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PREVALENCE AND CORRELATES OF REGIONAL PAIN AND ASSOCIATED DISABILITY IN JAPANESE WORKERS

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Abstract

Objectives—To assess the prevalence and correlates of regional pain and associated disability in four groups of Japanese workers.

Methods—As part of a large international survey of musculoskeletal symptoms (the CUPID study), samples of nurses, office workers, sales/marketing personnel and transportation operatives in Japan completed a self-administered questionnaire (response rate 83%). The questionnaire covered experience of pain in six anatomical regions, associated disability and sickness absence, and various possible occupational and psychosocial risk factors for these outcomes. Associations with risk factors were assessed by logistic regression.

Results—Analysis was based on 2290 subjects. Rates of regional pain were generally less than have been reported in the UK, with a particularly low prevalence of wrist/hand pain among office workers (6% in the past month). The strongest and most consistent risk factor for regional pain in the past month was tendency to somatise (odds ratios (95% confidence intervals) for report of ≥2 v 0 distressing somatic symptoms 3.1 (2.4-4.0) for low back pain, 2.8 (2.1-3.8) for shoulder pain, and 2.5 (1.6-4.1) for wrist/hand pain). Sickness absence for regional pain complaints in the past year was reported by 5% of participants, the major risk factor for this outcome being absence during the same period for other medical reasons (OR 3.7, 95%CI 2.4-5.8).

Conclusions—Japanese office workers have markedly lower rates of wrist/hand pain than their UK counterparts. In Japan, as in Western Europe, somatising tendency is a major risk factor for regional pain. Sickness absence attributed to regional pain complaints appears to be much less common in Japan than in the UK, and to be driven principally by a general propensity to take sickness absence.

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Keywords

Musculoskeletal; pain; disability; sickness absence; somatising

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Introduction

Musculoskeletal pain, especially in the back, neck and upper limb, is a common complaint in many developed countries, and an important cause of disability and incapacity for work. It is often attributed to strain from forceful or repetitive occupational activities, and epidemiological research has demonstrated fairly consistent associations of low back pain with work involving heavy lifting and/or repeated bending of the trunk [1], and of painful disorders of the forearm with work that entails repetitive movements of the wrist or hand [2].

However, regional pain complaints and associated disabilities are not a simple consequence of physical stresses to tissues. There is strong evidence that they are influenced also by psychological factors such as low mood and a general tendency to worry about common somatic symptoms (somatising tendency) [3,4]. In addition, culturally determined health beliefs could also have an important role, and may explain large variations in the incidence and prevalence of pain and disability that have been observed between countries [5,6], and within countries over time [5]. It is important to understand the contribution of these psychosocial influences if preventive measures are to be optimised.

To help advance knowledge in this area, a multi-centre international study, CUPID (Cultural and Psychosocial Influences on Disability), has been established. The study, which is being carried out in 19 countries (both developing and developed) from six continents, involves a baseline cross-sectional survey that will allow comparison of rates of regional pain and associated disability in samples of workers who carry out similar physical activities, but in widely different cultural environments. This is followed by a longitudinal component, which explores predictors of persistent and newly incident pain.

In this paper, we report findings from the initial cross-sectional survey that was carried out in Japan as part of the CUPID study, and draw comparisons with experience in the UK.

Method

The survey focused on four occupational groups – nurses, office workers, sales/marketing personnel and transportation operatives. All participants worked in or near to Tokyo. The nurses were employed at Tokyo University Hospital; the office workers in administrative and clerical jobs at the same hospital and at a four pharmaceutical companies and a private trading company, the sales/marketing personnel at six pharmaceutical companies, and the transportation operatives (mainly lorry drivers and loaders) at two companies transporting baggage and mail.

Within each participating organisation, a manager agreed to act as a coordinator for data collection. The coordinator distributed a self-administered questionnaire to all employees in relevant jobs, with a covering letter from the survey team. Completed questionnaires were then returned to the survey team via the coordinator. A total of 3187 questionnaires were distributed to 1074 nurses, 425 office workers, 380 sales/marketing personnel and 1308 transportation operatives. No reminders were sent to non-responders.

