Living conditions, including life style, in primary-care patients with nonacute, nonspecific spinal pain compared with a population-based sample: a cross-sectional study

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Background: Nonspecific spinal pain (NSP), comprising back and/or neck pain, is one of the leading disorders behind long-term sick-listing, including disability pensions. Early interventions to prevent long-term sick-listing require the identification of patients at risk. The aim of this study was to compare living conditions associated with long-term sick-listing for NSP in patients with nonacute NSP, with a nonpatient population-based sample. Nonacute NSP is pain that leads to full-time sick-listing > 3 weeks.

Methods: One hundred and twenty-five patients with nonacute NSP, 2000–2004, were included in a randomized controlled trial in Stockholm County with the objective of comparing cognitive–behavioral rehabilitation with traditional primary care. For these patients, a cross-sectional study was carried out with baseline data. Living conditions were compared between the patients and 338 nonpatients by logistic regression. The conditions from univariate analyses were included in a multivariate analysis. The nonsignificant variables were excluded sequentially to yield a model comprising only the significant factors (P < 0.05). The results are shown as odds ratios (OR) with 95% confidence intervals.

Results: In the univariate analyses, 13 of the 18 living conditions had higher odds for the patients with a dominance of physical work strains and indication of alcohol over-consumption, odds ratio (OR) 14.8 (95% confidence interval [CI] 3.2–67.6). Five conditions qualified for the multivariate model: High physical workload, OR 13.7 (CI 5.9–32.2); Hectic work tempo, OR 8.4 (CI 2.5–28.3); Blue-collar job, OR 4.5 (CI 1.8–11.4); Obesity, OR 3.5 (CI 1.2–10.2); and Low education, OR 2.7 (CI 1.1–6.8).

Conclusions: As most of the living conditions have previously been insufficiently studied, our findings might contribute a wider knowledge of risk factors for long-term sick-listing for NSP. As the cross-sectional design makes causal conclusions impossible, our study should be complemented by prospective research.

Keywords: nonspecific spinal pain, back pain, neck pain, long-term sick-listing, population-based sample, cross-sectional study

Introduction

Since the late 1990s, the industrial world, particularly Sweden, has seen a substantial growth of sick-listing, especially on a long-term basis, including disability pensions. In 2007, despite a slight decrease since 2004, 11% of Swedes of working age were sick-listed versus 6% in comparable countries.1 Up to and including 2004, musculoskeletal disorders, dominated by spinal pain, comprising back and/or neck pain, formed the largest diagnostic group behind disability pensions in Sweden. Following international trends,
it was outflanked from 2005 by mental disorders. Nevertheless, despite this relative decrease, recent data indicate a continued increase in the total cost to society of spinal pain. The vast majority of cases concern nonspecific spinal pain (NSP) and present a task for primary care.

Clinical guidelines emphasize the necessity of early intervention to prevent long-term sick-listing caused by NSP, requiring the identification of patients at risk. Socioeconomic and medical factors are associated both with the onset of acute NSP and the progression to nonacute NSP.

Acute and nonacute NSP is pain that leads to full-time sick-listing for ≤3 weeks and >3 weeks, respectively. However, research within the area has been seriously limited with, eg, an under-representation of women.

Sweden has a unique tradition of keeping population statistics, going back as far as 1749. Since 1975 extensive annual surveys of living conditions, including lifestyle, have been conducted on large random samples representing Sweden as a whole as well as local districts. This provides an exceptional opportunity for epidemiological research. However, we have found no previous study in which primary-care patients with nonacute NSP were compared with a population-based sample.

The aim of this study was to compare living conditions associated with long-term sick-listing for NSP in patients with nonacute NSP, with a nonpatient population-based sample.

Methods
The study was approved by the local ethics committee at Karolinska University Hospital, Huddinge, Sweden.

Setting and source population
The study area was the Southern part of Stockholm County, including 5 urban districts (Enskede-Årsta-Vantör, Farsta, Älvsjö, Skarpnäck, and Hägersten-Liljeholmen) and 4 semi-urban districts (Huddinge, Nynäshamn, Tyresö, and Haninge). The number of inhabitants (31 December 2001) in the county totalled about 1,830,000, of whom 1,100,100 were of the same age as the patients studied (18–59 years). The study area had about 467,000 inhabitants, of whom 281,000 were aged 18 to 59 years and constituted the source population. A detailed description of the distribution of the inhabitants between the districts is shown in Table 1.

