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Prognostic factors for long-term sickness absence among employees with neck–shoulder and low-back pain

by Andreas Holtermann, PhD,¹ Jørgen V Hansen, PhD,¹ Hermann Burr, PhD,¹ Karen Søgaard, PhD²

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Objective The aim of this study was to identify prognostic factors for long-term sickness absence among employees with neck–shoulder or low-back pain.

Methods In 2000, a representative sample of Danish employees (N=5036) rated their average pain intensity in the neck–shoulder and low-back during the last three months on a 10-point scale; using a questionnaire, they also reported on physical and psychosocial work factors, health behavior, work ability and self-efficacy. Employees reporting pain intensity of ≥ 4 were considered to have musculoskeletal pain. As a result, we defined two populations to be included in our analyses: people with pain in the neck–shoulder (N=848) and low-back (N=676) regions. Data on long-term sickness absence of ≥ 3 weeks for the period 2001–2002 were attained from the Danish national register of social transfer payments.

Results One fifth of employees with neck–shoulder and low-back pain experienced long-term sickness absence during the two-year follow-up. Among employees with neck–shoulder and low-back pain, respectively, the main significant risk factors were (i) pain intensity [hazard ratio (HR)=1.12, 95% confidence interval (95% CI) 1.02–1.24 and HR=1.13, 95% CI 1.01–1.26] and (ii) heavy physical work (HR=1.68, 95% CI 1.21–2.33 and HR=1.41 95% CI 1.00–2.01).

Conclusion Preventive initiatives for long-term sickness absence should aim to reduce pain intensity and heavy physical work among employees with neck–shoulder and low-back pain.

Key terms chronic pain; musculoskeletal disorder; MSD; musculoskeletal symptom; pain; sick leave.

The large cost implications of long-term sickness absence constitute a major concern for the welfare state in western societies (1). In Denmark, for example, long-term sick absence has not decreased despite public effort (2). The public and individual importance of such sick leave is highlighted by its association with subsequent disability pension (3, 4) and mortality (5). The causes for sickness absence are multi-factorial and complex (6, 7), but musculoskeletal pain is clearly a dominating source (8, 9). Particularly, pain in the neck–shoulder and the low-back regions has been shown to be strongly associated with long-term sickness absence (10, 11).

However, not all employees with musculoskeletal symptoms are absent from work (12), and it has been argued that preventive initiatives should focus on sickness absence resulting from musculoskeletal pain rather

than the onset of musculoskeletal pain per se (13). Moreover, much is known about risk factors for musculoskeletal pain (14) and sickness absence (15, 16), but information about the risk factors for sickness absence among employees with musculoskeletal pain is scarce (17, 18).

There may be several decisive factors for long-term sickness absence among employees with musculoskeletal pain. The region of the body with pain (19, 20) and pain intensity may play a prominent role for sickness absence (18). Moreover, heavy physical work has been shown to be associated with sickness absence as it can cause neck–shoulder and low-back pain (19–23). Health behaviors, like physical activity during leisure time and smoking, are also reported to be associated with both musculoskeletal pain (24–27) and sickness

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absence (4, 28, 29). In addition, psychosocial factors, such as low-decision authority, have been reported to be associated with sickness absence attributed to musculoskeletal pain (20). Other factors such as self-efficacy (ie, the personal confidence that one can successfully execute a course of action to produce a desired outcome in a given situation) (30) and work ability (ie, the self-perceived relation between work demands and individual resources) (31) may also be of relevance to long-term sickness absence when the individual suffers from musculoskeletal pain. Moreover, it has been shown that working conditions, like heavy physical work, affect health behavior, such as smoking cessation (32), and work ability (33).

The main aim of this study was to identify prognostic factors for long-term sickness absence among employees with pain in the neck–shoulder and low-back regions. Therefore, we investigated risk factors for long-term sick leave registered from 1 January 2001 to 31 December 2002 among a representative sample of Danish employees reporting such pain in 2000.

Methods

Population

This study was a part of the DWECS–DREAM project, which is based on a merger between the Danish work environment cohort study (DWECS) and the national register on social transfer payments [DREAM (Danish acronym)]. DWECS features a random sample of 11 437 people living in Denmark, 8583 (75%) of whom participated in interviews. At the time of the baseline interview, 5403 of these individuals were 18–69 years of age, had worked as employees for at least two months, and were not part of any education system. Of these, 103 were sick-listed in the week prior to baseline interview and 264 were lacking information on the questions mentioned below. Among the remaining 5036 employees with sufficient information, 676 experienced pain in the low-back, and 848 experienced pain in the neck–shoulder region. These two populations formed the basis of our study.