The questionnaire was a Japanese translation of the survey instrument that is being used throughout the CUPID study. The accuracy of the translation was checked by independent

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back-translation to English and comparison with the original. Amendments were then made as necessary. Among other things, the questionnaire asked about demographic characteristics, hours of work and duration of employment in current job, whether the job involved certain specified activities in an average working day, job satisfaction, mental health, indicators of tendency to somatise, experience of pain during the past month and past year at each of six anatomical sites (low back, neck, shoulder, elbow, wrist/hand and knee), disability for specified everyday tasks arising from such pain, and absence from work in the past year because of musculoskeletal pain or for other reasons. Mental health (mood) was assessed from the relevant subscale from the SF-36 questionnaire [7], and was graded to three levels defined by approximate thirds of the distribution of scores in all subjects combined. Somatising tendency was assessed using a subset of items from the Brief Symptom Inventory (BSI) [8], and was graded according to the number of symptoms (out of a total of seven) that were reported as causing at least moderate concern in the past week.

Data from the completed questionnaires were entered onto computer, and after checks for errors, were analysed using SPSS Version 15 and STATA Version 10 software. Because a major focus of the study was pain and disability during the past year, subjects were excluded from the main analysis if they had worked in their current job for less than a year.

In addition to the compilation of simple descriptive statistics, logistic regression was used to explore associations with regional pain (classified in various ways) and associated disability and sickness absence. Pain at an anatomical site was considered disabling if during the past month, it had made at least one of the everyday activities specified in the questionnaire difficult or impossible. These activities were: getting dressed (all sites of pain), doing normal household jobs (all sites of pain), cutting toe nails (low back), combing or brushing hair (shoulder), bathing/showering (shoulder), opening bottles, jars or taps (elbow and wrist/hand), writing (wrist/hand), locking and unlocking doors (wrist/hand), walking up and down stairs (knee) and walking on level ground (knee). When looking at associations with occupational activities, we defined for each site of pain, an activity in an average working day that could cause physical stress to local tissues. These activities were: lifting weights of ≥25 kg by hand (low back); work with the hands above shoulder height for ≥1 hour in total (neck and shoulders); repeated bending and straightening of the elbow for ≥1 hour in total (elbow); use of a keyboard or other repetitive movements of the wrist/fingers for ≥4 hours in total (wrist/hand); and kneeling or squatting for ≥1 hour in total (knees). Associations in the logistic regression analyses were summarised by odds ratios (ORs) with associated 95% confidence intervals (CIs).

Ethical approval for the study was provided by the University of Tokyo Ethics Committee.

Results

Questionnaires were returned by 2651 (83%) of the workers to whom they were issued, but 285 were excluded from analysis because the individual had been in his/her current job for less than a year, and a further 76 because of missing information on age (52), sex (1) or both (23). Of the remaining 2290 subjects, 599 were nurses, 316 were office workers, 355 were sales/marketing personnel, and 1020 were transportation operatives, representing 56%, 74%, 93% and 78% of those mailed in the respective occupational groups..

Table 1 summarises various characteristics of the participants. Most of the nurses were women, whereas almost all of the sales/marketing personnel and transportation operatives were men. The majority of subjects were employed full-time, including 30% of the sample (mostly sales/marketing personnel and transportation operatives) who indicated that they worked for more than 60 hours per week. Reported occupational activities were much as

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would be expected, with a high frequency of keyboard use by office workers (89%). Transportation operatives and nurses had the highest prevalence of heavy lifting (83% and 66% respectively) and of repeated bending and straightening of the elbow (78% and 72%). Rates of job satisfaction were relatively low in office workers (28%) and sales/marketing personnel (31%). Poor mental health and tendency to somatise were most common among the nurses. In the study sample overall, the somatic symptoms most frequently reported as distressing were nausea or upset stomach (14%), weakness (12%) and faintness or dizziness (8%).

Table 2 shows the prevalence of pain at different anatomical sites in the study sample as a whole. The lower back was the site most commonly affected by pain, with a prevalence of 28% in the past month. Next most common were pain in the neck (21% in the past month) and shoulder (17%). In comparison, pain in the elbow and wrist/hand was much less frequent. The sites most commonly affected by disabling pain in the past month were the lower back (11%) and knee (8%). Only 4% of subjects had been absent from work during the past year because of low back pain, and absence because of pain in the elbow or wrist/hand was extremely rare.

The prevalence of regional pain by occupational group is summarised in Table 3 (data for men and women separately are given in Supplementary Tables 1 and 2). At almost all anatomical sites, pain in the past month was most common in nurses or transportation operatives, and least frequent in sales/marketing personnel. However, office workers had the highest prevalence of sickness absence in the past year attributed to regional pain (11%). A total of 251 subjects (11%) reported pain in the past month at ≥3 anatomical sites, 744 (32%) reported disabling pain at one or more sites during the past month, and 125 (5%) indicated that they had taken sickness absence during the past year because of regional pain.