Patients
One hundred and twenty-five patients with nonacute NSP, between August 2000 and January 2004, were included in a randomized controlled trial, which was described in detail in a previous study. The patients were allocated to a multidisciplinary, cognitive–behavioral program at a rehabilitation center or continued with traditional primary care. The rehabilitation center opened in 1991 and was situated in Haninge, geographically near the middle of the study area.

The criteria for inclusion were: 1) Vocationally active, up to and including 59 years of age. 2) Sick-listed full-time for spinal pain for at least 6 weeks (42 days) and for at most 2 years (730 days). 3) Able to fill in forms. The criteria for exclusion were: 1) Temporary disability pension, or disability pension being paid or in preparation. 2) A primary need for action by a hospital specialist (eg, operation for intravertebral slipped disc). 3) Pregnancy and diseases (other than spinal pain) that would probably make rehabilitation impracticable (eg, advanced pulmonary disease). 4) Whiplash associated disorders as a primary obstacle to working. 5) Previous rehabilitation at the rehabilitation center. 6) Other multidisciplinary rehabilitation ongoing or planned.

The patients living in the study area were recruited by 41 family doctors at 13 primary-care health centers. Twelve of the centers engaged >1 family doctor, and 1 center was a

| Districts (inhabitants; total 467,298) | Inhabitants aged 18–59 years (%) | Patients (%) |
|--------------------------------------|----------------------------------|--------------|
|                                       | Frequency                        | Cumulative frequency | Frequency | Cumulative frequency |
| Huddinge (85,700)                    | 50,430 (18.0)                    | 50,430 (18.0)        | 37 (29.6) | 37 (29.6)            |
| Nynäshamn (24,332)                  | 13,523 (4.8)                     | 63,953 (22.8)        | 36 (28.8) | 73 (58.4)            |
| Tyresö (39,434)                     | 22,454 (8.0)                     | 86,407 (30.8)        | 26 (20.8) | 99 (79.2)            |
| Enskede-Årsta-Vantör (80,984)       | 49,562 (17.7)                    | 135,969 (48.5)       | 11 (8.8)  | 110 (88.0)           |
| Haninge (70,432)                    | 42,487 (15.1)                    | 178,456 (63.6)       | 5 (4.0)   | 115 (92.0)           |
| Farsta (54,597)                     | 26,211 (9.3)                     | 204,667 (72.9)       | 3 (2.4)   | 118 (94.4)           |
| Älvsjö (20,786)                     | 11,861 (4.2)                     | 216,528 (77.2)       | 3 (2.4)   | 121 (96.8)           |
| Skarpnäck (40,060)                  | 24,979 (8.9)                     | 241,507 (86.1)       | 3 (2.4)   | 124 (99.2)           |
| Hägersten-Liljeholmen (59,973)      | 39,118 (13.9)                    | 280,625 (100.0)      | 1 (0.8)   | 125 (100.0)          |

Notes: '31 December 2001; ^For age group 20–64 years (data for age group 18–59 years were not available).
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1-doctor clinic. To ensure that all the study patients, including those who were allocated to continued primary care, received a high minimum level of treatment, only permanently employed or long-term substitute doctors were engaged. The rehabilitation center was well known to the family doctors, as they had been referring patients to it for several years. The recruitment of the patients was nonsystematic, ie, dependent on the motivation and available time of the family doctor. Before randomization, the study patients met a research assistant in the health center and completed a questionnaire of baseline characteristics. A detailed description of the distribution of included patients between the family doctors is shown in Table 2, and of the distribution of the patients between the districts in Table 1. One of the 125 patients failed to complete the questionnaire and was excluded. The remaining 124 patients were included in this study.

Nonpatients
From a nationwide sample, a simple, random, local sample of 338 nonpatients was selected as a comparison group to the patients:

Statistics Sweden, a governmental authority, conducts The Survey of Living Conditions annually (In Swedish: Undersökningsarna av levnadsförhållanden [ULF]).

To reach an acceptable power, 2 years of ULF data, 2000 + 2001, were combined. Most of the patients (81/124) were recruited during that period. A flowchart of ULF is shown in Figure 1.

