

Pain and disability do not influence psychological and social factors at work among sick-listed patients with neck and back pain

Gunn Hege Marchand^{a,b,*}, Bjørn Lau^{c,d}, Kjersti Myhre^e, Cecilie Røe^{e,f}, Erik Bautz-Holter^{e,f} and Gunnar Leivseth^{a,g}

^a*Faculty of Medicine, Department of Neuroscience, Norwegian University of Science and Technology, Trondheim, Norway*

^b*Department of Physical Medicine and Rehabilitation, St. Olavs Hospital, Trondheim University Hospital, Trondheim, Norway*

^c*Lovisenberg Diakonale Hospital, Oslo, Norway*

^d*National Institute of Occupational Health, Oslo, Norway*

^e*Department of Physical Medicine and Rehabilitation, Oslo University Hospital, Ulleval, Oslo, Norway*

^f*Faculty of Medicine, University of Oslo, Oslo, Norway*

^g*Department of Clinical Medicine, Neuromuscular Diseases Research Group, The Arctic University of Norway UIT, Tromsø, Norway*

Received 4 July 2014

Accepted 5 January 2015

Abstract.

BACKGROUND: It is unknown whether living with neck and back pain, disability, and mental disorders influences the perception of psychological and social factors at work among sick-listed patients.

OBJECTIVES: The primary aim of the present study was to examine the associations between pain, disability, anxiety, depression, and perceived psychological and social factors at work among sick-listed patients with neck and back pain.

METHODS: We performed a cross-sectional study of 380 sick-listed patients with neck and low-back pain who were referred to spine clinics at two Norwegian university hospitals. Ordinal regression was applied, with psychological and social factors at work as the dependent variable.

RESULTS: Pain was not associated with psychological and social factors at work. Disability was associated with a minor increase in the perception of demands among women, but not men. Women with high anxiety or depression scores experienced less control over work situations and less positive challenges at work. Men with high depression scores perceived low support.

CONCLUSIONS: Sick-listed patients with neck and back pain who had concurrent anxiety or depression reported increased psychological and social challenges at work. To provide suitable treatment in the clinical setting, further attention should be paid to the interaction between anxiety or depression and perceived job strain.

Keywords: Work environment, psychosocial environment, job stress, sickness absence

*Address for correspondence: Gunn Hege Marchand, Medisinsk teknisk forskningscenter, Department of Neuro-

science, N-7489 Trondheim, Norway. Tel.: +47 72 57 58 88; Fax: +47 73 59 87 95; E-mail: gunn.hege.marchand@ntnu.no.

1. Introduction

Sickness absence, especially due to neck and back pain, carries substantial societal costs [1–3]. Most patients experience benign and self-limiting neck and back disorders, and there are seldom medical restrictions that prevent them from participating in most work situations [4]. However, a considerable number of patients with these painful conditions become long-term sick listed [3].

Studies report that various physical factors, including radiological findings, obesity, muscular strength, and flexibility, are predictors of persistent pain, disability, and sickness-absence among patients with neck and back pain [5–8]. Also gender, age and education predict poor return to work rate [9]. However, non-physical factors seems to be strongly linked to work related musculoskeletal disorders [10], and psychological and social factors are important predictors for both development of back pain and sick leave [11–13]. A recent meta-analysis concludes that high demands, low control, and low support from superiors at work are important risk factors for the development of neck and back pain [14], and a recent study underscores the importance of low demand and high control for work attendance [15]. Patients sick listed due to neck and back pain generally experience more quantitative demands, lower control of decisions, and less support from coworkers compared to a reference population, but the magnitude of this difference is small [16].

Most research on work-related musculoskeletal disorders has focused on how health is impacted by age, occupation, education level, and psychological and social factors at work [17–19]. However, living with pain and distress may also influence the perception of psychological and social factors at work [17, 20–21], and increased job strain may be the perceptual correlate. A study of male metal industry workers found that musculoskeletal symptoms predicted physiological stress symptoms 5 years later [22], while a study of female kitchen staff reported that multiple-site musculoskeletal pain predicted low job control and low support from supervisors [23].