Table 4 gives results from logistic regression analyses exploring risk factors for pain at different anatomical sites. For each site, two outcomes were examined – any pain in the past month and disabling pain in the past month – the comparator in both cases being no pain at the site in the past month. All analyses were adjusted for sex, age, mental health and occupational group. Significant associations with locally stressful physical activities were observed for pain in the low back (lifting ≥25 Kg), wrist/hand (use of use of keyboard or repeated movements of a hands/fingers for ≥4 hours) and knee (kneeling or squatting for ≥1 hour). However, the strongest and most consistent associations were with somatising tendency. For disabling pain in the low back, neck and shoulder, the ORs for report of ≥2 v 0 distressing somatic symptoms were all 4.5 or higher. Associations with poor mental health (not shown) were much weaker than those with somatising tendency, and not statistically significant.

Table 5 presents findings from two regression analyses, one for the risk of pain in the past month at ≥3 anatomical sites, and the other for disabling pain at one or more anatomical sites in the past month. In each case, the comparator was no pain at any site in the past month. Both variables were strongly associated with somatising tendency and showed a clear, progressive increase in risk in relation to the number of stressful physical activities reported. In addition, both were more frequent at older ages. Associations with poor mental health and job dissatisfaction were much weaker.

In contrast, sickness absence because of regional pain in the past year was unrelated to occupational physical activities and showed no clear association with somatising tendency (Table 6). It was, however, strongly associated with sickness absence during the past year for other reasons (OR 3.7, 95%CI 2.4-5.8), which was reported by 16% of participants.

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Discussion

In this cross-sectional survey of Japanese workers, rates of regional pain were generally lower than have been reported in the UK, with a particularly low frequency of pain in the wrist and hand. The prevalence of sickness absence attributed to regional pain was also substantially lower than in the UK. Pain at most sites was more common in workers who indicated that they were exposed to stressful physical activities in their job, but the strongest and most consistent risk factor for regional pain and associated disability was somatising tendency. In contrast, risk of sickness absence because of regional pain was related not to physical activities or somatising tendency, but to absence from work because of other health problems.

The occupational groups that were studied cannot necessarily be regarded as representative of the general population of working age in Japan. Nevertheless, they encompass a range of occupational tasks, both manual and non-manual, and provide useful insights into patterns of musculoskeletal symptoms and disability in a cultural environment that is notably different from that in, say, Western Europe. Furthermore, the high response rate that was achieved makes it likely that the samples of workers who participated were fairly typical of the occupational groups from which they were drawn.

A concern always in international studies of this type is that the meaning of questions may be distorted in translation between languages. Thus, care was taken to check the accuracy of the Japanese questionnaire by back-translation to English. It remains possible that a term such as “pain” is understood somewhat differently in Japan. However, this should not affect the relative frequency of the symptom at different anatomical sites, and is less likely to have been a problem in relation to more objective outcomes such as sickness absence.

Another possible source of error was incomplete recall of symptoms, particularly if they last occurred many months before the questionnaire was completed. For this reason, we based most of our analysis on pain and disability that was reported in the past month. An exception was sickness absence, for which a longer time period was required to give meaningful numbers of cases. However, we would expect spells of sickness absence to be more memorable than more minor episodes of pain.

The prevalence of pain at most of the anatomical sites considered was somewhat lower than has been recorded in UK workers who were surveyed using similar questions [6]. For example, low-back pain in the past month was reported by 28% of the Japanese workers as compared with 28% in a sample of white UK office workers and 37% in a group of white UK manual workers; while the corresponding figures were 21% v 26% and 23% for neck pain, 17% v 20% and 24% for shoulder pain, and 5% v 10% and 9% for elbow pain. More remarkable, however, is the much lower prevalence of wrist/hand pain in Japanese workers (7% v 30% and 23%). This lower prevalence extended to Japanese office workers (6% with wrist/hand pain), most of whom were regular users of computer keyboards. The difference in the prevalence of wrist/hand pain between Japanese and UK office workers was much larger than that between manual and non-manual workers in the UK, or between white workers in the UK and those of South Asian origin [6].

Also notable is the low rate of sickness absence that was attributed to regional pain complaints. Overall, only 4% of study participants had been absent from work in the past year because of low back pain, 2% for neck pain, 1% for shoulder pain, 0.3% for elbow pain and 0.4% for wrist/hand pain. In comparison, reported rates in UK workers were more than three times higher [6]. Workers from Japan tend to claim compensation and take time off work for illness attributed to occupation less often than their counterparts in the United States [9]. However, the differences we found are not explained simply by low overall rates

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of sickness absence in Japan – 16% of participants reported absence in the past year because of non-musculoskeletal illness. Rather the proportion of absence attributed to musculoskeletal disorders was much lower than in the UK.