ULF 2000 + 2001 was a simple, random sample of 7465 and 7459 individuals respectively, aged 16 to 84 years. They were invited to participate in an interview in their homes. Nonresponders and those who declared that they did not want to be visited were offered a telephone interview. From the interviewed individuals we selected subjects of the same age as the patients except for those with partial or total disability pensions. This resulted in a nationwide sample, of which 371 individuals were living in the home districts of the patients. By exclusion of the vocationally inactive and the full-time sick-listed subjects, a comparison group of 338 nonpatients was achieved.

Living conditions associated with long-term sick-listing for NSP
The cross-sectional design made conclusions about causes and effects impossible. For example, anxiety, depression and low physical activity could be both explanatory and responding variables for nonacute NSP. We therefore limited our analyses to living conditions that could reasonably be supposed to have existed before the start of the current sick-listing and excluded comparisons of, eg, mental distress, pain and exercise habits.

For a majority (10 out of 18) of the living conditions, the questions in the patient questionnaire and the ULF questionnaire were identical or nearly identical. For 8 living conditions, we made modifications so they were reasonably comparable. The nonidentical questions in the study and ULF, and our modifications of them, are shown in Table 3.

Questions on alcohol consumption were put only to the ULF subjects of 2001, of whom 169 belonged to the nonpatients. Questions on work conditions were put exclusively to the 325 nonpatients in employment. The questions on the other living conditions were put to all nonpatients.

The 18 living conditions associated with long-term sick-listing for NSP are shown in Table 4. The rationale of the choice of conditions is shown as references in the table.

Outcome measure
The outcome measure was the outcome variable of logistic regression, being either a patient or a nonpatient.

Statistics
The patients were compared with the nonpatients by applying logistic regression. Stata, version 10.1 was used to analyze the data.

We first estimated the distribution of the living conditions for the patients and the nonpatients. The results are shown as proportions (means) with 95% confidence intervals (CI). Differences between the patients and the nonpatients were evaluated by univariate-logistic regression, adjusted for gender and age. Two age classes were defined: Old age ≥45 years and Young age ≤44 years. The outcome (dependent) variable was the sample class, ie, patient or nonpatient.

Table 2 Distribution of patients (n = 125) between the recruiting family doctors (n = 41) (ranking by the number of patients)

| Family doctors (%) | Frequency | Cumulative frequency | Patients (%) | Frequency | Cumulative frequency |
|--------------------|-----------|----------------------|--------------|-----------|----------------------|
|                    | 1 (2.4)   | 1 (2.4)              | 17 (13.6)    | 17 (13.6) |                     |
|                    | 1 (2.4)   | 2 (4.9)              | 16 (12.8)    | 33 (26.4) |                     |
|                    | 1 (2.4)   | 3 (7.3)              | 10 (8.0)     | 43 (34.4) |                     |
|                    | 1 (2.4)   | 4 (9.8)              | 8 (6.4)      | 51 (40.8) |                     |
|                    | 1 (2.4)   | 5 (12.2)             | 7 (5.6)      | 58 (46.4) |                     |
|                    | 1 (2.4)   | 6 (14.6)             | 5 (4.0)      | 63 (50.4) |                     |
|                    | 4 (9.8)   | 10 (24.4)            | 4 (3.2)      | 79 (63.2) |                     |
|                    | 5 (12.2)  | 15 (36.6)            | 3 (2.4)      | 94 (75.2) |                     |
|                    | 5 (12.2)  | 20 (48.8)            | 2 (1.6)      | 104 (83.2) |                     |
|                    | 21 (51.2) | 41 (100.0)           | 1 (0.8)      | 125 (100.0) |                     |
The predictive (independent) variable was the living condition. The results are presented with odds ratios (OR), 95% CI and \( P \) values.

