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CULTURAL DIFFERENCES IN MUSCULOSKELETAL SYMPTOMS AND DISABILITY

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Abstract

Objectives—To compare the prevalence of common musculoskeletal symptoms and associated disability in groups of workers carrying out similar physical activities in different cultural settings.

Methods—We conducted a cross-sectional survey at factories and offices in Mumbai, India, and in the UK. A questionnaire about symptoms, disability and risk factors was administered at interview to three groups of office workers who regularly used computer keyboards (165 Indian, 67 UK of Indian sub-continental origin and 172 UK white), and three groups of workers carrying out repetitive manual tasks with the hands or arms (178 Indian, 73 UK of Indian sub-continental origin and 159 UK white). Modified Cox regression was used to calculate hazard ratios (HRs) for the prevalence of symptoms and disability by occupational group, adjusted for differences in sex, age, mental health and job satisfaction.

Results—Reported occupational activities were similar in the three groups of office workers (frequent use of keyboards) and in the three groups of manual workers (frequent movements of the wrist or fingers, bending of the elbow, work with the hands above shoulder height, and work with the neck twisted). In comparison with the Indian manual workers, the prevalence of back, neck and arm pain was substantially higher in all of the other five occupational groups. The difference was greatest for arm pain lasting >30 days in the past year in UK white manual workers (HR 17.8, 95%CI 5.4-59.1) and UK manual workers of Indian sub-continental origin (HR 20.5, 95%CI 5.7-73.1). Office workers in India had lower rates of pain in the wrist and hand than office workers in the UK. Only 1% the Indian manual workers and 16% of the Indian office workers had ever heard of "RSI" or similar terms, as compared with 80% of the UK workers.

Conclusions—Our findings support the hypothesis that cultural factors such as health beliefs and expectations may have an important influence on musculoskeletal symptoms and disability. If this is correct, current controls on hazardous physical activities in the workplace may not have the benefits that would be predicted from observational epidemiology.

Keywords

Back pain; neck pain; arm pain; RSI; WRULD; beliefs; expectations

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Introduction

In western countries, painful disorders of the back, neck and upper limb are a major cause of morbidity, disability and incapacity for work. Often, they are attributed to occupational activities such as lifting, bending, use of computer keyboards, and other repetitive manual tasks. Legislation in the European Union therefore requires employers to control health risks in the workplace from manual handling and from work with computers.1,2 Psychological risk factors also have an important role. For example, in prospective longitudinal studies, low mood has been found to predict the subsequent incidence of both back3 and arm pain.4

There remain, however, important features of the descriptive epidemiology of musculoskeletal complaints that cannot adequately be explained by known risk factors. These include a more than sevenfold increase in rates of incapacity for work because of back disorders in Britain between 1953 and 19925 (despite a reducing prevalence of heavy physical work), and a major epidemic of disabling arm pain in Australia during the early 1980s6 that was not paralleled in other countries.

Such observations have prompted the theory that painful disorders of the back and arm are subject also to cultural influences, their chronicity and associated disability being importantly determined by societal beliefs and expectations about causation and prognosis. It has been proposed that they occur as a psychologically mediated response to an external trigger (such as an initiating acute injury) that is conditioned both by individual characteristics (such as low mood) and by cultural circumstances.7

If correct, this hypothesis would predict the prevalence of musculoskeletal complaints and associated disability to vary between countries according to differences in understanding of their causation and, in particular, in beliefs about the risks associated with occupational activities. To test this prediction, we compared rates of musculoskeletal symptoms and disability in workers from India and the UK, whose jobs involved similar physical demands.

Methods

The survey focused on six groups of workers defined by combinations of job content (regular use of computer keyboards in offices / repetitive manual tasks with the hands and arms) and ethnicity (Indian / UK of Indian sub-continental origin / UK white). In India, the office workers were employed at a call centre, software house and other offices, while the manual group worked on production lines in engineering and the manufacture of soap and pharmaceuticals. All of the UK workers were employed by Royal Mail, either in offices or sorting mail by hand (classed here as a manual task). The initial selection of subjects in the UK was based only on occupation, but the large majority of participants were either white or of Indian sub-continental origin, and the remainder were excluded from the analyses presented in this paper.

