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Prediction of return-to-work of low back pain patients sicklisted for 3–4 months

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Abstract

The purpose of this Dutch prospective population-based study was to identify prognostic factors for return-to-work of employees with 3–4 months sick leave due to low back pain (LBP). A cohort of 328 employees was formed and baseline data were collected. One year after the first day of the sick leave, 91% of the original cohort participated in a second interview ($n = 298$). During the baseline measurement, information was collected about health status, history of LBP, occupational variables, job characteristics and social economic variables. At the second interview, 66% of the employees had returned to work ($n = 198$). Return-to-work was independently predicted by having a better general health status (OR 1.53; 95% CI 1.30–1.80), having better job satisfaction (OR 1.26; 95% CI 1.11–1.44), being a bread winner (OR 2.46; 95% CI 1.37–4.40), having a lower age (OR 0.70; 95% CI 0.52–0.93) and reporting less pain (OR 0.85; 95% CI 0.73–0.99) all measured at cohort entry. This study shows that psycho-social aspects of health and work in combination with economic aspects have a significantly larger impact on return-to-work when compared to relatively more physical aspects of disability and physical requirements of the job. This suggests that interventions aimed at return-to-work of employees sicklisted with LBP should predominantly be focused on these psycho-social aspects such as health behavior and job satisfaction, and on the (lack of) economic incentives for return-to-work. © 2000 International Association for the Study of Pain. Published by Elsevier Science B.V. All rights reserved.

Keywords: Low back pain; Return-to-work; Sick leave; Long-term disability

1. Introduction

Many people suffer from low back pain (LBP). In The Netherlands, one out of every two persons endures low back pain at some point in their life (Haanen, 1984). About three out of four patients whose initial episode of low back pain ended within 1 year, had one or more relapses within that year (Van den Hoogen, 1996). Only a few of the many methods for treating back pain have convincingly demonstrated efficacy in scientific studies (SBU, 1991; Koes et al., 1991a,b, 1992a,b,c, 1993; Van der Weide et al., 1997). Not only has back pain considerable impact on the lives of the patients, but also the social economic costs are immense: a recent study showed that the costs of back pain in The Netherlands is 1.7% of the Gross National Product (Van Tulder et al., 1995). The majority of these costs are caused by indirect consequences of back pain: loss of productivity, work absenteeism and permanent disability. Sick leave and

disability together constitute 93% of the costs of back pain (Van Tulder et al., 1995). This is not specific to The Netherlands, e.g. in Sweden, back pain is the most common reason for sick leave and early retirement, both of which place enormous costs on society (SBU, 1991; Nachemson, 1992).

Return-to-work after a longer period of sick leave is, besides the (semi-)medical aspects, very much dependent on procedures with respect to benefit schemes and employers personnel policies. Both of these differ considerably between countries, and have to be well understood when interpreting return-to-work rates from different countries (Bloch and Prins, 1997).

In contrast to most other industrialized countries, Dutch employees on sick leave do not have to present a sickness certification at the beginning or during the sick leave, and all employees on sick leave are (irrespective of the cause of their injury or disease) compensated by the employer by at least 70% (usually by 100%) of their income during the first year of sick leave. An occupational physician, contracted by the employer, assesses the work incapacity of the sicklisted

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employee during the period of sick leave and is responsible for rehabilitation. Guidelines for assessment and rehabilitation of employees on sick leave due to low back pain do not (yet) exist (Van der Weide et al., 1997). Studies in The Netherlands indicate that decisions about recovery, ability and return-to-work seem to be a process based on consensus between the employee, the employer and the occupational physician (Hadler, 1989; Mudde, 1995; Cuelenaere, 1997).