Several of the living conditions could be expected to intercorrelate, eg, Immigrant and Low education, and Blue-collar job and High physical workload. To find the most discriminative living conditions we used multiple-logistic regression, adjusted for gender and age, with the sample class as the outcome variable and the living conditions as the explanatory variables. A prerequisite for multiple-logistic regression is the same number of respondents for the different variables,\(^{16}\) so subjects with missing data were excluded from the multivariate analysis (Figure 2). This left 249 subjects (95 patients and 154 nonpatients) for multiple-logistic regression analysis. We first explored univariate analyses. The variables with a \( P \) value of at most 0.10 are presented with OR, \( P \) values and 95% CI. They were included in a multiple model, from which the variables with \( P \) values of 0.05 or higher were excluded stepwise to yield a model comprising only variables with \( P \) values < 0.05. The final multivariate model is presented with OR, \( P \) values, 95% CI, a goodness-of-fit test by Hosmer–Lemeshow, the percentage of correctly predicted patients, and the area under the ROC (receiver operating characteristic) curve.\(^{16}\)

**Results**

A flowchart of the study is shown in Figure 2.

**Eligible subjects in the source population**

From ULF data, we estimated a point prevalence of individuals with full-time sick-listing for NSP to 0.8% or 2200 subjects. As these data included both short- and long-term sick-listing, we had to estimate the proportion of nonacute NSP, ie, the individuals with sick-listing >3 weeks. Previous research indicates an initial high recovery speed: starting from full-time sick-listing for NSP, ∼90% of the individuals have returned to work after 12 weeks, and the rate clearly levels off thereafter.\(^9\)

We estimated the point prevalence in the source population of nonacute NSP to be ∼0.2% or ∼500 individuals. We have no data for the prevalence over time.

**Patients**

A majority of the patients were recruited by a minority of the doctors: 15 doctors (36.6%) recruited in all 94 patients (75.2%).
The mean age of the 338 nonpatients was 39.3 (range 19–59) years. Males predominated slightly. However, the difference in gender distribution versus the patients was nonsignificant (Table 4).

**Outcome**

In the univariate analyses, 13 of the 18 conditions had higher odds for the patients with a dominance of physical and...
psychosocial work strains, and Indication of alcohol over-consumption (OR 14.8); only one condition, Single life (OR 0.5), had lower odds (Table 4).

Five conditions qualified for the final multivariate model: High physical workload (OR 13.7), Hectic work tempo (OR 8.4), Blue-collar job (OR 4.5), Obesity (OR 3.5), and Low education (OR 2.7) (Table 5). The proportion of correctly classified subjects was high (85.5%) and the area under ROC curve was large (0.92; the maximum would be 1.0).

**Discussion**

Living conditions associated with long-term sick-listing in primary-care patients with nonacute NSP were compared with a local sample of nonpatients. In the univariate analyses, the patients had higher odds for 13 of the 18 conditions. In the multivariate analysis, 5 conditions qualified, indicating work strains, lower social class, and life-style.

**Work strains**

High physical workload and Hectic work tempo were the two outstanding living conditions in the model. The association of High physical workload with NSP has been pinpointed in many studies.17–20 Job strain, ie, high demands, including among other items a high work tempo, and low control,21 has been associated with disabling NSP in several studies.22–25 Hectic work tempo as a single risk factor, however, is far less clear. In a review of risk factors for NSP, insufficient evidence was found for high work pace.26 Despite occasional studies that indicate a relationship between high work tempo and a longer time to return to work,27 a recent review of psychosocial predictors of failure to return to work in NSP showed strong evidence for the recovery expectations of the patients, while stress/psychological strain were non-predictive.28 This is also in line with our newly published prospective study, in which High self prediction qualified as a predictor of stable return to work, while work-related variables did not.29

**Indicators of lower social class**

Blue collar job and Low education are closely associated and might be looked upon as different aspects of belonging to a lower social class.5 Low education limits the chances of getting a white-collar job, which explains the great dominance of work strains in the model and the fairly low degree of variance for Blue collar job and Low education in themselves. There is conflicting evidence in previous research of a relationship