In each place of work, eligible subjects were identified by their manager, and approached by a trained research assistant, who explained the study and invited them to take part. Those who agreed were then interviewed using a structured questionnaire that asked about: demographic characteristics; duration of employment in current occupation; whether or not an average working day involved each of six specified activities of the upper limb and neck; job satisfaction; sickness absence in the past year; mental health; knowledge and beliefs about musculoskeletal disorders; and the occurrence, frequency and impact of pain at each of five anatomical sites (low back, neck, shoulder, elbow and wrist/hand) in the past year.

Mental health was assessed using the relevant subscale of the SF-36 questionnaire,8 and was graded to three levels defined by approximate thirds of the distribution of scores in all

subjects combined. The questions about beliefs asked how strongly the participant agreed with statements of the form, “Your work may cause you to develop low back pain”. Similar questions were posed for each anatomical site of interest, and answers were classed as positive if the subject indicated that they “completely agreed” or “tended to agree”.

Knowledge about work-related musculoskeletal disorders was explored by the question, “Have you ever heard or read about repetitive strain injury (RSI), work-related upper limb disorder (WRULD) or cumulative trauma syndrome (CTS)?” The questions on musculoskeletal symptoms were adapted from the modified Nordic questionnaire on musculoskeletal complaints.9

The questionnaire was originally drafted in English, translated into Marathi, and then independently back-translated to English. After correction of errors revealed by the back-translation, both the English and Marathi versions were piloted in samples of Indian workers different from those used in the main survey. This revealed a problem with the interpretation of one of the SF-36 questions (“During the past 7 days, have you been a nervous person?”), which was therefore omitted from the final questionnaire. In the main survey, all participants were interviewed in English apart from a subset of the Indian manual workers, who preferred to be interviewed in Marathi.

Data were analysed using STATA (version 9.2) software. For each anatomical site, we defined five outcome variables - pain lasting longer than a day at any time in the past year, pain in the past month, pain on >30 days in the past year, disabling pain in the past year, and pain leading to sickness absence in the past year. Pain was classed as disabling if it had caused difficulty with more than a specified number of activities of daily living. For example, low back pain was considered disabling if it had impaired at least three of: standing for longer than 15 minutes, cutting toe nails, getting up from the floor or a chair, getting dressed, doing normal jobs around the house, and turning over in bed. A further set of five outcome variables was derived for “arm pain”, defined as pain in any of the shoulder, elbow or wrist/hand. In addition to generating simple descriptive statistics, we compared the prevalence of outcome variables by study group after adjustment for sex, age, mental health and job satisfaction. Estimates of relative risk (effectively prevalence rate ratios) were derived by modified Cox regression,10 and summarised as hazard ratios (HRs) with associated 95% confidence intervals (CIs).

The protocol for data collection in the UK was approved by the Health and Safety Executive Research Ethics Committee. The protocol for data collection in India was approved by the chairman of the ethics committee at the PD Hinduja National Hospital and Medical Research Centre, Mumbai, who judged that it did not need to be reviewed by the full committee.

Results

In total, interviews were completed by 855 (95.4%) of the 896 workers who were selected to take part in the study, and after exclusion of 41 UK workers who were neither white nor of Indian sub-continental origin, 814 participants provided data for analysis. Table 1 gives a breakdown of the study sample according to occupational group and various other characteristics. The Indian manual workers and UK white workers (both manual and office) tended to be somewhat older than the other groups. All but one of the Indian manual workers were men, whereas at least 20% of the other groups were women. The large majority of participants had been employed in their current job for at least one year. Reported occupational activities were much as would be expected, with a high frequency of keyboard use in all three groups of office workers, and of other repeated movements of the