To date, no studies have investigated whether living with neck and back pain, disability, and mental disorders influences the perception of psychological and social factors at work among sick-listed patients admitted to secondary care. Therefore, the present study aimed to examine the associations between health variables, such as pain, disability, and men-

tal disorders, and the perceived psychosocial work environment among sick-listed subjects.

2. Material and methods

2.1. Study design and participants

We performed a cross-sectional multi-center study of patients who were on sick leave due to neck and back pain. All patients referred to the neck and back outpatient clinic at Oslo and Trondheim University Hospital between August 2009 and August 2011 were screened for eligibility. The inclusion criteria were neck or back pain, age of 18–60 years old, employed or self-employed, and having been sick-listed for between four weeks and 12 months. Exclusion criteria were potential candidacy for surgical treatment, cauda equina syndrome, symptomatic deformities in the spine, osteoporosis with fractures, inflammatory rheumatic diseases, other serious somatic or mental diseases, pregnancy, legal labor dispute, and Norwegian language knowledge insufficient for group treatment participation. We identified 723 eligible patients, among whom 413 gave informed consent to participate, and 33 were excluded or did not fulfill all questionnaires (Fig. 1). The study was evaluated by REK (ref S-09024b 2009/1000) and approved by the data protection supervisor at Oslo University Hospital.

2.2. Demographic factors

Age was recorded as a scale variable (number of full years of age at inclusion). Years of education was classified into four categories: <10 years, 10–12 years, 13–15 years (<4 years college/university), and >15 years (≥ 4 years of college/university). The last two categories were collapsed for regression analyses. Occupation was manually classified using the International Standard Classification of Occupations (ISCO-88). For analyses, occupations were divided into two predictor variables: low-skilled or high-skilled occupation, and blue-collar or white-collar work [24].

2.3. Pain

Pain was measured on an 11-point numeric rating scale, from 0 (no pain) to 10 (worst possible pain) [25]. The patients were asked to rate the average pain that they experienced over the previous week in the