Earlier studies of musculoskeletal symptoms in Japan have focused mainly on low back pain [10-22], with prevalence rates varying from 13% (in female nursing students [18]) to 83% (in nurses [19]), according to the population studied and case definition. Where assessed, rates of neck pain have been lower than those for low back pain in the same study [16-19], and the prevalence of pain in the wrist or hand has been even lower [19,21].

Although there are many published surveys of regional pain in other countries, few studies to date have compared rates of musculoskeletal illness between countries, using standardised methods for data collection. In an analysis of data from surveys of the general adult population in 10 developed and seven developing countries, the age-standardised prevalence of chronic back pain was somewhat higher in developing countries (24.3%) than in developed countries (18.5%) [23]. A comparative survey of nursing personnel found a higher 12-month prevalence of back complaints among Greek hospital nurses (75%) than in Dutch nurses and caregivers employed in nursing homes (62%) [24]. And in another study, rates of pain among manual workers were substantially lower in Mumbai, India, than in the UK, at each of five anatomical sites (low back, neck, shoulder, elbow and wrist/hand) [6]. For office workers, the differences were much smaller.

Within our Japanese sample of workers, analysis of risk factors for regional pain revealed expected associations with stressful physical activities. However, associations with somatising tendency were stronger, especially when pain was disabling. Given that the data analysed were cross-sectional, it is possible that the observed associations between physical activities and regional pain arose in part because of greater awareness, and therefore more frequent reporting, of such activities among workers who found them painful. It seems less likely, however, that the presence of back, neck or arm pain would cause a person to over-report worry about somatic symptoms such as nausea, weakness, or faintness and dizziness. Furthermore, in other countries, longitudinal studies have found that somatising tendency predicted the future incidence and persistence of musculoskeletal pain [3,4,25,26], and was associated with subsequent poor outcome in patients presenting to primary care or treated by physiotherapy for musculoskeletal disorders [27-30]. Tendency to somatise has also been associated with other complaints, including irritable bowel syndrome [31] and report of symptoms following exposure to pesticides [32]. In comparison with somatising tendency, low mood was a much weaker risk factor for regional pain in the Japanese workers.

In contrast, neither physical activity nor somatising tendency were clearly related to sickness absence because of regional pain, which was associated much more strongly with absence attributed to non-musculoskeletal disorders. It may be that in Japan, the major determinant of variation in rates of absence ascribed to musculoskeletal symptoms is not differences in the occurrence of such symptoms, but differences in workers' general inclination to take sickness absence when they perceive a health problem.

In summary, this study provides further evidence that the prevalence of musculoskeletal symptoms varies importantly between countries, and suggests that, as in the UK, a major risk factor for musculoskeletal complaint in Japan is tendency to somatise.

Main messages

- Japanese office workers have markedly lower rates of wrist/hand pain than office workers in the UK.

- In Japan, as in Western Europe, somatising tendency is a major risk factor for musculoskeletal complaints.
- Sickness absence attributed to musculoskeletal disorders appears to be much less common in Japan than in the UK.

What this paper adds

Our findings add weight to a growing body of evidence that the occurrence of musculoskeletal symptoms and of resultant disability and sickness absence varies markedly between countries. Strategies to control work-related musculoskeletal disorders should take into account the factors that underlie these differences, which may include culturally determined health beliefs and expectations.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