Many studies tried to identify characteristics that predict long term disability or return-to-work for employees with low back pain (e.g. Bergquist-Ulmann and Larsson, 1977; Frymoyer and Cats-Baril, 1987; Gallagher et al., 1989; Gatchel et al., 1995a,b; Fishbain et al., 1996; Hazard et al., 1996; Infante-Rivard and Lortie, 1996). These predictors can help to identify at an early stage sicklisted employees at risk for long term disability. The biggest problem in most studies is the variation in length of sick leave/time out of work/disability duration before entering the study population: several studies report this to be one of the most important predictive characteristics (Sandström, 1986; Gallagher et al., 1989; Frymoyer, 1992; Lancourt and Kettelhut, 1992; Beissner et al., 1996). Two studies even showed that if the length of the sick leave increases, some predictive characteristics for return-to-work can change in strength and nature (Gallagher et al., 1989; Lancourt and Kettelhut, 1992). The study of Gallagher showed a significant interaction between length out of work and psychosocial risk factors: these factors seem to be stronger predictors in the group with 6–12 months out of work when compared to patients shorter or longer out of work (Gallagher et al., 1989). The study of Lancourt and Kettelhut (1992) showed that both non-organic physical signs and a relative short length of employment were predictive of failure to return-to-work within the group who was out of work less than 6 months, while these factors were not predictive in the group out of work more than 6 months. Another problem is that study populations often involve both employed and unemployed patients. In one study, the only significant predictor of return-to-work after follow-up was employment at baseline (Deyo and Diehl, 1988). Some other studies focus on patients with acute low back pain with none or only a limited period of sick leave (Cats-Baril and Frymoyer, 1991; Faas et al., 1995; Hazard et al., 1996).

The major implication from this is that studies with different populations with respect to time out of work or employment status at baseline, cannot be compared in terms of which factors are predictors for return-to-work. In our view, predictive studies should therefore control in their design for these variables.

Most of the available studies suggest that return-to-work after a period of sick leave due to low back pain seems to be more influenced by psycho-social and social-economic factors such as illness behavior, work satisfaction and compensation status and less by physical factors such as results of physical examination (e.g. biomechanical measures) or physical requirements of the job (Astrand

and Isacson, 1988; Cott et al., 1989; Gallagher et al., 1989; Frymoyer, 1992; Lancourt and Kettelhut, 1992; Gatchel et al., 1995b; Hazard et al., 1996). The empirical basis of this viewpoint is, however, rather weak because of methodological problems in the studies at issue.

The aim of our study was to identify predictors of return-to-work within 1 year after the first day of the sick leave. The subjects were a Dutch group of employees with 3–4 months of sick leave because of low back pain, and who still had an employment relationship with their employer at entry in the cohort.

2. Methods

2.1. Study background

We used the data of a longitudinal Dutch study of sicklisted employees, that is part of an international comparative cohort study 'Work Incapacity and Reintegration' of LBP-patients in the private sector (Van der Giezen et al., 1996, 1997). In most countries the social security laws differ between employees in the public and in the private sector. The international study focussed on laws and their effects in the private sector only.

This international study has been initiated by the ISSA (International Social Security Association) and various social security institutions and governmental agencies from six countries are participating in this study (The Netherlands, Denmark, Sweden, Germany, Israel, The United States) (Bloch and Prins, 1997).

2.2. Inclusion criteria

Sicklisted employees were selected through social security administrations. Criteria for selection were defined by the participating agencies in the international study. Employees were selected for possible participation in the cohort, only if they were:

- between 18 and 60 years old;
- receiving full sickness benefit and not working for 90 consecutive days;
- suffering from low back pain diagnosed as ICD-9 codes 721 (spondylosis, spinal stenosis), 722 (disc disorders) or 724 (not specified back pain);
- before the start of their sick leave, employees in the private sector.

Final inclusion in the cohort was restricted to patients who also:

- marked their back pain on a pain drawing between the shoulder and hip;
- were not patients who had spine surgery in the year before the first day of the current sick leave episode;
- did not resume work before the baseline data collection (weeks 13–17 after first day of sick leave episode);

Fig. 1. Cohort requirement, selection and follow-up.

could be interviewed (baseline data collection) during weeks 13–17.

2.3. Participants

Social security administrations throughout The Netherlands sent an invitation to participate to all sicklisted employees between November 1994 and February 1995 who met the first set of inclusion criteria (Fig. 1). This letter

informed the sicklisted employee about the content and the privacy procedure of the study. If the employee was willing to participate, he/she was asked to fill in an informed consent document, to answer some specific questions about the cause and location of the back pain and to send this information directly to the research agency conducting the project. The social security agency informed the research agency about demographic variables of all approached employees, but was not informed whether the