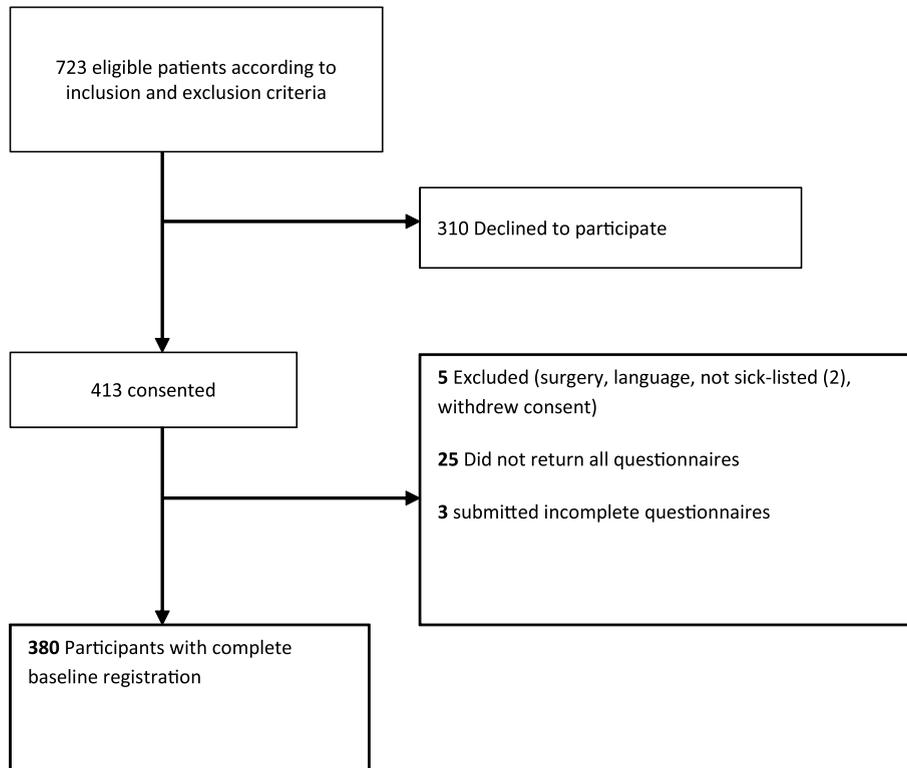


Fig. 1. Flow chart.

back/leg, both at rest and during activity, as well as in the neck/shoulder/arm at rest and during activity. The highest score of the four scales was used for the analyses. Pain distribution was assessed using a pain drawing from the Norwegian version of the McGill Pain Questionnaire [26]. Patients shaded the area with pain. For analysis, the body was divided into 10 areas, and the number of areas with complete or partly shading was counted [27].

2.4. Oswestry and Neck Disability Indices

Pain-related functioning was measured with the Oswestry Disability Index (ODI) for back pain, and with the Neck Disability Index (NDI) for neck pain [28–29]. Each index includes 10 items categorizing daily activities, which are rated on a 6-point scale (0–5). The responses are summarized into a percent score (0–100), with 100 indicating the highest disability. A review from 2008 [30] suggests that 12.8 is the minimal important clinical difference. When we found a statistically significant association, we calculated the odds ratio for a 10-point change in ODI.

2.5. Self-administered Comorbidity Questionnaire (SCQ)

Comorbidities were measured with a self-administered comorbidity questionnaire (SCQ) [31], that comprised 12 predefined conditions and three open optional fields. Each condition could receive a score ranging from 0–3. Many patients added optional items that reflected health complaints rather than comorbidities, and thus we chose to use only the first 12 items to create a sum score with a maximum possible score of 36.

2.6. Hospital Anxiety and Depression Scale (HADS)

Psychological distress level was assessed using the validated Norwegian version of the Hospital Anxiety and Depression Scale (HADS) [32]. HADS includes one subscale for depression (HADS-D) and another for anxiety (HADS-A). Each subscale consists of 7 items that are scored from 0–3, adding up to a sum score that ranges from 0–21. Cases that were missing more than one value in a subscale were excluded. If a

subscale was missing a single value, the missing value was replaced with the individual mean. Anxiety or depression, respectively, was defined as a HADS-A or HADS-D score of >8 , which is the normal cut-off point that indicates possible anxiety or depression [33–34].

2.7. General Questionnaire for Psychological and Social factors at work (QPS Nordic)

The General Questionnaire for Psychological and Social Factors at Work (QPS Nordic) comprises 129 questions that measure psychological, social, and organizational factors at work [35]. In the present study, we used 30 items from the following subscales: quantitative demands (4 items), decision demands (3 items), learning demands (3 items), positive challenges at work (3 items), control of decisions (5 items), control of work pacing (4 items), support from superior (3 items), support from co-workers (2 items), and support from friends and relatives (3 items). Each item measures the frequency of occurrences on a five-point scale from 1 (very seldom) to 5 (very often).

2.8. Statistical analyses

Spearman's rank order correlation was used to assess the associations between different variables to explore whether any variables were too highly correlated ($\rho > 0.7$) for the regression model. Ordinal regression (the cumulative logit model) was used to assess the relationships between health variables and psychological and social factors at work. Pre-examination of the data revealed significant interactions between gender and age, occupation, comorbidity, HADS, and ODI/NDI. The ordinal regression analyses were stratified by gender, and the Mann-Whitney U test was used to compare psychological and social factors between men and women.