| Table 4 Living conditions – univariate analyses |
|-----------------------------------------------|
| Patients (n = 124) | Nonpatients (n = 338) | Odds ratio | P value |
| Woman20,48–50 | 68 (54.8 [46.0–63.7]) | 161 (47.6 [42.3–53.0]) | 1.3 [0.9–2.0] | NS |
| Older age (= ≥ 45 years)17,18 | 57 (46.0 [37.1–54.9]) | 107 (31.7 [26.7–36.6]) | 1.8 [1.2–2.8] | 0.006 |
| Immigrant (= born outside Sweden)51 | 34 (27.4 [19.5–35.4]) | 43 (12.7 [9.2–16.3]) | 2.6 [1.6–4.4] | <0.001 |
| Single life (= living alone without children)52 | 22 (17.7 [10.9–24.6]) | 101 (29.9 [25.0–34.8]) | 0.5 [0.3–0.9] | 0.02 |
| Living with children at home44 | 69 (55.7 [46.8–64.5]) | 167 (49.4 [44.1–54.8]) | 1.3 [0.9–2.0] | NS |
| Low education (= at most junior high school)52 | 44 (35.5 [26.9–44.0]) | 41 (12.1 [8.6–15.6]) | 3.8 [2.3–6.3] | <0.001 |
| Unemployed48 | 29 (23.4 [15.8–30.9]) | 13 (3.9 [1.8–5.9]) | 8.2 [4.0–16.5] | <0.001 |
| Blue-collar job44,5,47 | 83 (67.4 [50.6–80.2]) | 108 (32.1 [28.1–38.4]) | 15.0 [7.7–29.1] | <0.001 |

**Physical work strains47**

| Physical work strains*47 |
|--------------------------|
| High physical workload17–20 | 79 (83.2 [75.5–90.8]) | 51/325 (15.7 [11.7–19.7]) | 30.4 [15.9–58.3] | <0.001 |
| Monotonous work moments9 | 61 (64.2 [54.4–74.0]) | 134/324 (41.4 [36.0–46.7]) | 2.7 [1.7–4.3] | <0.001 |
| Difficult work postures19 | 76 (80.0 [71.8–88.2]) | 107/324 (33.0 [27.9–38.2]) | 9.0 [5.1–15.9] | <0.001 |
| Vibrations in work55 | 35 (36.8 [27.0–46.7]) | 15/324 (4.6 [2.3–6.9]) | 18.6 [8.7–39.9] | <0.001 |

**Psychosocial work strains44,46**

| Psychosocial work strains44,46 |
|-------------------------------|
| Hectic work tempo26 | 88 (92.6 [87.3–98.0]) | 239/324 (73.8 [68.9–78.6]) | 4.5 [2.0–10.1] | <0.001 |
| Low decision latitude17 | 30 (31.6 [22.1–41.1]) | 42/321 (13.1 [9.4–16.8]) | 3.2 [1.8–5.5] | <0.001 |
| Smoking (daily + not daily)17 | 49 (39.5 [30.8–48.2]) | 118/336 (35.1 [30.0–40.2]) | 1.2 [0.8–1.8] | NS |
| Indication of alcohol over-consumption17–20 | 17 (13.7 [7.6–19.8]) | 216 (64.1 [50.0–70.0]) | 14.8 [3.2–67.6] | 0.001 |
| Obesity (= BMI ≥ 30)45 | 30 (24.2 [16.6–31.8]) | 23/332 (6.9 [4.2–9.7]) | 4.3 [2.3–7.7] | <0.001 |
| Camorbidty45 | 45 (36.3 [27.7–44.9]) | 105 (31.1 [26.1–36.0]) | 1.1 [0.7–1.7] | NS |

**Notes:** One hundred and twenty-four patients with nonacute nonspecific spinal pain (NSP) compared with 338 nonpatients by logistic regression, adjusted for gender and age. If not otherwise stated, results are shown as number (in case of missing data, the total number is also shown) with percentage in parenthesis; 95% confidence intervals within brackets. For the subjects in employment: 95/124 patients and 325/338 nonpatients; According to Socio-Economic Classification (in Swedish “Socioekonomisk indelning (SEI)”)[http://www.scb.se/statistik/LE/LE0101/_dokument/sEi standard.pdf]. Modification: the subjects in the group “Entrepreneur” were included or not in Blue-collar job starting from their probable level of education; The alcohol questions were put to 169/338 nonpatients; any other prolonged disease except NSP and obesity.
Patients with nonacute, nonspecific spinal pain compared with a population-based sample

The study area (Southern Stockholm County) (n) = 467,000 (31 December, 2001)

Source population (18–59 years) = 281,000

Full-time sick-listed for NSP = 2200

Eligible patients with nonacute NSP = 500

Recruited by family doctors (during 2000–2004) = 147

Excluded: 22 (not meeting inclusion criteria = 13; refused to participate = 9)

Randomized = 125

Excluded: 1 (incomplete initial questionnaire)

Patients = 124

Analyzed by univariate-logistic regression = 462

Excluded: 213 (lacking alcohol data = 174; unemployed = 35; lacking work-related data = 2; lacking obesity data = 2)

Analyzed by multiple-logistic regression = 249 (95 patients + 154 nonpatients)

ULF participants = 371

Excluded: 14 vocationally unactive (students = 13; housewife = 1)

Vocationally active = 357

Excluded: Full-time sick-listed = 19

Nonpatients = 338

Figure 2 Flowchart of the study.