Health <ul style="list-style-type: none"> - diagnosis by occupational physician ¹ - number of other (not LBP) chronic diseases ¹ - pain below knee ¹ - pain intensity ¹ - sf36: general health ¹ - sf36: energy/vitality ¹ - sf36: mental health ¹ - sf36: health change ¹ - ADL capacity ¹ - subjective work capacity ¹ - other work inhibiting chronic disease - Quetelet Initial - smoking habits ¹ - alcohol use 	History (of LBP) <ul style="list-style-type: none"> - impact of back pain on work in the past ¹ - duration and intensity of back pain ¹ - history of sick leave - history of sick leave due to back pain - back pain related to work ¹ - earlier work adaptations 	Social economic variables <ul style="list-style-type: none"> - gender (f/m) ¹ - age ¹ - education ¹ - urbanization - bread winner ¹ - living single - personal income before sick leave - personal income after sick leave
Occupational variables <ul style="list-style-type: none"> - Labor sector - social security agency ¹ - company plant size ¹ - length of service at current employer ¹ - economic position employer ¹ 	Job characteristics <ul style="list-style-type: none"> - part time work ¹ (< 36 hours a week) - usual weekly overtime - management job - job certainty - physical demands - decision latitude ¹ - psychological demands ¹ - work social support ¹ - job satisfaction ¹ 	Other variables <ul style="list-style-type: none"> - work attitude 1: work for work, less for income - work attitude 2: work most important in life - received support during sick leave ¹ - responsible for care other persons ¹ - help with personal problems

1. Potential predictors for return to work at T2 in the first step of the statistical analysis.

Fig. 2. Overview of potential predictors for return-to-work measured at the first measurement (T1).

approached employee decided to participate in the study. Social security would also not receive any information the participant presented at the questionnaires. Through this procedure we secured potential participants that participation could in no way influence their chances for sickness benefit. The research agency performed the final selection of the cohort members on the basis of all defined cohort inclusion criteria. As there were five types of social security administrations in The Netherlands (covering the five main labor sectors), cohort inclusion was stopped for the

employees of each type of social security administration as soon as the quatum for this type was reached, in order to achieve an equal distribution over these various administrations. Respondents who applied for participation after the cohort inclusion stopped for their social security administration, were not selected for the cohort (Fig. 1).

Between the 90th and the 120th day after the first day of sick leave (the first day of sick leave will be referred as T0), all selected employees were approached with a structured telephone interview followed by a mailed questionnaire (T1

measurement). Participants without telephones received a mailed questionnaire that also included the questions from the telephone interview.

2.4. Baseline data

The social security administrations supplied the research agency with basic information such as the first day of the sick leave, birth date, gender, company size, labor sector, contracted occupational health service for each approached employee. This information was privacy-protected by using a key-number for each employee: names or social security numbers of approached employees were not supplied. The research agency was able to link this information only to participating employees; their key-number was printed on their participation form. This privacy protection implied that the research agency had no knowledge of names of non-responders, and that the social security agency was not informed about who of the approached employees participated in the study. The participation form contained information about name, address and telephone number, the location of the back pain on a pain drawing, date of work resumption, and spine operation in the year before the first day of the sick leave. Each employee also had to fill in his/her informed consent for participation in this study, including collecting information from his/her physicians.

During the telephone interview and by the mailed questionnaire, information was collected on many potential predictors of return-to-work (Fig. 2). To assess the subjective health status, parts of the SF36 questionnaire were used: the subscales Energy/Fatigue, Emotional Well-being, General Health and Health Change (Ware and Sherbourne, 1992). To assess Activities of Daily Living (ADL) related functional capacity, the Hannover Functional Ability Questionnaire for measuring back pain-related functional limitations was used (Kohlmann and Raspe, 1994, 1996). In order to assess the subjective work capacity, one question about present work capacity from an original 7-item Work Ability-scale was used (Ilmarinen and Tuomi, 1992). For measuring the present pain intensity, the first question from the pain complaints questionnaire was used (Von Korff, 1988; Von Korff et al., 1992).

In order to measure various aspects of the content of the job or the work, decision latitude and psychological demands were measured with help of the Theorell-Karasek scale (Karasek, 1989; Karasek and Theorell, 1990). For measuring psycho-social aspects of the job, the scale 'social support in the workplace' (Johnson, 1986) and a scale for 'job satisfaction' (Symonds et al., 1996) were used.