Outcome

The cohort was followed up in the DREAM register from 1 January 2001 to 31 December 2002. In Denmark, sickness absence compensation is granted to all employers if an employee has experienced an episode of absence from work of >14 calendar days. Data concerning this compensation can be found in the register. DREAM contains weekly information on granted sickness absence compensation for all citizens in Denmark.

As there is no requirement to report the reason for a spell of sickness absence, DREAM does not contain diagnostic data.

Variables

Register data included gender and age at the time of data extraction (1 October 2000). All other variables were based on the interviews which took place during 2000 via telephone or person-to-person in the respondents' homes. We calculated inter-item correlations and Cronbach's alphas using answers from all respondents, including those who did not report pain in the neck–shoulder or low-back regions.

We measured pain intensity using a modified version of a validated questionnaire (34) based on a pain score (35). Neck–shoulder pain was measured as the maximal response to one of the following three questions: (i) "On a scale of 0–9 (with 0 being no discomfort at all, and 9 being the worst possible pain), state your average degree of discomfort in your left shoulder in the last 3 months", (ii) "On a scale of 0–9 (with 0 being no discomfort at all, and 9 being the worst possible pain), state your average degree of discomfort in your right shoulder in the last 3 months", and (iii) "On a scale of 0–9 (with 0 being no discomfort at all, and 9 being the worst possible pain), state your average degree of discomfort in your neck in the last 3 months". We defined "pain" as a score of ≥ 4 on at least one of the three questions. We measured pain in the low-back with the question: "On a scale of 0–9 (with 0 being no discomfort at all, and 9 being the worst possible pain), state your average degree of discomfort in your lower back in the last 3 months". We defined "pain" as a score of ≥ 4 on the scale. A cut-off point of 4 on a 10-point scale for neck–shoulder pain has been shown to predict clinical signs highly (ie, rotator cuff tendinitis and myofascial pain syndrome) and is recommended as a complaint score criterion for diagnosing a neck–shoulder disorder (34).

The respondents were classified into five social classes according to employment grade, job title, and education (36): executive managers and academics (I); middle managers and persons with 3–4 years of higher education (II); other white-collar workers (III), skilled blue-collar workers (IV); and semi-skilled or unskilled workers (V).

Smoking status was divided into two categories: "never and former" and "current".

We measured alcohol consumption with the question: "On average, how much alcohol do you drink during the day (number of bottles of beer/liquor, drinks per day/glasses of wine per day)?" (37) Answers were dichotomized into "no or moderate consumption" versus "heavy consumption", with the latter defined as drinking >2 and 3 units per day, for women and men, respectively.

Heavy physical work was dichotomized into a scale of “low” (0–35) versus “high” (>35–100). The scale was a mean of three questions and one subscale. The questions were: (i) “Does your job require that you sit down?” (ii) “Does your job require that you kneel or squat?” and (iii) “How much of your time at work do you push or pull something?” with the following response options: “almost all the time” = 100, “approximately ¾ of the time” = 75, “approximately ½ of the time” = 50, “approximately ¼ of the time” = 25, “rarely/very little” = 6, “never” = 0. The coding of question (i) was reversed. The subscale was based on a mean of two questions: (i) “How much of your working hours do you carry or lift things/people?” (same response options as above) and (ii) “What does the load you carry normally weigh?” (response options: <3 kg = 2.5, 3–10 kg = 10.8, 11–29 kg = 33.3, 30–49 kg = 65.8, and ≥50 kg = 100. If respondents answered “never” to the first question, we coded the latter question as 0. The inter-item correlations were 0.20–0.45, Cronbach’s alpha was 0.62.

We measured physical activity during leisure time using the question: “If you were to list the physical activities you participated in during your leisure time within the last year, including transportation to and from work, which of the following best describes you?” The response options included: “almost completely physically inactive or light physical activity for <2 hours/week (eg, reading, television, movies)” = 1; “light physical activity for 2–4 hours per week (eg, going on walks, riding a bicycle, doing light yard work or light workouts)” = 2; “light physical activity for >4 hours/week or more strenuous physical activity for 2–4 hours per week (eg, walking quickly and/or bicycling quickly and passing others, heavy yard work, hard workouts that cause you to sweat or become out of breath)” = 3; and “more strenuous physical activity for >4 hours, or regular hard workouts and perhaps competitions several times per week” = 4.