wrist or fingers and repeated bending and straightening of the elbow in all three groups of manual workers. The latter also indicated a higher prevalence of work with the hand(s) above shoulder height (38% to 40%), and of work with the neck twisted (42% to 46%). Most participants were satisfied with their current job, particularly those in India. The proportion of workers with at least one spell of sickness absence in the past year was higher in the UK (68% to 77%) than in India (47% and 52%). Poor mental health was most common in UK manual workers (both white (46%) and of Indian sub-continental origin (51%)), and lowest in the Indian manual workers (14%). Most participants believed that their work could cause musculoskeletal pain to develop, UK workers rather more than those in India. However, knowledge of RSI and related terms differed markedly between the groups, ranging from 1% among the manual workers in India and 16% in office workers in India to 86% in UK white manual workers and 95% in UK white office workers.

Table 2 shows the prevalence of pain at different anatomical sites by occupational group. Rates of symptoms among UK manual workers were generally similar, whether they were white or of Indian sub-continental origin. The same applied to UK office workers, except that frequent pain over the past year (>30 days in total) was reported less often by those of Indian sub-continental origin. Symptom rates among office workers in India were similar to those in the UK office workers of Indian sub-continental origin, except at the wrist/hand where they were less common. Most striking, however, were the much lower rates of symptoms at all sites among manual workers in India.

This difference is apparent in Table 3, which shows risk estimates for various measures of low back pain from regression modelling. After adjustment for the expected associations with poor mental health, and also for sex, age and job satisfaction, the one-month prevalence of low back pain in Indian manual workers was only about half of that in the other occupational groups. Disabling and frequent low back pain also occurred at less than half the frequencies observed in UK manual workers, but for these outcomes, differences from office workers were less consistent.

For neck pain (Table 4), the risks among manual workers in the UK relative to those in the India were larger than for low back pain, and highly significant statistically. Risks in office workers were also much higher (generally by more than a factor of three) than in Indian manual workers.

For arm pain (Table 5), the pattern was similar, but with even larger differentials. For example, in comparison with manual workers in India, the relative risk of arm pain in the past month was 6.8 (95% CI 3.4-13.4) in UK manual workers of Indian sub-continental origin, and 5.6 (95% CI 3.0-10.6) in UK white manual workers.

Repeat of the analyses for Tables 2 to 5 after exclusion of the minority of participants who had worked in their current job for less than one year produced similar results.

To check for possible bias as a consequence of unsatisfactory translation of the questionnaire, we compared the prevalence of musculoskeletal outcomes among the manual workers in India according to the language in which they were interviewed. Low back pain was reported rather more often by Marathi speakers (n = 146) than by English speakers (n = 32), but otherwise there were no consistent differences. For example, the prevalence of arm pain in the past year was 15% among those interviewed in Marathi and 13% among those interviewed in English.

Discussion

Our survey indicates major differences in the prevalence of musculoskeletal symptoms and associated disability between workers in India and the UK. These differences could not be explained by differences in established physical risk factors or mental health. Most striking were the substantially lower rates of arm pain among manual production line workers in India, only 1% of whom had ever heard of terms such as “RSI”. In the UK, rates of symptoms in workers of Indian sub-continental origin were generally similar to those in white workers, except that they tended to be less persistent.

A strength of our study was the high response rate from those eligible for inclusion. It is possible that a few workers were omitted from our sampling frame because they were absent from work at the time of the survey as a consequence of musculoskeletal disorders.

However, it seems implausible that selection bias could explain the large differences in symptom prevalence that were observed.

Bias could also have occurred if questions about symptoms were understood differently in India and the UK. In particular, this might apply where interviews were conducted in different languages. However, we took special care to ensure that translation of the questionnaire was as accurate and understandable as possible, with back-translation and pre-piloting. Moreover, when we compared answers from Indian workers who were interviewed in Marathi and in English, symptom rates were much the same.