All individual scores on the used scales were transformed to a 0–10 range before entering both bivariate and multivariate analyses to enhance comparability of the odds ratios. For all items presented in Fig. 2, the original questions, answer options, protocols for data reduction and transformations are available on request from the first author in the Dutch language. For the variables also used in the interna-

tional study (most of the mentioned variables) English descriptions are also available. If not, the first author is willing to provide a translation of specific variables of interest.

2.5. Follow-up measurement

One year after the first day of the initial sick leave episode (T0) a follow-up measurement (T2) was performed by a telephone and mailed questionnaire. Questions dealt with work resumption (date, type of job, number of working hours) and about new periods of sick leave (recurrences). All these questions referred to the year after the first day of the initial sick leave episode.

T2 work status (12 months after the first day of sick leave) was the primary outcome. Return-to-work included return to the old job, to a new job, working less hours, working less productively etc. All of the not working employees were included in the 'not working' group: 87% of this group was (still) sicklisted or disabled due to low back pain.

2.6. Statistical analyses

Predictors for return-to-work were identified through two steps: firstly, ANOVA was performed to select characteristics that differed between employees who were working and employees who were not working at the end of follow-up (T2). The selection criterion for this first step was set at a P value of 0.10. We used the $P \leq 0.10$ level solely to select potential predictors for the multivariate analysis in step 2, not to test the significance of the relationship. Using $P \leq 0.05$ as selection criterion would, in our opinion, be too strict and could cause omission of possibly relevant predictors.

Secondly, logistic regression analysis was performed to assess which variables predict independently work status at T2 (after controlling for confounding effects of other predictors). Candidate variables were all selected in step 1. A forward selection procedure based on the likelihood-ratio (LR) criterion was used (Hosmer and Lemeshow, 1989). The probability of the score statistic for entering a variable was set at 0.05, and the probability of the LR statistic for removing a variable at 0.10. The maximum number of iterations was 30. The cut off point for classification was set at 0.65 to maximize both sensitivity and specificity of the model.

The final multivariate model only contains predictors that significantly improve the model without the factor at issue with the probability level at $P \leq 0.05$. Both crude and adjusted odds ratios (and 95% confidence intervals) are presented for the variables that were the best predictors of return-to-work at T2 (Table 2). In the Appendix the crude odds ratios are also printed for characteristics that differed significantly ($P \leq 0.05$) between employees who were working and employees who were not working at the end of follow-up (T2).

3. Results

3.1. Cohort recruitment

Social security offices identified and approached 1890 possible candidates for the study (Fig. 1); 1087 (58%) of them were willing to take part in the study, of which 658 actually were selected for the application of an interview/questionnaire. The rest of the employees who applied for participation either did not meet all cohort criteria (e.g. 32% of all approached employees on sick leave when selected, indicated on the participation form that they had resumed work before day 90) or they applied for participation after recruitment stopped for their social security administration.

3.2. Response

About 10% of all remaining employees within the group of 658 could not be reached by telephone within the period between 3 and 4 months of sick leave (90–120 days). Only 3% of all participants were without telephone and received a mailed questionnaire. The combined response to both the telephone interview and the mailed questionnaire was 91% for those who were reached before day 120. After screening of the data from these questionnaires for eligibility (diagnosis, work resumption, age etc.) a group of 328 employees were selected for the final cohort (Fig. 1).

One year after the first day of the sick leave, all 328 employees were approached for a second telephone interview (T2 measurement). In total for 91% ($n = 298$) the telephone interview was successfully completed. Within this group, 86% also completed and returned the mailed questionnaire ($n = 255$). As the telephone questionnaire yielded the most important follow-up data, the 298 employees who participated are the basis for the analyses in this paper.

The employees on sick leave who were initially approached by the social security institutions, but who did

not send in their participation form (non responders, $n = 803$) and the employees who were willing to participate ($n = 1087$), were compared for age, gender, labor sector and company size. Table 1 presents differences between the initial responders and non-responders on these variables. Responders appear to be a little bit older, and less often working in labor sectors like construction or health and welfare. However the differences are small: all ages and labor sectors are well represented in the cohort. Unfortunately we were not able to ask non-participants the reasons for not participating because due to privacy regulations, we received only anonymous data about the non-participating employees from the social security institutions.