The subscales of the QPS Nordic were used as response (dependent) variables. For all models, we tested the assumption of proportional odds across all categories. To meet this assumption, we had to collapse the response variables into the following three categories: category 1, a mean value between 1.00 and 2.99 (corresponding to "very seldom" or "rather seldom"); category 2, a mean value between 3.00 and 3.99 (corresponding to "sometimes"), and category 3, a mean value of ≥ 4.00 (corresponding to "rather often" or "very often"). Age, first language, occupation (blue collar, 1; white collar, 2),

Table 1
Demographic characteristics of sick-listed patients with neck or back pain admitted to secondary care

	Men		Women	
	<i>n</i>	%	<i>n</i>	%
Mother tongue: Norwegian	151	75.1	146	81.6
Foreign mother tongue	50	24.9	33	18.4
Education				
Equivalent of <10 years	40	19.9	19	10.6
Equivalent of 10–12 years	126	62.7	91	50.8
Equivalent of 13–15 years	26	12.9	36	20.1
Equivalent of >15 years	8	4.0	33	18.4
High-skilled workers	110	54.7	78	43.6
Low-skilled workers	91	45.3	101	56.4
Blue-collar	125	62.2	23	12.8
White-collar	76	37.8	156	87.2

skill level (low, 1; high, 2), comorbidity (SCQ), pain, functioning (ODI/NDI), and anxiety (HADS-A) or depression (HADS-D) were entered as independent variables. HADS-A and HADS-D were correlated with a ρ of >0.7 , and were thus entered in separate models. The results correspond to the model with the highest explained variance. The odds ratios for a one-unit change in the independent variables are reported. A significance level of $p < 0.05$ was adopted, and Bonferroni correction was applied for multiple comparisons. As we tested nine subscales of the QPS-Nordic, we applied a corrected significance level of $p < 0.006$. Data were analyzed using IBM SPSS statistics version 19 (SPSS Inc., Chicago, IL, USA).

3. Results

Among the included patients, the mean age was 40 years (SD, 9.8 years) for men and 42 years (SD, 10 years) for women. Table 1 presents other demographic characteristics of the included patients. There were significant gender differences ($p < 0.05$) in education and proportion of high-skilled and white-collar workers. Table 2 presents the mean pain levels, disability, and HADS scores. Depression was identified in 29% of the population (HADS-D score of >8), and anxiety was found in 41% of the population (HADS-A score of ≥ 8). The median number of shaded pain areas was 3 (range, 1–10) among men and 4 (range, 1–9) among women. The variables listed in Table 2 did not significantly differ ($p < 0.05$) between genders. Table 3 presents the mean scores of psychological and social factors at work, measured using QPS Nordic, stratified by gender. Compared

Table 2

Mean level of pain, disability, comorbidity, anxiety and depression in sick-listed patients with neck or back pain admitted to secondary care

	Men (<i>n</i> = 201)			Women (<i>n</i> = 179)		
	Mean	(SD)	Range	Mean	(SD)	Range
HADS ^a depression scale	5.3	(4.0)	0–17	5.4	(3.7)	0–20
HADS ^a anxiety scale	7.2	(4.2)	0–21	7.2	(3.8)	0–16
Comorbidity (SCQ)	1.1	(1.8)	0–8	1.1	(1.5)	0–8
Maximum pain score	6.6	(2.1)	0–10	6.4	(2.1)	1–10
Disability (ODI/NDI)	35.5	(12.7)	8–70	37.6	(14.4)	8–80

^aHospital anxiety and depression scale.

Table 3

Psychological and social factors at work, mean score and standard deviation measured with demand, control and support scale from QPS Nordic, in men and women

	Women		Men	
	N	Median	N	Median
Quantitative demands ^a	179	3.00	200	3.25
Decision demands	179	3.67	200	3.67
Learning demands	179	2.33	200	2.33
Positive challenges ^a	178	4.00	200	4.00
Control decisions	179	2.60	201	2.60
Control work pacing	179	2.25	201	2.50
Support from superior	176	3.67	201	3.33
Support from co-workers ^a	177	4.00	201	3.50
Support from friends and relatives ^a	177	4.30	201	4.00

^aSignificant difference between gender ($p < 0.05$).

to women, men had significantly higher scores on quantitative demands at work ($p < 0.05$). Compared to men, women experienced significantly more support from co-workers, friends, and relatives, and also reported more positive challenges at work ($p < 0.05$). Tables 4 and 5 present the associations between pain, disability, emotional distress, and psychological and social factors at work.