We measured decision authority with the following questions (38): (i) “Do you have a large degree of influence concerning your work?” (ii) “Do you have a say in choosing with whom you work?” (iii) “Can you influence the amount of work assigned to you?” (iv) “Do you have any influence over *what* you do at work?” The response options (and values for the scale) included: “always” = 10; “often” = 7.5; “sometimes” = 5; “seldom” = 2.5; or “never/hardly ever” = 0. The inter-item correlations were 0.33–0.51, Cronbach’s alpha was 0.72.

We measured predictability with the following two questions (38): (i) “At your place of work, are you informed well in advance concerning, for example, important decisions, changes, or plans for the future?” and (ii) “Do you receive all the information you need in order to do your work well?” The response options (and values for the scale) were: “to a very large extent” = 10;

“to a large extent” = 7.5; “somewhat” = 5, “to a small extent” = 2.5; or “to a very small extent” = 0. These were combined into a scale with values from 0–10. The inter-item correlation was 0.54, Cronbach’s alpha was 0.69.

We measured general self-efficacy with the following question (39): “How often are these statements true for you: (i) ‘you are good at handling unforeseen problems’; (ii) ‘you can solve most problems if you really want to’; and (iii) ‘no matter what happens in your life you feel you can handle it’.” The response options (and values for the scale) included: “always” = 10; “often” = 7.5; “sometimes” = 5; “rarely” = 2.5; or “never/almost never” = 0. The inter-item correlations were 0.41–0.59, Cronbach’s alpha was 0.74.

We measured work ability using a modified version (40) of a global 1-item workability score (41): “Imagine a 10-point scale, where 0 is not being able to work at all and 10 is your ability to work being at its best, how many points would you give your current ability to work?”

Body mass index was based on self-reported body weight and height and measured as kg/m².

Statistical analyses

To examine the relationship between factors of interests and long-term sickness absence, we analyzed data using the Cox proportional hazards model (42). In this study, the data corresponded to “survival times”, which in most cases were censored as the cohort was only followed for two years. Persons who retired, entered an early retirement pension scheme, emigrated, or died during the period were censored at the time of the event. If a person experienced long-term sickness absence in the period 2001–2002, the survival times were not censored and referred to as “event times”.

Among employees with neck–shoulder pain and low-back pain, respectively, the Cox model consisted of mutually adjusted hazard ratios (HR) for long-term sickness absence with a step-wise forced entry of (i) covariates (gender, age in years, pain intensity) and work-related factors (predictability, decision latitude and heavy physical work); (ii) lifestyle factors (body mass index, smoking status, alcohol consumption and physical activity during leisure time); (iii) work ability and self-efficacy; (iv) all factors in the previous steps; and (v) all factors including social class (in order to control for possible unmeasured risk factors for sickness absence such as educational level) (43). Gender, smoking status, alcohol consumption, and physical work exposure were dichotomous. We measured the other covariates on a continuous scale and modeled the linear effects thereof. We analyzed data using the PHREG procedure of SAS software version 9.2 (SAS Institute Inc, Cary, NC, USA). Results are presented as HR with 95% confidence intervals (95% CI). Each HR

represents the estimated risk of a 1-point increase for continuous covariates or the difference in risk between groups defined by dichotomous variables.

Results

Of the total study population comprising 5036 Danish employees, 13% experienced at least one episode of long-term sickness absence during the two-year follow-up period. Among the employees with neck–shoulder (N=848) and low-back (N=676) pain, 20% and 21%, respectively, had at least one spell of long-term sick leave in the follow-up period. These two groups were not independent from each other, with an overlap of 313 persons experiencing both neck–shoulder and low-back pain.

Demographic data, health behavior, physical and psychosocial work factors, pain intensity, work ability, and self-efficacy are presented in table 1. The proportions of employees with neck–shoulder and low-back pain taking long-term sick leave during the follow-up period and having heavy physical work were 36% and 38%, respectively. The proportions having heavy physical work but no long-term sickness absence were 24% for neck–shoulder and 27% for low-back pain. Moreover, the mean pain intensity scores among employees with neck–shoulder and low-back pain who had sick leave were 6.0 and 6.1, respectively. The mean pain intensity scores among employees with no long-term sick leave were 5.7 and 5.8, respectively.