Abbreviations: NSP, nonspecific spinal pain; ULF, Undersökningarna av levnadsförhållanden.

between NSP and lower social class. A possible association is probably a matter of social disadvantage, although it is not clear which aspects of the disadvantage are important.5 In our prediction study, there were indications that Low education, though a nonpredictor, may have qualified as a predictor with a longer follow-up than the 2 years of that study.29 Blue-collar job, however, was a clear nonpredictor. With a prevalence of 87.4% of the patients versus 33.2% of the nonpatients, it is logical that such a great difference qualifies for a multivariate analysis with the sample class as outcome variable. The prediction study, however, exclusively involved patients with return to work/nonreturn to work as the outcome. A variable of such overwhelming frequency might be nondiscriminative, although it has a powerful effect on sick-listing. There is a lack of conclusive studies on the possible association between sick-listing for NSP and social class, according to a large 2004 review.10 Our research might contribute to the elucidation of this complex issue.
among the subjects with chronic recent primary-care research indicates a continued increase. A 1999 review indicated smoking as a weak risk indicator, but not a cause of NSP, and signs of causality were evident only in the study with the largest sample, though with low OR (1.7). However, in a large 2004 review, obesity should be considered a possible weak risk factor for the transition from acute to nonacute NSP, though with a decreased OR, probably influenced by Blue-collar job, which is a risk factor for obesity. According to a 2000 review, obesity was a risk factor for the transition from acute to nonacute NSP, with a 2-year follow-up. Though these conflicting results motivate further research, this cross-sectional study might contribute in pinpointing the comparatively higher prevalence of abuse problems among those patients.

During recent decades the prevalence of obesity has increased remarkably but with a certain international variation. For example, while the prevalence in the USA has increased to a full 20%, it doubled in Sweden from the years 1980/81 to 2004/5 from 5% to 10% in both women and men. Comorbidities with obesity include diabetes, cardiovascular diseases, pain in general, and NSP in particular. In our study, the prevalence of Obesity in the nonpatients during the years 2000/01 corresponded well with the 7% in 1996/97 concerning all Swedes 16 to 84 years, while among the patients it was more than 3-fold higher. Obesity remained significant in the multivariate model, though with a decreased OR, probably influenced by Low education, which is a risk factor for obesity. According to a 2000 review, obesity should be considered a possible weak risk indicator, but with insufficient data to assess whether it causes spinal pain. In a prospective study from 2002, obesity was a risk factor for the transition from acute to nonacute NSP, though with low OR (1.7). However, in a large 2004 review on predictors for nonacute NSP, there was insufficient evidence for obesity as a risk factor. A quite recent, very large, cross-sectional population-based study from Norway indicated associations between obesity and NSP and commented that further studies were needed to determine whether the association was causal. Our prediction study, however, found no impact of Obesity on sick-listing. Obesity was found in 24.2% of the patients versus 6.9% of the nonpatients. In line with the paragraph above, such a difference might qualify for a model with the sample class as outcome variable, but be eliminated in an analysis with return to work/nonreturn to work as outcome. It therefore remains unclear whether, how, and why obesity and NSP are correlated. Furthermore, the clinical relevance of that association, if any, is obscure. Recently, however, a reduction of musculoskeletal pain was reported in a study of a weight-reduction program, at least on a short-term basis.

Life-style

While the prevalence of Smoking was nonsignificantly higher in the patients, the prevalences of Indication of alcohol over-consumption and Obesity were remarkably higher. Smoking as a nonpredictor of disabling NSP was indicated in a cross-national, prospective study from 2000, including about 2000 subjects. However, associations between smoking and NSP have been found in several other studies. A 1999 review indicated smoking as a weak risk indicator but not a cause of NSP, and signs of causality were evident only in the study with the largest sample, >30,000 subjects.