3.1. Demands

Among female patients, the perception of high quantitative demands was significantly influenced by neck- and back-pain-related disability (ODI/NDI) ($p < 0.006$). Women with a 10-point increase in ODI/NDI score had an odds ratio of 1.49 for perceiving high quantitative demands at work. Educational level influenced the perception of both quantitative demands and learning demands among women, but not men. Women with higher education had an odds ratio of 8.76 for experiencing high quantitative demands and an odds ratio of 5.81 for experiencing high decision demands. The variables blue/white collar and low/high skilled did not influence the perception of demands among either gender. Men showed a non-significant tendency for anxiety

or depression to influence all of the subscales of demands in the QPS Nordic.

3.2. Control

None of the studied medical factors significantly influenced the perception of control at work among men. Among women, anxiety and depression were significantly associated with the perception of diminished control ($p < 0.006$). Women with high depression scores reported significantly less positive challenges at work, and women with high anxiety scores reported less control of decisions. A 2-point increase in HADS score was associated with an odds ratio of 1.36 for low positive challenges at work, and an odds ratio of 1.48 for reporting low control of decisions. Among women, the variable white/blue-collar influenced the perception of positive challenges at work. Highly skilled men reported a higher degree of control at work on all QPS Nordic subscales. The effect was highest on control of work pacing, where white-collar workers had an odds ratio of 4.76 for reporting a high degree of control.

3.3. Support

Among men, depression was associated with perception of low support from coworkers ($p < 0.006$), with a 2-point increase in depression score associated with an odds ratio of 1.30 for reporting low support. For both genders, support was less influenced by type of work and education, with skilled work, white collar vs. blue collar, and education having no impact on the perception of support. Mother tongue was a significant explanatory variable in men. Men whose mother tongue was Norwegian experienced significantly less support from their superior compared to men with a foreign mother tongue. Among women, no factors significantly influenced the perception of support.

Table 4
 Estimated Odds ratio for 1 unit change (95% confidence interval) for demographic and health variables on the demand, control and support subscales from General Questionnaire for Psychological and Social factors at work (QPS Nordic) in females