Table 2 illustrates the percentage of employees with heavy physical work, average work ability, and long-term sickness absence among employees with progressive levels of pain intensity of the neck–shoulder and low-back regions. While 15% of employees reporting a

neck–shoulder pain score of 4 in the three months prior to baseline had at least one spell of long-term sick leave during the follow-up period, as much as 23% of those reporting a pain score of ≥ 7 had at least one episode in the same period. As presented in table 2, 18% of employees with low-back pain had a pain intensity score of 4 during the three months prior to baseline and long-term sickness absence thereafter; 24% reported a pain intensity score of ≥ 7 and long-term sickness absence during the same period.

Table 3 presents the results of the regression analyses, estimating the risk of long-term sickness absence from demographical variables, health behavior, physical and psychosocial work factors, pain intensity, work ability and self-efficacy among employees with neck–shoulder or low-back pain. Among employees with neck–shoulder pain (controlled for work-related and lifestyle factors, work ability, and self-efficacy) heavy physical work, smoking, pain intensity in the neck–shoulder region, and female gender were significant risk factors for long-term sickness absence in the follow-up period (model 4). In particular, heavy physical work increased the risk in the follow-up period by 65%. Controlling for social class did not change these risks (model 5). The risks for pain intensity and physical work in the work environment model (model 1), dropped by 21% and 12%, respectively, in the full model.

Among employees with low-back pain – when controlling for work-related and lifestyle factors – high work ability significantly decreased the risk for long-term sickness absence during the follow-up (models 4 and 5). Controlling for social class did not change this association. However, pain intensity and heavy physical work were significant risk factors in the models without work ability (models 1 and 2). Note that the risk for long-term sickness absence resulting from heavy physical work was

Table 1. Descriptive table of the study population with neck–shoulder (N=848) and low-back (N=676) pain stratified on long-term sickness absence (LTSA) in the two-year follow-up period.

	Neck–shoulder pain						Low-back pain					
	With LTSA			Without LTSA			With LTSA			Without LTSA		
	%	Mean	SD	%	Mean	SD	%	Mean	SD	%	Mean	SD
Male gender	30.0	.	.	36.7	.	.	41.1	.	.	40.4	.	.
Smoker	47.7	.	.	40.3	.	.	46.8	.	.	43.7	.	.
Alcohol consumption	5.3	.	.	6.8	.	.	5.7	.	.	6.2	.	.
Heavy physical work	36.5	.	.	24.3	.	.	37.6	.	.	27.3	.	.
Age in years	.	42.8	10.0	.	42.1	10.7	.	41.0	11.1	.	41.9	11.0
Body mass index	.	24.7	4.4	.	24.6	4.0	.	25.2	4.2	.	24.8	4.1
Pain intensity	.	6.0	1.5	.	5.7	1.4	.	6.1	1.7	.	5.8	1.5
Decision latitude	.	41.7	26.4	.	42.9	27.4	.	39.3	27.3	.	41.8	26.1
Predictability	.	60.2	24.9	.	62.5	24.4	.	57.9	23.8	.	59.7	23.2
Self-efficacy	.	82.4	14.1	.	81.1	14.2	.	82.1	14.1	.	81.2	13.6
Work ability	.	8.2	1.8	.	8.3	1.7	.	7.9	1.9	.	8.2	1.7

similar in all models, only the variance increased when work ability was introduced in the model. On the other hand, the estimate for pain intensity was reduced from 1.14 to 1.11 when controlling for work ability.

Table 2. Distribution of heavy physical work, work ability (scale 1–10) and long-term sickness absence (LTSA) among employees with progressive levels of pain intensity of the neck–shoulder (N=848) and low-back (N=676) regions.

	Heavy physical work (%)	Work ability		LTSA (%)
		Mean	SD	
Neck–shoulder pain intensity				
4 (N=204)	23.0	8.56	1.44	14.7
5 (N=243)	28.4	8.39	1.69	20.6
6 (N=135)	28.9	8.38	1.55	20.7
≥7 (N=266)	27.1	7.82	1.98	23.3
Low-back pain intensity				
4 (N=142)	30.3	8.45	1.72	18.3
5 (N=195)	27.7	8.22	1.59	19.0
6 (N=103)	29.1	8.01	1.80	20.4
≥7 (N=236)	30.5	7.84	1.90	24.2

Discussion

According to our findings, as much as one fifth of employees reporting neck–shoulder or low-back pain experienced at least one episode of long-term sickness absence in the two year follow-up period. Among employees with neck–shoulder and low-back pain, pain intensity and heavy physical work were the main significant prognostic factors for sickness absence during this time. In addition, it seems that self-reported work ability mediated the association between pain intensity and long-term sickness absence among people with low-back pain, but not significantly among those with neck–shoulder pain.