3.3. Return-to-work

The majority of the 298 employees (77%) from the original cohort, but excluding the employees who could not be reached for the second telephone interview, resumed work during follow-up. However 31 (14%) of these resumeres were not working anymore at the end of follow-up. A smaller group within the cohort ($n = 69$; 23%), excluding the employees who could not be reached for the second telephone interview, never went back to work after the start of their initial episode of sick leave (Fig. 1). Of all resumeres, 40% had one or more other episodes of sick leave during follow-up: for the majority of this group this or these new episodes of sick leave were rather short in length.

At the end of follow-up (T2), 34% of all employees in the cohort, excluding the employees who could not be reached for the second telephone interview, was not working (Fig. 1). The large majority (87%) of these employees were on sick leave or involved the long-term disability claims process. Most of these employees who were not working at T2 had been on sick leave throughout the complete follow-up period of the study. However 31% of them had resumed work after the T1-measurement, but reported sick again before the T2-measurement.

Of all employees who were working at T2 (66% of all employees in the cohort, excluding the employees who could not be reached for the second telephone interview) 21% worked less hours and/or less productive compared to the old job and 13% worked at a new employer. The mean time out of work was 31 weeks (SD 10.0) for the employees at work at T2, and 47 weeks (SD 9.3) for the employees not at work at T2.

3.4. Predictors for return-to-work

The first step (bivariate analysis) identified 29 variables from Fig. 2 that were potential predictors for work status at T2 as these were different ($P \leq 0.10$) between the T2 working and the T2 not-working employees: these are indicated in Fig. 2. The majority of these variables differed significantly between T2 working and T2 not-working employees ($P \leq 0.05$): for these variables the crude odds ratios are printed in the Appendix.

Table 1
Demographic characteristics of the original responders and non-responders to the invitation to participate in the study

	Responders ($n = 1.087$)	Non-responders ($n = 803$)
Gender (%men)	59%	59%
Age (mean)	39 years	38 years ^a
Labor sectors		
Agriculture	1%	2%
Retail trade	17%	15%
Building	16%	20%
Health and welfare	23%	27%
Other	44%	37% ^a
Company plant size		
>15 employees	17%	18%
≥15 employees	83%	82%

^a $P \leq 0.01$.

Almost all health variables differed between both groups. From the other fields some variables in each field differed between both groups. The logistic regression model choose five variables from these 29 that each independently significantly related to the T2 work status (Table 2). With a cut-off point of 0.65, the model correctly classified 76% of the employees who were working at T2 and 71% of those not working (overall accuracy is 74%; overall accuracy with a cut off point of 0.5 is 75%). Addition of other variables did not increase the accuracy of the model.

General health, as measured by the subscale of the SF36, is the most significant predictor: the odds ratio for working at T2 is 1.5 for those who feel one point better on a 0–10 scale of general health. After general health, job satisfaction turned out to be related mostly to the T2 work status. Each point progress on a 0–10 scale had an adjusted odds ratio of 1.3. The third variable chosen by the logistic regression procedure was the status of bread winner: being the bread winner in the household yielded an adjusted odds ratio of 2.5. The mean age of employees who were not working at the end of follow-up was 41 years, whereas the mean age of employees working at T2 was 39 years ($P \leq 0.05$): each increase of 10 years of age was associated with an odds ratio of 0.7 for being at work at the end of follow-up. Employees with less pain at cohort entry had also a significant better prognosis for work resumption (Table 2).

4. Discussion

Our study differs from most other studies performed in this field because all members of our cohort were employed at the start of the study and there was hardly any variation in duration of sick leave (3–4 months) at cohort entry. A high number of the employees completed both measurements (91% of the initial cohort). The study was population-based: the social security administration offices approached

each potential employee who could possibly meet the cohort criteria.

We focussed our analysis on subjects who were at work 12 months after the first day of the initial episode of sick leave which lasted minimally 3–4 months. The majority of the cohort (77%) resumed work during follow-up. This return-to-work rate of the cohort appears to be rather high when compared to statistics from social security offices in which for only 61% of LBP patients the sickness benefit, which had lasted minimally 13 weeks, was terminated within 1 year (Van der Giezen and Veerman, 1997). It is therefore possible that the participants in our study were a positive selection with respect to predictors of return-to-work compared to all patients who where initially approached for this study. However, the difference will also be caused by the fact that social security offices only register complete return-to-work with termination of sickness benefit. In our study various degrees of return-to-work were counted as successful return-to-work: at T2 21% of all working employees was working with a partial sickness or disability benefit.