	Demographic factors					Medical factors					
	Age	Mother tongue	Education	Low-skilled	Blue-collar	Comorbidity	Anxiety	Depression	Pain areas	Disability	
Quantitative demands	1	0.85	0.11^b	0.48	0.88	0.97	1.05	-	0.88	1.01	1.04^b
95% CI	(0.97, 1.03)	(0.36, 2.04)	(0.03, 0.47)	(0.22, 1.05)	(0.35, 2.25)	(0.78, 1.13)	(0.96, 1.15)	-	(0.75, 1.04)	(0.87, 1.18)	(1.01, 1.06)
Decision demands	0.99	1.65	0.17^b	0.89	0.31 ^a	0.93	1.05	-	1.03	0.94	1.01
95% CI	(0.96, 1.02)	(0.71, 3.86)	(0.06, 0.54)	(0.42, 1.85)	(0.13, 0.76)	(0.76, 1.13)	(0.97, 1.15)	-	(0.88, 1.21)	(0.81, 1.08)	(0.99, 1.03)
Learning demands	1	0.97	1.22	0.75	0.17 ^a	0.91	1.10 ^a	-	0.99	0.98	1
95% CI	(0.97, 1.04)	(0.36, 2.57)	(0.34, 4.36)	(0.31, 1.78)	(0.04, 0.79)	(0.72, 1.16)	(0.99, 1.21)	-	(0.82, 1.19)	(0.82, 1.16)	(0.97, 1.03)
Positive challenges	1.01	0.48	1.43	0.39 ^a	0.25^b	1.18	-	0.88^b	1.02	0.98	1.02
95% CI	(0.98, 1.05)	(0.25, 1.80)	(0.30, 3.52)	(0.18, 1.01)	(0.09, 0.57)	(0.94, 1.58)	-	(0.77, 0.96)	(0.79, 1.16)	(0.87, 1.20)	(1.00, 1.06)
Control of decisions	1.01	1.02	0.8	0.88	2.61	1.07	0.82^b	-	1.05	0.99	1.04 ^a
95% CI	(0.98, 1.05)	(0.36, 2.86)	(0.21, 2.97)	(0.36, 2.14)	(1.00, 6.82)	(0.84, 1.35)	(0.74, 0.92)	-	(0.87, 1.27)	(0.16, 1.17)	(1.01, 1.07)
Control of work	1.03	1.99	2.83	0.33 ^a	1.47	0.93	0.92	-	1.01	1.09	1.01
pacing											
95% CI	(1.00, 1.07)	(0.69, 5.70)	(0.86, 9.30)	(0.14, 0.76)	(0.56, 3.86)	(0.74, 1.17)	(0.84, 1.02)		(0.85, 1.20)	(0.93, 1.27)	(0.98, 1.04)
Support from superior	1.01	2.74 ^a	0.61	1.17	1.37	0.95	-	0.96	0.92	1	1.02
95% CI	(0.98, 1.05)	(1.18, 6.36)	(0.20, 1.83)	(0.56, 2.45)	(0.55, 3.46)	(0.78, 1.16)	-	(0.87, 1.05)	(0.78, 1.08)	(0.87, 1.16)	(1.00, 1.05)
Support from coworkers	0.98	2.57 ^a	0.8	0.51	0.57	1.15	0.88 ^a	-	1.02	0.94	1.02
95% CI	(0.95, 1.02)	(1.05, 6.27)	(0.25, 2.57)	(0.23, 1.17)	(0.23, 1.43)	(0.91, 1.46)	(0.80, 0.96)		(0.85, 1.22)	(0.81, 1.10)	(0.99, 1.05)
Support from friends and relatives	0.96 ^a	1.18	1.71	0.61	1.25	0.94	-	0.91	1.07	0.97	0.99
95% CI	(0.92, 0.99)	(0.47, 2.97)	(0.48, 6.11)	(0.27, 1.39)	(0.46, 3.42)	(0.76, 1.16)	-	(0.83, 1.01)	(0.89, 1.28)	(0.83, 1.13)	(0.96, 1.02)

^a Significant at level $p < 0.05$, ^b significant at level $p < 0.0055$ (Bonferroni corrected for multiple testing).

Table 5
 Estimated Odds ratio for 1 unit change (95% confidence interval) for demographic and health variables on the demand, control and support subscales from General Questionnaire for Psychological and Social factors at work (QPS Nordic) in males