In order to reduce the enormous financial burden of and public health problems relating to long-term sickness absence, it is essential to identify the population concerned and predictive factors that can be modified via intervention (10). Previous studies have reported that only a small minority of employees with musculoskeletal pain have an episode of sickness absence (11, 44, 45). Our observation was that 20–21% of all employees with pain in the neck–shoulder or low-back had at least one episode

Table 3. Mutually adjusted hazard ratios (HR) and 95% confidence intervals (95% CI) for long-term sickness absence (LTSA) with a step-wise forced entry of work-related and lifestyle factors, work ability, self-efficacy, and social class among employees with neck–shoulder (N=848) and low-back (N=676) pain.

	Work-related factors (model 1)		Lifestyle factors (model 2)		Work ability and self-efficacy (model 3)		Full model (model 4)		Full model + control for social class (model 5)	
	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI
Neck–shoulder pain										
Female gender	1.49	1.06–2.09	1.61	1.13–2.28	1.49	1.06–2.09	1.59	1.12–2.25	1.57	1.10–2.22
Age	1.01	1.00–1.03	1.01	1.00–1.03	1.01	1.00–1.03	1.01	1.00–1.03	1.01	1.00–1.03
Pain intensity	1.14	1.03–1.26	1.12	1.02–1.24	1.12	1.01–1.24	1.11	1.00–1.23	1.11	1.00–1.23
Body mass index	.	..	1.02	0.98–1.06	.	..	1.02	0.98–1.06	1.02	0.98–1.06
Smoking	.	..	1.44	1.05–1.98	.	..	1.40	1.02–1.94	1.42	1.03–1.97
Alcohol consumption	.	..	0.79	0.40–1.57	.	..	0.79	0.39–1.57	0.77	0.39–1.54
Leisure-time physical activity	.	..	1.07	0.90–1.29	.	..	1.08	0.90–1.30	1.08	0.90–1.30
Predictability	0.97	0.91–1.03	0.95	0.89–1.02	0.97	0.91–1.04	0.96	0.90–1.03	0.96	0.90–1.03
Decision latitude	1.01	0.95–1.07	1.02	0.96–1.08	1.01	0.95–1.07	1.01	0.95–1.07	1.01	0.95–1.08
Physical work exposures	1.74	1.26–2.40	1.68	1.21–2.33	1.71	1.23–2.36	1.65	1.19–2.30	1.65	1.17–2.33
Self-efficacy	.	..	.	..	1.06	0.95–1.19	1.05	0.94–1.17	1.05	0.94–1.17
Work ability	.	..	.	..	0.96	0.88–1.05	0.97	0.89–1.07	0.96	0.87–1.05
Social class	.	..	.	..	.	..	.	..	1.01	0.88–1.15
Low-back pain										
Female gender	1.00	0.71–1.40	1.04	0.73–1.49	1.00	0.71–1.42	1.03	0.72–1.47	1.07	0.74–1.54
Age	1.00	0.98–1.01	1.00	0.98–1.01	1.00	0.98–1.01	1.00	0.98–1.01	1.00	0.98–1.01
Pain intensity	1.14	1.03–1.27	1.13	1.01–1.26	1.11	0.99–1.24	1.10	0.98–1.23	1.09	0.97–1.22
Body mass index	.	..	1.02	0.98–1.06	.	..	1.01	0.97–1.06	1.01	0.97–1.05
Smoking	.	..	1.12	0.79–1.58	.	..	1.09	0.76–1.54	1.07	0.75–1.53
Alcohol consumption	.	..	0.94	0.45–1.94	.	..	0.92	0.44–1.92	0.95	0.45–1.99
Leisure-time physical activity	.	..	1.01	0.83–1.23	.	..	1.00	0.81–1.22	0.99	0.80–1.21
Predictability	0.99	0.92–1.07	1.00	0.92–1.07	1.00	0.92–1.07	1.00	0.92–1.08	0.99	0.92–1.07
Decision latitude	0.98	0.92–1.05	0.98	0.92–1.05	0.97	0.91–1.04	0.97	0.91–1.04	0.98	0.91–1.05
Physical work exposure	1.41	1.00–2.00	1.41	1.00–2.01	1.41	0.99–2.01	1.42	0.99–2.03	1.38	0.96–1.98
Self-efficacy	.	..	.	..	1.03	0.90–1.17	1.03	0.90–1.17	1.03	0.90–1.17
Work ability	.	..	.	..	0.90	0.82–0.99	0.91	0.82–0.99	0.91	0.83–1.00
Social class	.	..	.	..	.	..	.	..	1.09	0.94–1.28

of long-term sick leave in the two-year follow-up period, compared to 13% in the total population of all employees in the cohort. This confirms that employees with pain in both the neck–shoulder and low-back regions ought to be the primary focus of preventive initiatives.