1. Bernard, et al., editors. Musculoskeletal Disorders and Workplace Factors. A Critical Review of Epidemiologic Evidence for Work-related Musculoskeletal Disorders of the Neck, Upper Extremity, and Low Back. US Department of Health and Human Sciences/NIOSH; Cincinnati, OH: 1997. National Institute for Occupational Health and Safety. (Publication no. 97-141)
2. Kuorinka, I.; Forcier, L., editors. Work-related Musculoskeletal Disorders *(WMSDs)*: A Reference Book for Prevention. Taylor & Francis; London: 1995.
3. Palmer KT, Reading I, Calnan M, et al. Does knee pain in the community behave like a regional pain syndrome? Prospective cohort study of incidence and persistence. Ann Rheum Dis. 2007; 66:1190–1194. [PubMed: 17114191]
4. Palmer KT, Reading I, Linaker C, et al. Population based cohort study of incident and persistent arm pain: role of mental health, self-rated health and health beliefs. Pain. 2008; 136:30–37. [PubMed: 17689865]
5. Coggon D. Occupational medicine at a turning point. Occup Environ Med. 2005; 62:281–283. [PubMed: 15837843]
6. Madan I, Reading I, Palmer KT, et al. Cultural differences in musculoskeletal symptoms and disability. Int J Epidemiol. 2008; 37:1181–9. [PubMed: 18511493]
7. Ware JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). Medical Care. 1992; 30:473–483. [PubMed: 1593914]
8. Derogatis LR, Melisaratos N. The Brief Symptom Inventory: an introductory report. Psychol Med. 1983; 13:595–605. [PubMed: 6622612]
9. Volinn E, Nishikitani M, Volinn W, et al. Back pain claim rates in Japan and the United States: Framing the puzzle. Spine. 2005; 30:697–704. [PubMed: 15770188]
10. Ando S, Ono Y, Shimaoka M, et al. Associations of self estimated workloads with musculoskeletal symptoms among hospital nurses. Occup Environ Med. 2000; 57:211–216. [PubMed: 10810105]
11. Fujimura T, Yasuda N, Ohara H. Work-related factors of low back pain among nursing aides in nursing homes for the elderly. Sangyo Eiseigaku Zasshi. 1995; 37:89–98. [PubMed: 7749998]
12. Kaneda K, Shirai Y, Miyamoto M. An epidemiological study on occupational low back pain among people who work in construction. J Nippon Med Sch. 2001; 68:310–7. [PubMed: 11505278]

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13. Miyamoto M, Konno S, Gembun Y, et al. Epidemiological study of low back pain and occupational risk factors among taxi drivers. Ind Health. 2008; 46:112–7. [PubMed: 18413963]
14. Nagasu M, Sakai K, Ito A, et al. Prevalence and risk factors for low back pain among professional cooks working in school lunch services. BMC Public Health. 2007; 7:171. [PubMed: 17650300]
15. Miyamoto M, Shirai Y, Nakayama Y, et al. An epidemiologic study of occupational low back pain in truck drivers. J Nippon Med Sch. 2000; 67:186–90. [PubMed: 10851352]
16. Smith DR, Takeda Y, Mizutani T, et al. Musculoskeletal disorders and skin disease in a Japanese CD manufacturing plant. J UOEH. 2002; 24:397–404. [PubMed: 12506856]
17. Smith DR, Ohmura K, Yamagata Z, et al. Musculoskeletal disorders among female nurses in a rural Japanese hospital. Nurs Health Sci. 2003; 5:185–8. [PubMed: 12877719]
18. Smith DR, Sato M, Miyajima T, Mizutani T, et al. Musculoskeletal disorders self-reported by female nursing students in central Japan: a complete cross-sectional survey. Int J Nurs Stud. 2003; 40:725–9. [PubMed: 12965164]
19. Smith DR, Kondo N, Tanaka E, et al. Musculoskeletal disorders among hospital nurses in rural Japan. Rural Remote Health. 2003; 241 http://www.rrh.org.au/articles/subviewnew.asp?ArticleID=241.
20. Suka M, Yoshida K. The national burden of musculoskeletal pain in Japan: Projections to the year 2055. Clin J Pain. 2009; 25:313–9. [PubMed: 19590480]
21. Suka M, Yoshida K. Musculoskeletal pain in Japan: prevalence and interference with daily activities. Mod Rheumatol. 2005; 15:41–7. [PubMed: 17028821]
22. Ueno S, Hisanaga N, Jonai H, et al. Association between musculoskeletal pain in Japanese construction workers and job, age, alcohol consumption, and smoking. Ind health. 1999; 37:449–56. [PubMed: 10547961]
23. Tsang A, Von Korff M, Lee S, et al. Common chronic pain conditions in developed and developing countries: gender and age differences and comorbidity with depression-anxiety disorders. J of Pain. 2008; 9:883–91. [PubMed: 18602869]
24. Alexopoulos EC, Burdorf A, Kalokerinou A. A comparative analysis on musculoskeletal disorders between Greek and Dutch nursing personnel. Int Arch Occup Environ Health. 2006; 79:82–8. [PubMed: 16133523]
25. Macfarlane GJ, Hunt I, Silman AJ. Role of mechanical and psychosocial factors in the onset of forearm pain: prospective population based study. BMJ. 2000; 32:676–9. [PubMed: 10987773]
26. Andersen JH, Kaergaard A, Mikkelsen S, et al. Risk factors in the onset of neck–shoulder pain in a prospective study of workers in industrial and service companies. Occup Environ Med. 2003; 60:649–54. [PubMed: 12937185]
27. Jørgensen CK, Fink P, Olesen F. Psychological distress and somatisation as prognostic factors in patients with musculoskeletal illness in general practice. Br J Gen Pract. 2000; 50:537–41. [PubMed: 10954933]
28. Karels CH, Bierma-Zienstra SM, Burdorf A, et al. Social and psychological factors influenced the course of arm, neck and shoulder complaints. J Clin Epidemiol. 2007; 60:839–48. [PubMed: 17606181]
29. Mallen CD, Peat G, Thomas E, et al. Prognostic factors for musculoskeletal pain in primary care: as systematic review. Br J Gen Pract. 2007; 57:655–61. [PubMed: 17688762]
30. Spies-Dorgelo MN, van der Windt D, Prins APA, et al. Clinical course and prognosis of hand and wrist problems in primary care. Arth Rheum (Arth Care Res). 2008; 59:1349–57.
31. Choung RS, Locke GR, Zinsmeister AR, et al. Psychological distress and somatic symptoms in community subjects with irritable bowel syndrome: a psychological component is the rule. Am J Gastroenterol. 2009; 104:1772–9. [PubMed: 19491833]
32. Solomon C, Poole J, Palmer KT, et al. Acute symptoms following work with pesticides. Occup Med. 2007; 57:505–11.