Nor could the observed differences in symptom prevalence be explained by confounding effects of known risk factors such as occupational physical activities, job satisfaction and mental health. By design, exposure to physical activities was much the same among the three groups of manual workers, and similarly among the three groups of office workers. Furthermore, the relative risks that we found (five- to seven-fold for arm pain) were substantially larger than those that have been reported for work activities in most previous investigations. Job satisfaction was lower and poor mental health more common in the UK than in India, but the differences in symptom prevalence persisted when adjusted for job satisfaction and mental health (Tables 3 to 5).

The observation that in the UK, rates of symptoms and disability were generally similar in white workers and those of Indian sub-continental origin indicates that the lower frequency among workers in India is unlikely to reflect genetic differences in susceptibility.

We cannot exclude the possibility that participants in India, and especially the manual workers, had less knowledge of “RSI” and related terms simply because arm pain was relatively rare in their community. However, our findings are consistent with our prior hypothesis that societal beliefs about such illness and its causation importantly influence its occurrence. This accords with observations on “chronic whiplash injury”, another musculoskeletal disorder that varies in occurrence between countries and appears to be influenced by societal beliefs.11 As with low back pain and non-specific arm pain, there is generally no demonstrable underlying local pathology in “chronic whiplash injury”.

Evidence is also now accumulating that individual beliefs and expectations are important predictors of outcome in people suffering from back and arm pain.12,13 Moreover, in Victoria, Australia, an attempt to modify people’s beliefs about low back pain through a media campaign was associated with a reduction in incapacity for work attributed to back disorders.14

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If the hypothesised contribution of cultural factors to musculoskeletal symptoms and disability is correct, there are important practical implications. In particular, controls on hazardous physical activities in the workplace may not have the benefits that would be predicted from observational epidemiology. This is because while they reduce physical stresses on tissues, they may also reinforce beliefs that the activities controlled carry serious risks to health. There is therefore a need for research to extend our observations to a wider range of cultural settings, and to characterise in more detail the reasons for the striking differences in the prevalence of symptoms that we have observed. It will also be important to evaluate the impact of controls on hazardous occupational activities directly in experimental investigations rather than relying on potentially misleading extrapolation from risk estimates in observational studies.

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Table 1

Characteristics of participants by study group

Characteristic[a]	Manual workers			Office workers		
	India	Indian sub-continental	UK White	India	Indian sub-continental	UK White
	(n = 178)	(n = 73)	(n = 159)	(n = 165)	(n = 67)	(n = 172)
Age (years)						
<25	5 (3%)	19 (26%)	13 (8%)	70 (42%)	20 (30%)	34 (20%)
25 - 34	23 (13%)	21 (29%)	42 (26%)	75 (45%)	34 (51%)	37 (22%)
35 - 44	46 (26%)	24 (33%)	51 (32%)	19 (12%)	7 (10%)	44 (26%)
≥45	103 (58%)	9 (12%)	53 (33%)	1 (1%)	6 (9%)	57 (33%)
Sex						
Male	177 (99%)	45 (62%)	82 (52%)	118 (72%)	53 (79%)	93 (54%)
Female	1 (1%)	28 (38%)	77 (48%)	47 (28%)	14 (21%)	79 (46%)
Age finished full-time education (years)						
≤16	122 (69%)	19 (26%)	117 (74%)	0 (0%)	8 (12%)	88 (51%)
17 - 19	48 (27%)	26 (36%)	34 (21%)	2 (1%)	21 (31%)	49 (28%)
>19	7 (4%)	28 (39%)	8 (5%)	163 (99%)	38 (57%)	35 (20%)
Duration in current job (years)						
<1	5 (3%)	11 (15%)	17 (11%)	52 (32%)	19 (28%)	16 (9%)
≥1	173 (97%)	62 (85%)	142 (89%)	99 (60%)	48 (72%)	156 (91%)
Occupational activities in an average working day						
Use of keyboard ≥1 hour	6 (3%)	11 (15%)	12 (8%)	165 (100%)	67 (100%)	169 (98%)
Use of keyboard ≥4 hours	3 (2%)	0 (0%)	4 (3%)	163 (99%)	44 (66%)	137 (80%)
Other repeated movements of wrist/fingers ≥4 hours	171 (96%)	69 (95%)	147 (92%)	23 (14%)	0 (0%)	4 (2%)
Repeated bending and straightening of elbow for >1 hour in total	163 (92%)	68 (93%)	140 (88%)	88 (53%)	40 (60%)	81 (47%)
Work with hand above shoulder height >1 hour in total	68 (38%)	27 (40%)	60 (38%)	8 (5%)	1 (2%)	2 (1%)
Work with neck twisted >30 minutes in total	82 (46%)	31 (42%)	67 (42%)	40 (24%)	11 (16%)	19 (11%)
Satisfied with current job						
Yes	169 (95%)	62 (85%)	135 (85%)	161 (98%)	60 (90%)	151 (88%)
Spells of sickness absence in past year						

