ORIGINAL ARTICLE

Health-related job loss: findings from a community-based survey

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Aims: To explore the frequency, nature, determinants and outcome of health-related job loss (HRJL) in men sampled from the general population of three rural areas.

Methods: Data on lifetime occupational history, including any HRJL, were obtained as part of a postal survey of men aged 24–70 years in three rural areas of England and Wales. Incidence rates were calculated for first health-related loss of a job that had been held for ⩾1 year. Associations with risk factors were examined by Poisson regression, and by application of conditional logistic regression in a nested case–control study.

Results: HRJL was reported by 1408 (13%) of the 10 559 men who had held long-term jobs. The incidence rose steeply with age for cardiorespiratory and neurological disorders, but for accidents and poisoning the trend was, if anything, in the reverse direction. An increase in incidence over time was most marked for musculoskeletal disorders and mental illness, and much less prominent for cardiorespiratory and neurological disease. In comparison with other occupations, the risk was lower in agricultural workers (odds ratio (OR) 0.6, 95% CI 0.5 to 0.8), and higher in policemen (OR 2.4, 95% CI 1.6 to 3.7) and teachers (OR 2.0, 95% CI 1.5 to 2.7), this differential being even greater for HRJL caused by mental illness. Risk was also increased in employees relative to the self-employed (OR 2.0, 95% CI 1.7 to 2.3). Shift work was associated with a higher incidence of job loss caused by mental illness (OR 1.5, 95%CI 1.1–2.2), and heavy lifting with HRJL caused by musculoskeletal disorders (OR 2.6, 95% CI 2.0 to 3.5). After HRJL, 61% of subjects had subsequently obtained further long-term employment, usually within 1 year.

Conclusions: In the population studied, HRJL has become increasingly common, especially in relation to musculoskeletal disorders and mental illness. In addition to being associated with ergonomic stresses in the workplace, it may be importantly influenced by cultural and economic factors. Future research should focus on the minority of workers who leave a job for health reasons and do not rapidly return to further work.

Like many other European countries, the UK currently faces an economic challenge in providing for a growing elderly population at a time when young people are entering the workforce later and many older workers are leaving employment before the normal retirement age.[1] Thus, in its recently launched 5-year strategy for social security, the British government identified a national employment rate of 80% as its aspiration.[2] Achieving this goal will require the minimisation of unemployment not only among those traditionally deemed eligible to work but also among people with disabilities who previously have been regarded as outside the labour market. To avoid wasting valuable skills and experience, there will be an imperative to reduce unnecessary health-related job loss (HRJL) and to promote the redeployment of people who have left jobs for reasons of ill-health.

One particular concern has been the high rate of early retirement because of ill-health among public-sector employees,[3] which is likely to be driven, at least partly, by relatively generous financial provisions in their pension schemes. There have been calls to apply stricter and more uniform criteria in determining eligibility for ill-health retirement in these groups,[3 4] At the same time, however, there is a need for balance, and an approach that is too stringent could cause unjustified hardship.

To investigate the frequency, nature, determinants and outcome of HRJL, we analysed data from a survey of men living in three rural areas of England and Wales. In particular, we explored differences between agricultural workers, many of whom were self-employed or worked in small businesses, and two major groups of public sector employees: policemen and teachers.

METHODS

The study population comprised male residents of three rural areas of England and Wales who were born between 1933 and 1977. The three areas (in north Devon, the Welsh borders and south Lincolnshire) were chosen to include a high proportion of men working in agriculture at the time of the 1991 national census. Each member of the study population (n = 34 486) was sent via local health agencies a postal questionnaire about various aspects of work and health, followed if necessary by a reminder after 10–16 weeks. To preserve participants' privacy, the research team was not told their names or addresses, and the questionnaires were identified only by a serial number. The local health agencies did, however, pass on the year of birth of each man mailed, which allowed calculation of response rates by birth cohort.

Among other things, the questionnaire asked for a lifetime history of all jobs held for ⩾1 year, including the ages of starting and finishing, the nature of the job, and whether an average working day entailed various specified activities. It also asked ''Have you ever left, or given up a job (including jobs held for less than a year) because of a health problem?''. Participants who answered to this question affirmatively were then asked to give the age(s) at which this had occurred, the job(s) left and the nature of the health problem(s). Health problems were reported as free text, and were coded to 12 categories.