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Table 1

Characteristics of participants by occupational group

Characteristic	Nurses (n=599)		Office workers (n=316)		Sales/marketing personnel (n=355)		Transportation operatives (n=1020)		Total (n=2290)	
	n	%	n	%	n	%	n	%	n	%
Sex										
Male	20	3.3	181	57.3	331	93.2	1016	99.6	1548	67.6
Female	579	96.7	135	42.7	24	6.8	4	0.4	742	32.4
Age (years)										
19-29	253	42	14	4	103	29	214	21	584	26
30-39	193	32	112	35	178	50	415	41	898	39
40-49	81	14	101	32	63	18	278	27	523	23
50-64	72	12	89	28	11	3	113	11	285	12
Hours worked per week										
Up to 20	30	5	35	11	30	8	142	14	237	10
21-40	248	41	114	36	33	9	97	10	492	21
41-60	286	48	148	47	188	53	214	30	836	37
≥61	20	3	15	5	103	29	552	54	690	30
Missing	15	3	4	1	1	0.2	15	1	35	2
Occupational activities in an average working day										
Use of keyboard ≥4h	142	24	281	89	99	28	25	2	547	24
Other repeated movements of wrist/fingers ≥4h	144	24	44	14	36	10	336	33	560	24
Repeated bending and straightening of elbow for ≥1h in total	434	72	74	23	107	30	795	78	1410	62
Work with hands above shoulder height ≥1h in total	73	12	5	2	15	4	343	34	436	19
Lifting weights of ≥25kg by hand	398	66	10	3	33	9	849	83	1290	56
Kneeling or squatting ≥1h in total	289	48	7	2	43	12	534	52	873	38
Satisfied with current job										
Yes	329	55	91	28	108	31	589	58	1117	49
Mental health										

Characteristic	Nurses (n=599)		Office workers (n=316)		Sales/marketing personnel (n=355)		Transportation operatives (n=1020)		Total (n=2290)	
	n	%	n	%	n	%	n	%	n	%
Good	164	27	142	45	119	34	297	29	722	32
Intermediate	190	32	85	27	121	34	331	32	727	32
Poor	234	39	84	27	110	31	371	36	799	35
Somatising tendency (number of symptoms in past week causing at least moderate concern)										
0	170	28	141	45	146	41	516	51	973	42
1	237	40	107	34	121	34	278	28	743	32
≥2	183	31	66	21	86	24	213	21	548	24

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Table 2

Prevalence of regional pain by anatomical site

Anatomical site	Any pain in past month		Disabling pain in past month[a]		Any pain in past year		Pain for ≥1 month in past year[b]		Pain causing absence from work in past year	
	n	%	n	%	n	%	n	%	n	%
Low back	636	28	255	11	1075	47	293	13	101	4
Neck	484	21	91	4	735	32	209	9	40	2
Shoulder	382	17	107	5	549	24	193	8	25	1
Elbow	123	5	39	2	170	7	36	2	7	0.3
Wrist/hand	161	7	72	3	236	10	69	3	9	0.4
Knee	285	12	181	8	429	19	116	5	27	1