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Characteristic[a]	Manual workers			Office workers		
	India	Indian sub-continental	UK White	India	Indian sub-continental	UK White
	(n = 178)	(n = 73)	(n = 159)	(n = 165)	(n = 67)	(n = 172)
0	95 (53%)	23 (32%)	35 (22%)	78 (47%)	20 (30%)	53 (31%)
1+	83 (47%)	50 (68%)	123 (77%)	86 (52%)	47 (70%)	118 (69%)
Mental health (SF-36)						
Good	85 (48%)	18 (25%)	28 (18%)	50 (30%)	15 (22%)	48 (28%)
Intermediate	68 (38%)	18 (25%)	58 (36%)	56 (34%)	27 (40%)	57 (33%)
Poor	25 (14%)	37 (51%)	73 (46%)	59 (36%)	25 (37%)	67 (39%)
Knowledge and beliefs						
Your work may cause you to develop low back pain[b]	106 (60%)	59 (81%)	112 (70%)	89 (54%)	44 (66%)	91 (53%)
Your work may cause you to develop neck pain[b]	108 (61%)	51 (70%)	117 (74%)	93 (56%)	48 (72%)	95 (55%)
Your work may cause you to develop arm pain[b,c]	125 (70%)	62 (85%)	137 (86%)	110 (67%)	53 (79%)	136 (79%)
Heard of RSI, WRULD or CTS	1 (1%)	46 (63%)	137 (86%)	26 (16%)	32 (48%)	164 (95%)

[a] Data were missing on duration in current job (14 subjects), sickness absence in past year (two subjects), mental health (two subjects), age (one subject) and age finished full-time education (one subject).

[b] Completely agree or tend to agree with statement.

[c] Agreement for at least one of pain in shoulder, elbow or wrist/hand.