	Demographic factors					Medical factors					
	Age	Mother tongue	Education	Low-skilled	Blue-collar	Comorbidity	Anxiety	Depression	Pain	Pain areas	Disability
Quantitative demands	0.99	0.81	0.87	0.52 ^a	1.36	1.17	-	1.12 ^a	1	1.22 ^a	1.01
95% CI	(0.96, 1.02)	(0.39, 1.70)	(0.33, 2.29)	(0.29, 0.95)	(0.73, 2.53)	(0.98, 1.38)	-	(1.03, 1.21)	(0.86, 1.16)	(1.04, 1.43)	(0.99, 1.04)
Decision demands	0.99	1.23	0.71	0.81	0.89	1.07	1.09 ^a	-	1.05	1.07	1.02
95% CI	(0.96, 1.02)	(0.60, 2.53)	(0.27, 1.84)	(0.45, 1.48)	(0.48, 1.67)	(0.90, 1.27)	(1.01, 1.18)	-	(0.91, 1.21)	(0.91, 1.25)	(1.00, 1.05)
Learning demands	0.97	1.48	1.35	0.73	1.18	1.09	-	1.13 ^a	1.04	0.83	0.98
95% CI	(0.94, 1.01)	(0.63, 3.46)	(0.43, 4.29)	(0.36, 1.45)	(0.57, 2.45)	(1.89, 1.33)	-	(1.03, 1.01)	(0.87, 1.23)	(0.69, 1.01)	(0.96, 1.01)
Positive challenges	1.02	0.34 ^a	2.81^b	0.28^b	0.52	1.11	-	0.93	1.02	1.08	1.02
95% CI	(0.99, 1.05)	(0.15, 0.78)	(1.02, 7.73)	(0.15, 0.54)	(0.26, 1.02)	(0.92, 1.34)	-	(0.86, 1.02)	(0.88, 1.19)	(0.92, 1.27)	(1.00, 1.05)
Control of decisions	1.03	1.22	1.48	0.29^b	0.57	1.03	0.96	-	1.07	1.06	0.97
95% CI	(1.00, 1.06)	(0.53, 2.80)	(0.53, 4.14)	(0.15, 0.57)	(0.29, 1.13)	(0.85, 1.23)	(0.89, 1.04)	-	(0.91, 1.26)	(0.90, 1.26)	(0.95, 1.00)
Control of work	1.03	1.53	0.8	0.21^b	0.39 ^a	0.97	1.03	-	0.99	0.96	0.97
pacing											
95% CI	(0.99, 1.06)	(0.61, 3.78)	(0.28, 2.27)	(0.10, 0.44)	(0.19, 0.81)	(0.79, 1.17)	(0.94, 1.13)		(0.84, 1.16)	(0.80, 1.14)	(0.94, 1.00)
Support from superior	0.97	0.30^b	1.28	0.7	0.74	0.9	-	0.89 ^a	1	0.89	0.98
95% CI	(0.94, 1.00)	(0.14, 0.66)	(0.50, 3.29)	(0.39, 1.26)	(0.40, 1.38)	(0.76, 1.06)	-	(0.83, 0.97)	(0.87, 1.16)	(0.76, 1.04)	(0.95, 1.00)
Support from coworkers	0.98	0.82	1.45	0.7	0.57	0.96	-	0.88^b	1.01	0.81 ^a	0.98
95% CI	(0.95, 1.01)	(0.39, 1.73)	(0.55, 3.78)	(0.38, 1.27)	(0.30, 1.08)	(0.81, 1.14)	-	(0.81, 0.95)	(0.87, 1.17)	(0.69, 0.95)	(0.96, 1.01)
Support from friends and relatives	0.97	1.68	1.36	1.08	1.01	0.99	-	0.91 ^a	0.96	0.91	0.97 ^a
95% CI	(0.94, 1.00)	(0.80, 3.53)	(0.50, 3.67)	(0.58, 2.01)	(0.53, 1.92)	(0.84, 1.17)	-	(0.84, 0.98)	(0.82, 1.13)	(0.77, 1.06)	(0.95, 1.00)

^a Significant at level $p < 0.05$, ^b significant at level $p < 0.0055$ (Bonferroni corrected for multiple testing).

4. Discussion

Our present results in sick-listed patients with neck and back pain showed no association between level of pain and psychological and social factors at work, and only a minor influence of disability. A high disability score (ODI/NDI) was associated with reporting higher quantitative demands among women but not men. Anxiety and depression were found to influence perception of psychological and social factors at work in both genders. Other studies have also reported anxiety and depression to be associated with psychological and social factors at work [36–38]. The causal relationship of psychological and social factors at work with employee well-being has been discussed [39]; however, most studies have investigated the relationship between job exposure and the development of musculoskeletal pain [10]. Few have investigated the reciprocal relationship [20]. To our knowledge, the present results are the first illustration of this relationship in patients with neck and back pain.