[a] For definition of disabling pain, please see text

[b] Pain for at least one month in total

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Table 3

Prevalence of regional pain by occupational group

Category of Pain	Nurses		Office Workers		Sales/Marketing personnel		Transportation operatives	
	n	%	n	%	n	%	n	%
Low back pain in past month	182	30	68	22	68	19	318	31
Neck pain in past month	184	31	85	27	63	18	152	15
Shoulder pain in past month	132	22	61	19	47	13	142	14
Elbow pain in past month	16	3	13	4	11	3	83	8
Wrist/hand pain in past month	39	7	19	6	15	4	88	9
Knee pain in past month	74	12	36	11	34	10	141	14
Pain at ≥3 sites in past month	80	13	34	11	16	5	121	12
Disabling pain at any site in past month[a]	220	37	79	25	65	18	380	37
Pain at any site causing absence from work in past year	15	3	34	11	13	4	63	6

[a]For definition of disabling pain, please see text

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Table 4

Risk factors for regional pain in past month

Risk Factor	Low Back			Neck			Shoulder			Elbow			Wrist/Hand			Knee		
	n	OR[a]	(95% CI)	n	OR[a]	(95% CI)	n	OR[a]	(95% CI)	n	OR[a]	(95% CI)	n	OR[a]	(95% CI)	n	OR[a]	(95% CI)
Any pain in past month [b]																		
Physical activity[c]	421	1.9	(1.4-2.5)	87	1.2	(0.9-1.6)	76	1.2	(0.9-1.7)	81	1.2	(0.8-2.0)	86	1.9	(1.3-2.6)	144	2.0	(1.5-2.7)
Somatising tendency[d]																		
0	348	1		240	1		98	1		71	1		90	1		160	1	
1	113	1.7	(1.3-2.3)	106	2.3	(1.8-3.1)	77	1.9	(1.4-2.6)	16	1.2	(0.7-2.1)	29	1.6	(1.0-2.5)	52	1.7	(1.2-2.4)
≥2	158	3.1	(2.4-4.0)	125	3.2	(2.4-4.2)	97	2.8	(2.1-3.8)	31	2.5	(1.6-4.1)	38	2.2	(1.4-3.3)	71	2.6	(1.9-3.6)
Job dissatisfaction	260	1.3	(1.0-1.6)	225	1.1	(0.8-1.4)	201	1.1	(0.9-1.5)	68	1.1	(0.7-1.7)	64	1.5	(1.0-2.1)	133	1.1	(0.8-1.4)
Disabling pain in past month [b]																		
Physical activity[c]	180	2.2	(1.5-3.4)	24	1.6	(0.9-2.7)	24	1.1	(0.6-1.8)	24	0.7	(0.3-1.4)	39	1.8	(1.1-3.0)	95	2.0	(1.4-2.9)
Somatising tendency[d]																		
0	128	1		37	1		39	1		20	1		32	1		90	1	
1	38	1.6	(1.0-2.4)	17	2.3	(1.2-4.2)	19	2.5	(1.4-4.5)	4	1.0	(0.3-2.9)	18	2.7	(1.4-4.9)	38	2.1	(1.4-3.2)
≥2	82	4.5	(3.2-6.4)	33	5.0	(2.9-8.4)	45	7.2	(4.4-11.8)	14	3.9	(1.8-8.2)	21	3.4	(1.8-6.3)	51	3.3	(2.2-4.9)
Job dissatisfaction	157	1.5	(1.1-2.0)	36	1.1	(0.7-1.8)	38	1.2	(0.8-2.0)	18	0.7	(0.3-1.3)	27	1.5	(0.9-2.7)	79	1.1	(0.8-1.6)

[a] For each anatomical site and pain outcome, ORs were derived from a logistic regression model that included all of the risk factors presented together with sex, age (in four strata), mental health (in three strata) and occupational group

[b] Risks are relative to no pain at site in past month

[c] Stressful occupational activity in an average working day defined as lifting weights of ≥25 kg by hand (low back); work with the hands above shoulder height for ≥1 hour (neck and shoulder); repeated bending and straightening of elbow for ≥1 hour (elbow); use of a keyboard or repeated movements of hands/fingers for ≥4 hours (wrist/hand); kneeling or squatting for ≥1 hour (knee).