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Table 2

Prevalence of pain and associated disability by study group

Symptom	Manual workers						Office workers					
	India		Indian sub-continental		UK White		India		Indian sub-continental		UK White	
	(n = 178)		(n = 73)		(n = 159)		(n = 165)		(n = 67)		(n = 172)	
Low back pain												
Past month	26	(15%)	24	(33%)	59	(37%)	41	(25%)	16	(24%)	48	(28%)
Past year	50	(28%)	38	(52%)	83	(52%)	52	(32%)	28	(32%)	79	(46%)
>30 days in past year	18	(10%)	12	(16%)	37	(23%)	5	(3%)	3	(4%)	26	(15%)
Disabling in past year	20	(11%)	20	(27%)	47	(30%)	11	(7%)	10	(15%)	37	(22%)
Leading to sickness absence in past year	13	(7%)	12	(16%)	24	(15%)	10	(6%)	8	(12%)	23	(13%)
Neck pain												
Past month	12	(7%)	21	(29%)	37	(23%)	46	(28%)	13	(19%)	44	(26%)
Past year	22	(12%)	27	(37%)	56	(35%)	55	(33%)	23	(34%)	66	(38%)
>30 days in past year	6	(3%)	9	(12%)	20	(13%)	3	(2%)	4	(6%)	16	(9%)
Disabling in past year	6	(3%)	9	(12%)	19	(12%)	11	(7%)	7	(10%)	15	(9%)
Leading to sickness absence in past year	6	(3%)	3	(4%)	11	(7%)	5	(3%)	2	(3%)	9	(5%)
Shoulder pain												
Past month	6	(4%)	29	(40%)	38	(24%)	27	(16%)	7	(10%)	34	(20%)
Past year	13	(7%)	34	(47%)	60	(38%)	36	(22%)	14	(21%)	54	(31%)
>30 days in past year	0	(0%)	13	(18%)	21	(13%)	4	(2%)	3	(4%)	22	(13%)
Disabling in past year	6	(3%)	18	(25%)	22	(14%)	4	(2%)	5	(7%)	13	(8%)
Leading to sickness absence in past year	5	(3%)	4	(5%)	13	(8%)	2	(1%)	2	(3%)	9	(5%)
Elbow pain												
Past month	1	(1%)	6	(8%)	15	(9%)	4	(2%)	3	(4%)	18	(10%)
Past year	5	(3%)	14	(19%)	27	(17%)	10	(6%)	5	(7%)	26	(15%)
>30 days in past year	2	(1%)	2	(3%)	9	(6%)	0	(0%)	0	(0%)	13	(8%)

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Symptom	Manual workers						Office workers					
	India		Indian sub-continental		UK White		India		Indian sub-continental		UK White	
	(n = 178)		(n = 73)		(n = 159)		(n = 165)		(n = 67)		(n = 172)	
Disabling in past year	0	(0%)	7	(10%)	10	(6%)	2	(1%)	3	(4%)	4	(2%)
Leading to sickness absence in past year	0	(0%)	3	(4%)	3	(2%)	0	(0%)	0	(0%)	3	(2%)
Wrist/hand pain												
Past month	5	(3%)	19	(26%)	36	(23%)	30	(18%)	19	(28%)	51	(30%)
Past year	11	(6%)	25	(34%)	49	(31%)	36	(22%)	32	(48%)	76	(44%)
>30 days in past year	1	(1%)	6	(8%)	20	(13%)	1	(1%)	2	(3%)	31	(18%)
Disabling in past year	3	(2%)	16	(22%)	21	(13%)	7	(4%)	10	(15%)	25	(15%)
Leading to sickness absence in past year	11	(6%)	25	(34%)	49	(31%)	36	(22%)	32	(48%)	76	(44%)
Arm pain[a]												
Past month	12	(7%)	37	(51%)	71	(45%)	50	(30%)	24	(36%)	69	(40%)
Past year	26	(15%)	47	(64%)	96	(60%)	59	(36%)	38	(57%)	101	(59%)
>30 days in past year[b]	3	(2%)	16	(22%)	40	(25%)	5	(3%)	5	(7%)	46	(27%)
Disabling in past year[c]	9	(5%)	26	(36%)	44	(28%)	11	(7%)	13	(19%)	32	(19%)
Leading to sickness absence in past year	15	(8%)	29	(38%)	58	(36%)	38	(23%)	33	(49%)	81	(47%)

[a] Arm pain was defined as pain in any of shoulder, elbow or wrist/hand.

[b] Pain for >30 days in at least one of shoulder, elbow or wrist/hand.

[c] Disabling pain in at least one of shoulder, elbow or wrist/hand.