We found that almost 40% of all resumed employees experienced another period of sick leave during follow-up. The majority of this group resumed work again before the end of follow-up. The fact that, for a large number of employees, work resumption during follow-up was followed by another period of sick leave, led us to choose as the primary outcome variable, work status at the end of follow-up. With this outcome, we consider a work resumption that results in another period of sick leave, with the result that the employee is not working at the end of follow-up, as a failed work resumption. In our view this is a more valid approach compared to for example survival analysis with 'time-to-first-work-resumption' as the outcome variable. Changes in work status are also described by Fishbain et al. (1993, 1996). It is important to understand that in The Netherlands, different from the US situation, employers of employees who are on sick

Table 2

Crude and adjusted odds ratios for independent predictors for return to work within one year within a group of employees with a sick leave of 3–4 months ($n = 298$)^a

	Crude odds ratio	95% CI	Adjusted odds ratio	95% CI
SF36: general health (10 point scale ^b)	1.58	1.35–1.83	1.53	1.30–1.80
Job satisfaction (10 point scale ^c)	1.21	1.08–1.36	1.26	1.11–1.44
Bread winner (yes/no)	2.01	1.26–3.44	2.46	1.37–4.40
Age (10 years categories ^d)	0.78	0.61–0.99	0.70	0.52–0.93
Pain intensity (10 point scale ^e)	0.77	0.68–0.89	0.85	0.73–0.99

^a Predictors of return-to-work: crude and adjusted odds ratios (OR) with their 95% confidence intervals (95% CI) as computed by a forward logistic regression procedure with variables indicated in Fig. 2 as candidate independent variables. Being at work 12 months after the first day of sick leave is the dependent variable. The predictors are presented in descending order of selection by the logistic regression procedure. The adjusted odds ratios are adjusted for all other predictors in the model.

^b Ten points: maximum positive general health score, OR for every point improvement.

^c Ten points: maximum positive job satisfaction, OR for every point improvement.

^d Highest category, oldest age group, OR for every 10 years older in age.

^e Ten points: maximum pain level, OR for every point of more pain.

leave are prohibited to terminate the contract with this employee within a period of 2 years after the first day of the sick leave. Also these employers are required to offer lighter work to this employee during the same period. We can expect that these legal aspects between employer and employee result in a smaller variation in job movements in the Dutch situation compared to the US situation: employees are usually either working for the old employer or are sicklisted during the follow-up period of this study. Only a few employees decide to leave the old employer, mostly because they changed to a job with a new employer.

There is another important aspect about the measurement of the outcome variable. Although return-to-work at a certain point in time is a widely used outcome parameter, the operationalization of this variable varies among studies. Most studies split the study population based on the work status at the end of follow-up, but include in the 'working' group, or exclude totally from the analysis, people who are out of work for reasons unrelated to back pain (Sandström, 1986; Cats-Baril and Frymoyer, 1991; Gatchel et al., 1995a; Hazard et al., 1996). We classified people out of work for other reasons than sick leave or long-term disability in the group not working at T2: conceptually we evaluate being really at work to be the success parameter, and we 'care' less about the difference between being on sick leave, receiving disability benefits or otherwise not working. In regular Dutch statistics only full return-to-work is counted: persons who work less hours or less productive are counted as being on sick leave or on disability benefit. This artifact regularly leads to misunderstandings in defining goals for return-to-work policies for persons on disability benefits (Besseling et al., 1998). We coded all persons at work as working, including working less hours, less productive etc. to prevent erroneous interpretation of the results with an alternative dichotomous coding scheme. We therefore did not follow the outcome classification chosen by most of the authors or institutions mentioned above. In our study the number of people not working at T2 for reasons unrelated to back pain was low (13%), so this difference in classification will not have influenced the results strongly.

Results presented here confirm that for employees with chronic low back pain, being at work one year after the first day of the initial episode of a sick leave of 3–4 months, is more related to psycho-social and economic factors and less related to more physical factors like ADL-capacity, radiating pain, physical requirements in the job, or labor sector (e.g. construction). Although we found many variables to be significantly related to work status at the end of follow-up, most of these lost their impact on being at work after controlling for other variables in a multivariate logistic regression model.