In a 2000 review, a possible association between NSP and cigarette smoking was suggested, but the lack of prospective studies was emphasized. In a recent meta-analysis of both cross-sectional and prospective studies, current as well as former smoking was associated with NSP, though the association was fairly modest. The nonsignificance of Smoking in this study and in our prediction study might therefore be due to the small sample size.

More or less hidden alcohol abuse constitutes one of the greatest public health problems, with substantial social and clinical implications. Large population studies have shown that 10% to 15% of all men and approximately 5% of all women suffer from chronic alcohol dependency and quite recent primary-care research indicates a continued increase of those proportions. Among the subjects with chronic alcohol dependency about one-quarter are in a phase of active abuse. This should correspond to around 2% to 2.5% of the nonpatients of our study, which was approximately confirmed by the ULF data. The patients had a substantially higher prevalence, and we have found nothing equivalent in any other study of NSP. The reason could be our use of one single binge-drinking question (Table 3), which might decrease the risk for under-estimation of alcohol abuse in questionnaires that ask for total intake. We have found no previous study of NSP where this question has been used. However, in the multivariate context, the alcohol issue was eliminated by other closely correlated variables. For example, 15 of the 16 subjects in the multivariate analysis with Indication of alcohol over-consumption had a Blue-collar job. One study showed that alcohol over-consumption was not a risk factor for long-term sick-listing for NSP, but this was contradicted by another study.

In our prediction study, Indication of alcohol over-consumption did not predict sick-listing during a 2-year follow-up. Though these conflicting results motivate further research, this cross-sectional study might contribute in pinpointing the comparatively higher prevalence of abuse problems among those patients.

During recent decades the prevalence of obesity has increased remarkably but with a certain international variation. For example, while the prevalence in the USA has increased to a full 20%, it doubled in Sweden from the years 1980/81 to 2004/5 from 5% to 10% in both women and men. Comorbidities with obesity include diabetes, cardiovascular diseases, pain in general, and NSP in particular. In our study, the prevalence of Obesity in the nonpatients during the years 2000/01 corresponded well with the 7% in 1996/97 concerning all Swedes 16 to 84 years, while among the patients it was more than 3-fold higher. Obesity remained significant in the multivariate model, though with a decreased OR, probably influenced by Low education, which is a risk factor for obesity. According to a 2000 review, obesity should be considered a possible weak risk indicator, but with insufficient data to assess whether it causes spinal pain. In a prospective study from 2002, obesity was a risk factor for the transition from acute to nonacute NSP, though with low OR (1.7). However, in a large 2004 review on predictors for nonacute NSP, there was insufficient evidence for obesity as a risk factor. A quite recent, very large, cross-sectional population-based study from Norway indicated associations between obesity and NSP and commented that further studies were needed to determine whether the association was causal. Our prediction study, however, found no impact of Obesity on sick-listing. Obesity was found in 24.2% of the patients versus 6.9% of the nonpatients. In line with the paragraph above, such a difference might qualify for a model with the sample class as outcome variable, but be eliminated in an analysis with return to work/nonreturn to work as outcome. It therefore remains unclear whether, how, and why obesity and NSP are correlated. Furthermore, the clinical relevance of that association, if any, is obscure. Recently, however, a reduction of musculoskeletal pain was reported in a study of a weight-reduction program, at least on a short-term basis.

### Table 5 Living conditions – multivariate analysis

|                | Odds ratio | P value | 95% confidence interval |
|----------------|------------|---------|-------------------------|
| High physical workload | 13.7       | <0.001  | 5.9–32.2                |
| Hectic work tempo     | 8.4        | 0.001   | 2.5–28.3                |
| Blue-collar job       | 4.5        | 0.003   | 1.8–11.4                |
| Obesity              | 3.5        | 0.02    | 1.2–10.2                |
| Low education        | 2.7        | 0.04    | 1.1–6.8                 |
| Goodness-of-fit:      |            |         |                         |
| Hosmer–Lemeshow      | 0.57       |         |                         |
| Correctly classified  | 85.5%      |         |                         |
| Area under ROC       | 0.92       |         |                         |

Notes: Ninety-five patients with nonacute nonspecific spinal pain compared with 154 nonpatients by logistic regression. Ranking by odds ratios.