Heavy physical work (ie, prolonged standing, highly repetitive work, heavy lifting, working with the hands lifted to shoulder height or higher, and working with the back twisted or bent forward) are well-documented risk factors for long-term sickness absence in the general working population (16). Our study found heavy physical work to be a risk factor among employees reporting neck–shoulder and low-back pain. Specifically, employees with neck–shoulder pain and heavy physical work had a 65% increased risk during the two-year follow-up period compared to those with pain but without heavy physical work. This finding corresponds with the previously reported association between physical exposure at work and sickness absence due to neck pain (20). Among people with low-back pain, the risk was somewhat lower, around 40%. Overall, these findings support the argument that initiatives aimed at preventing or decreasing long-term sickness absence ought to focus on employees with heavy physical work.

Pain intensity was shown to be a risk factor among employees with neck–shoulder and low back pain. In the latter case, this association was mediated by self-reported work ability. Previous research has highlighted the prominent role pain intensity plays in sickness absence (18, 46). These findings indicate that interventions targeted at long-term sickness absence in occupations with a high prevalence of neck–shoulder and low-back pain should aim to reduce pain intensity among employees. Recent studies have shown the positive effects of physical exercise on neck–shoulder pain intensity (ie, strength training and general physical exercise for the prevention and reduction of neck pain in a working population) (47, 48). Physical exercise may, therefore, be an appropriate initiative for reducing long-term sick leave among employees with neck–shoulder pain.

A substantial fraction of long-term sickness absence has previously been documented to be attributed to smoking in the general working population (28). This study showed that smoking indeed enhanced the risk among employees with neck–shoulder pain. Smoking cessation programs (49) in occupations with high prevalence of neck–shoulder pain may, therefore, be considered for the reduction of long-term sickness absence.

Among employees with low-back pain, high work ability reduced the risk for long-term sick leave in the two-year follow up period. Decreased work ability implies that the employee perceives the work demands to exceed his or her working capacity (31). Reduced work ability has been observed to be associated with sickness absence (50, 51). However, it remains unknown

why work ability mediates the association between pain intensity and sick leave among employees with low-back pain, but not significantly among those with neck–shoulder pain.

Psychosocial factors have previously been shown to be associated with sickness absence in the general working population (15). However, the examined psychosocial factors, decision authority, predictability and self-efficacy in this study did not predict long-term sickness absence among employees with neck–shoulder and low-back pain. This finding is in accordance with previous studies, which observed that psychosocial factors did not predict sick leave caused by musculoskeletal pain (46, 52).

Methodological aspects

Our study had many advantages. It was prospective, based on a representative population, and captured nearly all episodes of long-term sickness absence in the study population (53). Some weaknesses of the study included the following: all possible risk factors were self-reported by means of questionnaire, the number of study participants was relatively small, and information about psychological factors [eg, fear-avoidance beliefs shown to be related to disability from musculoskeletal pain (54)] was not available.

A methodological aspect of this study, like all studies of sickness absence, is that it took place in a national context. Very few studies of labor market behavior have explicitly investigated if the national context plays a role in the results (55). It should be stressed that Denmark differs from most other countries as compensated sickness absence spells do not require a diagnosis. Therefore, we do not know the specific causes of the long-term sickness absence in this study.

The relation between musculoskeletal pain and disability may differ between men and women (56). However, we did not find any significant interaction between gender and the work-related factors and sickness absence. Due to the limited number of subjects in our study, we did not perform any stratification by gender.

Concluding remarks

The high prevalence of long-term sickness absence among employees with neck–shoulder and low-back pain stresses that employees with such pain ought to be a primary target for preventative initiatives. Pain intensity and heavy physical work were the main significant prognostic factors in the two-year follow-up period among employees with neck–shoulder and low-back pain. Consequently, long-term sickness absence interventions should aim to reduce these two factors among employees suffering from such pain.

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