Typical psychological variables (e.g. depression, fear avoidance) could, however, not be taken into account, as these were not measured in the data collection.

In our study, the most important predictor for being at

work were the subjective evaluation of the health status and the satisfaction about the job.

Gatchel et al. (1995b) also found both a high score on a pain and disability scale and a high score on the Minnesota Multiphasic Personality Inventory (MMPI) scale 3 (e.g. general malaise about the condition) to be negatively associated with return-to-work. On the other hand, Lancourt and Kettelhut (1992) found no relation between the Oswestry score nor between job satisfaction and return-to-work in the subgroup who were out of work less than 6 months before entering the study population.

We also found an economic variable (bread winner) as being significantly predictive for return-to-work, even after controlling for other variables. This finding might be somehow comparable with the result that receiving workers compensation benefits is negatively associated with return-to-work (Gatchel et al., 1995b). It reveals the importance of an economic incentive to return-to-work: employees with a bigger financial need return more often back to work, irrespective of their health. Most of the bread winners are male: women returned less often back to work compared to men, as was also found by Gatchel et al. (1995b). Lancourt and Kettelhut (1992) found a less strong relationship between financial need and return-to-work.

This study shows that psycho-social aspects of health and work in combination with economic aspects have a significantly larger impact on return-to-work when compared to relatively more physical aspects of disability and physical requirements of the job. This suggests that interventions aimed at return-to-work of employees sicklisted with LBP should predominantly be focused on these psycho-social aspects for example health behavior and job satisfaction, and on the (lack of) economic incentives for return-to-work. New studies on these issues could probably give more insight in the kind of (causal) interrelationship between these characteristics, intermediate characteristics, changes in these characteristics and (lack of) return-to-work: it is possible that long-term sick listing is a way of changing the work status for some employees because of other reasons than disability alone.

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Appendix A.

Crude odds ratios for characteristics that significantly differed ($P \leq 0.05$) between T2 working and T2 not-working employees ($n = 298$)¹

	Crude odds ratio	95% CI
<i>Health</i>		
Pain below knee (yes/no)	1.63	1.00–2.66
Pain intensity (10 point scale ²)	0.77	0.68–0.89
SF36: General health (10 point scale ³)	1.58	1.35–1.83
SF36: Energy/vitality (10 point scale ³)	1.26	1.10–1.45
SF36: Health change (10 point scale ³)	1.22	1.09–1.40
ADL capacity (10 point scale ³)	1.23	1.08–1.41
Subjective work capacity (10 point scale ³)	1.14	1.01–1.29
<i>History (of LBP)</i>		
Impact of back pain on work in the past (10 point scale ²)	0.89	0.81–0.98
Back pain related to work (for the most part)	0.50	0.29–0.88
<i>Social economic variables</i>		
Gender (female)	0.53	0.32–0.86
Age (10 years categories ⁴)	0.78	0.61–0.99

(continued)

	Crude odds ratio	95% CI
Education (7 point scale ⁵)	1.25	1.03–1.52
Bread winner (yes/no)	2.01	1.26–3.44
<i>Occupational variables</i>		
Labor sector (retail trade/other)	0.50	0.27–0.92
Company plant size (10 employees more)	1.02	1.00–1.03
Economic position employer (10 point scale ³)	1.12	1.02–1.23
<i>Job characteristics</i>		
Decision latitude (10 point scale ³)	1.23	1.09–1.40
Psychological demands (10 point scale ²)	0.86	0.75–0.99
Work social support (10 point scale ³)	1.16	1.03–1.30
Job satisfaction (10 point scale ³)	1.21	1.08–1.36
<i>Other variables</i>		
Not responsible for care other persons (10 point scale ³)	1.11	1.01–1.22

¹ Being at work 12 months after the first day of sick leave is the dependent variable.

² Ten points, maximum negative score, OR for every point worse in pain or impact of back pain.

³ Ten points, maximum positive score, OR for every point better in health, economic situation or job characteristics or less responsibility.

⁴ Highest category, oldest age group, OR for every 10 years older in age.

⁵ Seven points: maximum is scientific degree, OR for every point higher in education.