In Norway, patients with neck and back pain are generally referred to a health specialist to receive an examination and advice for further treatment and sick listing. In this process, it is important for health care professionals to know which individual factors might contribute to symptom persistence and obstacles that can impede one's return to work. Therefore, knowledge about factors that contribute to an experience of an adverse work environment is important. Our present results revealed that anxiety and depression were the most important factors associated with adverse psychological and social factors at work. These factors are also known to be strong predictors of prognosis among sick-listed patients with neck and back pain [40]. These findings suggest the particular importance of exploring a patient's perception of their work environment if anxiety or depression is present.

Our patients reported levels of demands, control, and support at work similar to those in a Nordic reference population [35, 41]. Gender distribution, educational level, pain, and disability were also comparable to reports of other Norwegian studies, including among patients with chronic back pain [42–47]. However, the present study population showed a higher than expected prevalence of anxiety and depression—this rate was more than twice that reported in Norwegian population-based studies [48–49], and was also high compared to another study of patients with back pain and a similar duration of sick leave [50].

We found gender differences in the perception of psychological and social factors at work, as has also been reported in other studies [36]. These differences should be taken into account when analyzing psychological and social factors at work, and justify the stratification of analyses by gender to avoid difficulties in interpretation of interactions [51]. The blue/white collar factor was associated with demand and control among women, while the high/low skill level factor was more important among men. Similarly, education was associated with perception of demands for women, and with positive challenges at work for men. Other studies have also found that the white collar/blue collar factor and skill level are associated with job strain [17], and that age and education influence the perception of control and demands [52].

4.1. Strengths and limitations

The present study was part of a multicenter study on occupational rehabilitation of a representative sample of sick-listed patients with neck and back pain who were referred to secondary care in Norway. We aimed to include all patients on sick leave, as this group is suggested to have a higher prevalence of work-related problems. As this was a cross-sectional study, we could only find associations between factors.

We used a subjective measure of job strain that assessed the individual's perceptions of exposure; however, it is also possible to measure job strain using more objective methods based on occupation, working hours, and payment. The correlation between the two methods is low [53], but the "QPS Nordic" questionnaire is designed to include response categories that are not easily affected by emotion, and that are less distorted by social desirability bias [54]. We also tried to reduce the problems associated with the utilized method by controlling for occupation in the analyses.

We used appropriate ordinal regression analyses, as the outcome measures were ordinal in nature. The numbers of categories in the response variables were reduced in order to meet the assumptions of proportional odds. This may have reduced the power of the results. We also chose to correct for multiple testing to avoid spurious relationships. There was a tendency of association between more variables. The Bonferroni correction may have been too conservative of an approach and some of these associations might be clinically important.

5. Conclusions

Depression and anxiety appeared to be the two most important factors influencing the experience of low support and low control among sick-listed patients with neck and back pain. On the other hand, pain and disability were of only minor importance. Hence, attention should be paid to the interaction between anxiety or depression and perceived job strain in the clinical setting. We found gender differences in the perception of psychological and social factors at work, where men reported higher demands and women reported more support. The significance of these differences regarding health and sickness absence need to be established.

Acknowledgments

The study was funded by the Research Council of Norway.

Authors' contributions

GHM participated in the study design and coordination, data acquisition, statistical analysis, data interpretation, and drafting of the manuscript. BL participated in the study conception and design, data analysis and interpretation, and critical revision of the manuscript. KM participated in the study design and coordination, data acquisition, and critical revision of the manuscript. CR participated in the study conception, design, and coordination; data interpretation; and critical revision of the manuscript. EBH participated in the study design and conception, data interpretation, and critical revision of the manuscript. GL participated in the study design, data analysis and interpretation, and critical revision of the manuscript. All authors read and approved the manuscript.

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