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Table 3

Associations with prevalent low back pain

Risk factor	No low back pain (N=484)	Low back pain in past month (N=214)		Low back pain >30 days in past year (N=101)		Disabling low back pain in past year (N=145)	
	N	N	HR (95% CI)[a]	N	HR (95% CI)[a]	N	HR (95% CI)[a]
Sex							
Male	361	133	1.0	59	1.0	86	1.0
Female	123	81	1.2 (0.9 - 1.5)	42	1.4 (0.9 - 2.1)	59	1.2 (0.9 - 1.8)
Age (years)							
<25	104	36	1.0	8	1.0	20	1.0
25 - 34	138	65	1.3 (0.8 - 1.9)	24	1.6 (0.7 - 3.7)	33	1.1 (0.6 - 2.0)
35 - 44	114	50	1.2 (0.8 - 1.9)	24	1.4 (0.6 - 3.3)	43	1.3 (0.7 - 2.3)
≥45	128	62	1.5 (1.0 - 2.4)	44	2.5 (1.1 - 5.7)	48	1.6 (0.9 - 2.8)
Mental health (SF-36)							
Good	177	46	1.0	18	1.0	28	1.0
Intermediate	166	68	1.3 (0.9 - 1.9)	36	1.8 (1.0 - 3.2)	46	1.5 (0.9 - 2.4)
Poor	141	100	1.7 (1.2 - 2.4)	47	1.8 (1.0 - 3.3)	71	1.8 (1.2 - 3.0)
Satisfied with current job							
No	36	23	1.0	21	1.0	22	1.0
Yes	448	190	1.0 (0.6 - 1.5)	80	0.6 (0.3 - 0.9)	122	0.8 (0.5 - 1.2)
Study group							
Manual India	128	26	1.0	18	1.0	20	1.0
Manual Indian sub-continental	35	24	2.3 (1.3 - 4.3)	12	2.1 (0.9 - 4.8)	20	2.4 (1.2 - 4.8)
Manual UK White	76	59	2.2 (1.3 - 3.6)	37	2.1 (1.1 - 3.9)	47	2.3 (1.3 - 4.1)
Office India	113	41	1.7 (1.0 - 3.0)	5	0.5 (0.2 - 1.4)	11	0.7 (0.3 - 1.7)
Office Indian sub-continental	39	16	1.8 (0.9 - 3.4)	3	0.7 (0.2 - 2.4)	10	1.6 (0.7 - 3.6)
Office UK White	93	48	1.9 (1.1 - 3.2)	26	1.6 (0.8 - 3.1)	37	1.8 (1.0 - 3.4)

[a]For each symptom outcome, all risk estimates were derived from a single regression model with mutual adjustment, and were relative to subjects with no low back pain.

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Table 4

Associations with prevalent neck pain

Risk factor	No neck pain (N=565)	Neck pain in past month (N=173)		Neck pain >30 days in past year (N=58)		Disabling neck pain in past year (N=67)	
	N	N	HR (95% CI)[a]	N	HR (95% CI)[a]	N	HR (95% CI)[a]
Sex							
Male	418	106	1.0	35	1.0	47	1.0
Female	147	67	1.1 (0.8 - 1.5)	23	1.1 (0.6 - 2.0)	20	0.7 (0.4 - 1.3)
Age (years)							
<25	113	32	1.0	6	1.0	13	1.0
25 - 34	164	53	1.3 (0.8 - 2.0)	11	1.4 (0.5 - 4.1)	17	0.9 (0.4 - 1.9)
35 - 44	121	54	1.8 (1.1 - 2.9)	20	2.8 (1.0 - 7.9)	23	1.6 (0.8 - 3.3)
≥45	166	34	1.4 (0.8 - 2.4)	21	3.0 (1.1 - 8.4)	14	1.1 (0.5 - 2.5)
Mental health (SF-36)							
Good	199	33	1.0	14	1.0	7	1.0
Intermediate	200	51	1.3 (0.8 - 2.1)	17	1.1 (0.5 - 2.3)	30	3.3 (1.4 - 7.6)
Poor	166	89	1.9 (1.2 - 2.9)	27	1.6 (0.8 - 3.2)	30	3.4 (1.5 - 7.9)
Satisfied with current job							
No	44	24	1.0	7	1.0	9	1.0
Yes	521	148	0.8 (0.5 - 1.2)	50	0.9 (0.4 - 2.0)	58	0.8 (0.4 - 1.6)
Study group							
Manual India	156	12	1.0	6	1.0	6	1.0
Manual Indian sub-continental	46	21	3.4 (1.6 - 7.3)	9	4.5 (1.5 - 13.6)	9	3.9 (1.3 - 11.7)
Manual UK White	103	37	2.8 (1.4 - 5.6)	20	4.0 (1.5 - 10.7)	19	3.5 (1.3 - 9.2)
Office India	110	46	4.2 (2.1 - 8.6)	3	1.3 (0.3 - 5.6)	11	2.6 (0.9 - 7.9)
Office Indian sub-continental	44	13	3.0 (1.3 - 6.9)	4	3.2 (0.8 - 11.8)	7	3.5 (1.1 - 11.2)
Office UK White	106	44	3.5 (1.8 - 6.8)	16	3.7 (1.4 - 9.9)	15	3.1 (1.2 - 8.5)