Abbreviation: ROC, receiver operating characteristic.
which might be of future clinical interest in the treatment of disabling NSP.\textsuperscript{44}

To sum up: the patients were distinguished by higher odds of obesity, higher odds of indication of alcohol abuse that vanished in the multivariate analysis, and nonsignificant differences on smoking. Prospective research, including our prediction study, has yielded conflicting results. Therefore, the causal associations between smoking, alcohol abuse, and obesity, and sick-listing for NSP, if any, are small.

**Study strengths**

One of the strengths of our study was the good representation of women.

As in the ULF surveys, the patient questionnaires were completed under the supervision of an assistant during an interview with the patient in the recruiting health center. This might have contributed to the high quality of the patient data, and increased the comparability between the patients and the nonpatients.

The design of the nationwide ULF also allows local comparisons to be made. The responding rates of the ULF in 2000 and 2001 were practically 80%. These high-quality data for the comparison group were a strength.

Another strength of the study was the excellent model fit. The number of variables in the multivariate model was by a wide margin within the upper limit, which is suggested in previous research.\textsuperscript{45}

**Study limitations**

The sample of 124 patients was a very low proportion of the eligible subjects and the inclusion procedure was prolonged and nonsystematic. These limitations are discussed in detail in our predictor study.\textsuperscript{29} A closely related limitation was the geographical imbalance in the recruitment; however, the greatest number of recruited patients were living in the district with the greatest number of inhabitants (Huddinge) (Table 1).

A limitation was the nonprospective design. However, this study might contribute to a more detailed cross-sectional picture of the patients with nonacute NSP, which is also of value in the planning of prospective research, eg, our predictor study.\textsuperscript{29}

**External validity**

To what extent might the results be generalized beyond the samples of patients and nonpatients studied and be applied to other subjects (population validity) or settings (ecological validity)? As the rehabilitation center and the family doctors engaged were very well established, the 124 patients might be reasonably representative of the everyday primary care in the study area, comprising a comparably large part of Stockholm County. The 338 nonpatients in the study were generally comparable with nonpatients in the nation. The only significant ($P < 0.05$) differences from the national sample of 7007 subjects were a higher prevalence of Immigrant (12.7\% vs 10.5\%), Unemployed (3.9\% vs 8.4\%), Blue-collar job (33.3\% vs 39.2\%), Heavy physical workload (15.7\% vs 35.3\%), and Vibrations in work (4.6\% vs 8.6\%). According to a large cross-national study, including primary care in 14 countries in 5 continents, the dominating pain problem was nonacute spinal pain; and despite certain variations, the cross-national manifestations of spinal pain were surprisingly equivalent.\textsuperscript{46} Therefore, given that the study samples are reasonably representative of Swedish primary care, the external validity might also be satisfactory from a non-Swedish perspective.

**Clinical implications**

Standing alone, the cross-sectional design of this study limits its clinical implications. However, together with prospective studies, it might increase the knowledge of what distinguishes patients with nonacute, nonspecific spinal pain. Though this knowledge in no way includes unambiguous management options, it might help family doctors, supervisors in the workplace, handling officers of the Social Insurance Agency, and so on, to identify subjects at risk.

**Conclusions**

The living conditions associated with long-term sick-listing of 124 patients with nonacute nonspecific spinal pain were compared with 338 nonpatients by applying logistic regression. In the univariate analyses, 13 of the 18 conditions had higher odds for the patients with a dominance of physical work strains and Indication of alcohol over-consumption (OR 14.8). Five conditions qualified for the multivariate analysis: High physical workload (OR 13.7), Hectic work tempo (OR 8.4), Blue-collar job (OR 4.5), Obesity (OR 3.5), and Low education (OR 2.7). As most of those living conditions have hitherto been insufficiently studied, our findings might help extend our knowledge of what distinguishes the individuals at risk for long-term sick-listing due to NSP. As the cross-sectional design makes causal conclusions impossible, our study should be complemented by prospective research.

**Authors’ contributions**

OL was the main investigator and carried out the study, performed the analysis, and drafted the manuscript. SEJ...
contributed to the statistical analysis. LES, as supervisor of OL, participated in all phases of the study. All authors read and approved the final manuscript.

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Disclosure
The authors declare that they have no competing interests.

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