factors are modifiable, these findings may provide support to more focused interventions.

Acknowledgments The authors thank all the study participants, the staff of the Population Health Research Unit, and all the research assistants who worked on this study. Thanks also to the following physicians for their help with the recruitment of subjects: Dr. Stéphane Bergeron, Dr. Alexandra Dansereau, Dr. Georges Dufresne, Dr. Louis Larue, Dr. Natalie Le Sage, Dr. Jean Maziade, and Dr. Jean Ouellet. Special thanks to Julie Soucy, PhD, for her participation to the coordination of the study. This study was supported by a grant (#97-061) from the Quebec Institute for Occupational Safety and Health (Institut de recherche Robert-Sauvé en santé et en sécurité du travail du Québec—IRSST). CE Dionne and R Bourbonnais are Quebec Health Research Fund Scholars. This study was approved annually by the Ethics Committees of all the hospitals involved in the recruitment of participants.³ It complies with current Canadian laws.

³ (Centre Hospitalier Universitaire de Québec—CHUQ, Centre Hospitalier Affilié Universitaire de Québec—CHAUQ, CLSC Haute-Ville-des-Rivières, and Centre Hospitalier Affilié Universitaire Hôtel-Dieu de Lévis).

Appendix

List of constructs measured

Sociodemographic factors

Age
Current financial problems because of back pain
Education
Ethnic origin
Gender
Gross annual family income
Living with spouse
Maternal language
Number of household members
Number of children under 5 years

Anthropometric factors

Body mass index (kg/m²)
Hand dominance
Height
Weight

Health behavior factors

Alcoholism
Cigarette smoking
Coffee/tea consumption
Physical activity/sports when no pain
Regular meditation or relaxation
Sleep during past 2 weeks
Usual sleep

Clinical factors/back pain history

Age at menopause
Average pain, past 6 months
Current functional limitations
Current pain level
Diagnostic category
Duration of current episode at time of consultation
Duration of pain, past 6 months
Number of previous surgeries for back pain
Number of days with pain since index consultation
Number of times gave birth
Pain radiating to upper or lower limb
Previous back pain episode affecting work capacity—when?
Reduction of daily life activities because of back pain, past 6 months
Reduction of work capacity because of back pain, past 6 months
Self-reported health status
Self-reported type of back pain
Site of pain
Spitzer classification [2, 71]
Worst pain, past 6 months
Years since onset of back pain

Health services utilization

Duration of index-consultation
Number of visits to the same clinic during the past 12 months
Number of hospitalizations for back pain during the past 12 months
Perception that the doctor's diagnosis of back problem is correct
Satisfaction with health services since index consultation

Appendix continued

“The doctor asked you to undress for the physical examination of your back”
“The doctor, physical therapist, or another health professional helped you learn exercises for your back to help in your recovery”
“The doctor showed interest in you as a person”
“The doctor asked about your lifestyle and stress that may affect your back pain”
“The doctor discussed options with you, asked your opinion, and offered choices about the care of your back pain”
“The doctor relieved any concern about the cause of your back pain”
“Your visit to the doctor helped you feel that you could control your back pain”
“You were treated like your back pain was an important problem, and not “all in your head”
“The doctor listened carefully while you described your back problem”
“The doctor took time to answer all your questions about your back pain”
“The doctor asked you about your occupation and took time to give you advices”
“Your doctor, physical therapist or another professional showed you how to work to protect your back from injury”
Weight of the medical file

Dramatization of diagnosis

“The doctor asked you to get an X-Ray, CT-Scan, myelography, magnetic resonance imaging, or other radiological examination”
“The doctor told you to stay in bed” – number of days recommended
“The doctor asked you to schedule a check back visit”
“The doctor mentioned that you might need surgery for your back problem”

Occupational factors

Adaptation of work environment is possible
Change of job or employer in the past 12 months
Company size
Current financial compensation for back pain
Days of sick-leave permitted without medical certificate
Declared professional lesion
Effort–reward imbalance (Siegrist's model)
Exposure to cold at work
Job decision latitude (Karasek's model)
Job satisfaction
Job seniority
Job status at time of consultation (permanent/occasional or seasonal/self-employed/other)
Likelihood of losing job during the next 2 years
Number of days off-work or with modified duties or schedule, past 12 months
Number of jobs
Number of previous sick-leave (or modified duties or schedule) for back pain in the last 10 years
Pace of work
Physical demands of the job (sitting and standing, forward and lateral trunk flexion, rotation of the trunk, manipulation of charges, efforts made with tools, lifting or transportation of persons, whole body vibrations, physical strength)
Previous financial compensation for back pain

Appendix continued

Psychological demands of work (Karasek's model)
 Responsibility of household chores
 Satisfaction concerning possibilities of work adaptation
 Social support at work
 "Supervisor takes back pain seriously"
 Time to commute to work
 Unionized job
 "When did you modify work or stop working for the current episode"
 Work schedule (Full time/Part time)
 Work shift (Day/Evening/Night/Variable)
 Work status at time of consultation
 (At regular job/Completely off-work/Modified duties/Modified schedule/Job assignment)

Psychological factors

Aggressiveness
 Exposure to stressful events during the past 12 months (changed job for worse, divorced or separated, financial problems, got gravely sick, significant other got gravely sick, death of spouse, death of other significant other)
 Fear-avoidance beliefs-activity
 Fear-avoidance beliefs-work
 Health Locus of Control (internal, external, chance)
 Pain control strategies
 Psychological trauma before age 18
 Self-efficacy with regards to work capacity
 Symptoms of depression
 Symptoms of somatization
 Social support outside work

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