[a]For each symptom outcome, all risk estimates were derived from a single regression model with mutual adjustment, and were relative to subjects with no neck pain.

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Table 5

Associations with prevalent arm pain

Risk factor	No arm pain (N=447)	Arm pain in past month (N=263)		Arm pain >30 days in past year (N=115)		Disabling arm pain in past year (N=135)	
	N	N	HR (95% CI)[a]	N	HR (95% CI)[a]	N	HR (95% CI)[a]
Sex							
Male	354	152	1.0	62	1.0	79	1.0
Female	93	111	1.2 (0.9 - 1.6)	53	1.2 (0.8 - 1.7)	56	1.2 (0.8 - 1.7)
Age (years)							
<25	94	51	1.0	16	1.0	18	1.0
25 - 34	123	79	1.2 (0.8 - 1.7)	26	1.2 (0.6 - 2.3)	36	1.4 (0.8 - 2.4)
35 - 44	99	70	1.3 (0.9 - 1.8)	31	1.3 (0.7 - 2.4)	39	1.6 (0.9 - 2.9)
≥45	130	63	1.4 (0.9 - 2.1)	42	1.9 (1.1 - 3.6)	42	2.1 (1.2 - 3.8)
Mental health (SF-36)							
Good	171	47	1.0	26	1.0	23	1.0
Intermediate	165	82	1.4 (0.9 - 2.0)	33	1.1 (0.7 - 1.8)	36	1.3 (0.8 - 2.3)
Poor	111	134	1.8 (1.3 - 2.6)	56	1.4 (0.9 - 2.3)	76	2.2 (1.4 - 3.6)
Satisfied with current job							
No	26	34	1.0	22	1.0	22	1.0
Yes	421	228	0.8 (0.6 - 1.2)	93	0.6 (0.4 - 0.9)	113	0.7 (0.5 - 1.2)
Study group							
Manual India	152	12	1.0	3	1.0	9	1.0
Manual Indian sub-continental	26	37	6.8 (3.4 - 13.4)	16	20.5 (5.7 - 73.1)	26	8.4 (3.7 - 18.9)
Manual UK White	63	71	5.6 (3.0 - 10.6)	40	17.8 (5.4 - 59.1)	44	5.8 (2.7 - 12.3)
Office India	106	50	4.3 (2.2 - 8.5)	5	3.1 (0.7 - 13.6)	11	2.1 (0.8 - 5.5)
Office Indian sub-continental	29	24	6.0 (2.9 - 12.3)	5	9.2 (2.1 - 39.6)	13	6.1 (2.5 - 15.0)
Office UK White	71	69	5.6 (2.9 - 10.5)	46	18.7 (5.6 - 61.7)	32	4.7 (2.2 - 10.2)

[a]For each symptom outcome, all risk estimates were derived from a single regression model with mutual adjustment, and were relative to subjects with no arm pain