[d] Number of somatic symptoms causing at least moderate concern in past week

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Table 5

Risk factors for multi-site and disabling pain in the past month

Risk Factor	Pain at ≥3 sites			Disabling pain at any site		
	n	OR[a]	(95% CI)	n	OR[a]	(95% CI)
Sex						
Male	144	1		327	1	
Female	97	1.8	(0.9-3.7)	161	0.8	(0.4-1.3)
Age (years)						
19-29	44	1		107	1	
30-39	84	1.7	(1.1-2.6)	179	1.4	(1.0-1.9)
40-49	72	4.4	(2.7-7.1)	136	2.7	(1.9-3.9)
50-64	41	4.4	(2.5-7.8)	66	2.6	(1.7-4.0)
Number of stressful occupational physical activities [b]						
0	11	1		36	1	
1	49	2.8	(1.3-5.9)	104	1.9	(1.2-3.0)
2	46	3.1	(1.5-6.6)	97	2.2	(1.3-3.5)
3	50	4.3	(2.0-9.3)	106	2.8	(1.7-4.5)
4	50	6.0	(2.7-13.2)	89	3.5	(2.1-5.9)
5	35	9.3[d]	(4.0-21.5)	56	5.0[e]	(2.8-9.0)
Somatising tendency [c]						
0	108	1		259	1	
1	55	3.4	(2.3-5.1)	90	2.2	(1.6-3.0)
≥2	78	6.2	(4.1-9.3)	139	4.5	(3.3-6.2)
Mental Health						
Good	57	1		119	1	
Intermediate	73	1.3	(0.8-1.9)	146	1.2	(0.9-1.6)
Poor	111	1.4	(0.9-2.1)	223	1.5	(1.1-2.1)
Job Satisfaction						

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Risk Factor		Pain at ≥3 sites			Disabling pain at any site	
	n	OR[a]	(95% CI)	n	OR[a]	(95% CI)
Satisfied	148	1		281	1	
Dissatisfied	93	1.3	(0.9-1.9)	207	1.2	(0.9-1.6)
Occupational group						
Nurses	77	1		140	1	
Office workers	33	1.1	(0.6-2.2)	61	0.8	(0.5-1.3)
Sales/marketing personnel	14	0.9	(0.3-2.2)	46	0.6	(0.3-1.1)
Transportation operatives	117	1.1	(0.5-2.5)	241	0.6	(0.3-1.1)

[a]Odds ratio relative to no pain at any site. ORs for each pain outcome were derived from a single regression model incorporating all of the variables.

[b]Occupational activities in an average working day (lifting weights of ≥25 Kg by hand; work with the hands above shoulder height for ≥1 hour; repeated bending and straightening of the elbow for ≥1 hour; use of a keyboard or repeated movements of hands/fingers for ≥4 hours; kneeling or squatting for ≥1 hour).

[c]Number of somatic symptoms causing at least moderate concern in past week,

[d]p for trend <0.001

[e]p for trend <0.001

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Table 6

Risk factors for sickness absence because of regional pain in past year.

Risk Factor	n	OR[a]	(95% CI)
Sex			
Male	86	1	
Female	26	0.7	(0.4-1.5)
Age (years)			
19-29	17	1	
30-39	49	1.4	(0.8-2.5)
40-49	31	1.3	(0.7-2.6)
50-64	15	1.2	(0.5-2.5)
Number of stressful occupational physical activities [b]			
0	13	1	
1	42	1.2	(0.6-2.5)
2	22	1.0	(0.5-2.1)
3	14	0.7	(0.3-1.6)
4	13	0.8	(0.3-2.0)
5	8	0.9	(0.3-2.4)
Somatising tendency [c]			
0	71	1	
1	16	1.0	(0.5-1.8)
≥2	25	1.4	(0.9-2.4)
Mental Health			
Good	35	1	
Intermediate	23	0.7	(0.4-1.2)
Poor	54	1.6	(1.0-2.7)
Job Satisfaction			
Satisfied	52	1	
Dissatisfied	60	0.9	(0.6-1.5)
Sickness absence in past year for reasons other than regional pain			
No	67	1	
Yes	45	3.7	(2.4-5.8)
Occupational group			
Nurses	13	1	
Office workers	33	2.9	(1.2-6.7)
Sales/marketing personnel	13	1.1	(0.4-3.3)
Transportation operatives	53	2.5	(1.0-6.3)

[a]Odds ratio relative to no sickness absence for regional pain in past year. ORs were derived from a single regression model incorporating all of the variables

[b] Occupational activities in an average working day (lifting weights of ≥25 Kg by hand; work with the hands above shoulder height for ≥1 hour; repeated bending and straightening of the elbow for ≥1 hour; use of a keyboard or repeated movements of hands/fingers for ≥4 hours; kneeling or squatting for ≥1 hour).

[c] Number of somatic symptoms causing at least moderate concern in past week

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