Statistical analysis

Statistical analysis was carried out with STATA (v. 8.2 SE) software, and was mostly restricted to long-term jobs (ie,

Abbreviations: HRJL, health-related job loss; IRR, incidence rate ratio

Table 1 Reasons for health-related job loss by occupation

Reasons for job loss	Farming/forestry n	%*	Teachers n	%*	Police officers n	%*	Other occupations n	%*	All occupations n	%*
Musculoskeletal disorders	106	45	13	15	17	37	403	32	539	33
Mental health problems	29	12	52	58	17	37	310	24	410	25
Cardiovascular disease/stroke	17	7	19	21	5	11	211	17	252	15
Accidents/poisoning	30	13	0	0	10	22	155	12	195	12
Neurological disorders	19	8	4	4	1	2	95	7	119	7
Respiratory disorders	24	10	1	1	0	0	67	5	93	6
Gastrointestinal disorders	10	4	6	7	1	2	49	4	66	4
Neoplasms	11	5	4	4	3	7	38	3	56	3
Infections	4	2	1	1	2	4	27	2	35	2
Diabetes	3	1	3	3	0	0	21	2	27	2
Skin disorders	1	0	0	0	0	0	22	2	23	1
Other	16	7	6	7	1	2	81	6	104	6
All reasons†	233	100	89	100	46	100	1270	100	1641	100

Analysis was performed on the basis of 1502 men who reported leaving at least one job during their working lifetime because of a health problem.
*Percentages sum to >100 because some jobs were left for multiple health reasons.
†Details for three occupations are excluded because information was missing or ambiguous.

those that had been held for at least 1 year). A person-year calculation was used to derive the incidence of first leaving a long-term job for health reasons, according to age and calendar period, and risks were compared by Poisson regression analysis, the results being summarised by incidence rate ratios (IRRs) with associated 95% confidence intervals (CIs).

For each case of first health-related departure from a long-term job, we selected four controls who were in a long-term job at the age when the participant left his job, and who were matched to the participant for year of birth (to within 1 year) and area of residence. Controls were sampled without replacement from the pool of non-cases (ie, men who never became cases at any stage during follow-up), according to a predefined algorithm. Thus, each case and control appeared only once in the final analysis. Conditional logistic regression was used to assess the association (summarised by odds ratios (ORs)) of health-related job loss with various potential risk factors including type of work, employment status and occupational activities. For controls, these variables were defined in relation to the age at which the matched participant had lost his job.

Finally, we reviewed the occupational histories of the cases to establish how many subsequently returned to long-term employment, and applied modified Cox regression analysis[5] to assess the influence of various risk factors on the probability of further long-term employment by the time of the survey. The results of this analysis were summarised as prevalence ratios (PRs).

RESULTS

Questionnaires were returned by 10 765 (31%) of the men mailed, with higher response rates (up to 43%) in the earliest birth cohorts. The ages of those who responded ranged from 24 to 70 years, with a mean of 52 years and a median of 53 years.

A total of 1502 men reported that they had left at least 1 job during their working lifetime because of a health problem, including 104 who had left 2 jobs, 13 who had left 3 jobs, and 3 who had left 4 jobs, all for health reasons. Of the 1641 occurrences of HRJL, 233 were from agricultural occupations, 89 from teaching and 46 from the police force. Table 1 shows a breakdown of the reasons for HRJL by occupation. Overall, the most common underlying health problems were musculoskeletal disorders and mental illness (which included mental illness attributed to stress), but proportionately, the former were much more common as a reason for leaving agricultural jobs (45% v 12%), whereas the reverse applied for teachers (15% *v* 58%).

Usable information about long-term jobs was provided by 10 559 men, including 3879 who had worked long-term in agricultural jobs, 600 as teachers and 243 within the police force. Within this cohort, 1408 (13%) men had left at least one long-term job for health reasons. Table 2 shows the incidence of first health-related loss of a long-term job by age and calendar period. The incidence increased with age, particularly above 50 years, and was higher after 1985 in all birth cohorts.

Table 3 shows the risk of HRJL by age and calendar period separately for different categories of health problem. The increase in risk with age was most marked for cardiorespiratory and neurological disorders, whereas for accidents and poisoning, the trend was, if anything, in the opposite direction. The rise in health-related job loss over time was steepest for musculoskeletal disorders and mental health

Table 2 Incidence (per 1000 person-years) of first health-related loss of a long-term job by age and calendar period

Age (years)	Calendar period 1949–59	1960–4	1965–9	1970–4	1975–9	1980–4	1985–9	1990–4	1995–9	2000–4
16–24	1.1	1.9	1.3	1.7	1.3	1.4	2.2	4.6	4.5	4.5
25–29	4.0	1.2	0.7	1.5	1.2	1.5	2.1	5.2	6.5	3.7
30–34		0.0	0.2	1.5	2.0	1.5	2.2	4.2	4.2	8.2
35–39			0.0	1.2	1.1	1.1	2.2	3.4	5.4	7.3
40–44				1.9	1.8	2.0	2.4	5.5	6.8	8.8
45–49					2.0	2.7	4.5	7.1	7.5	9.2
50–54						2.0	7.3	11.0	12.6	13.3
55–59							13.2	15.8	14.4	17.0
60–64								17.2	16.9	23.9

Analysis was based on the 10 559 men who provided usable information about long-term jobs.

Table 3 Risk of first health-related loss of a long-term job by age, calendar period and reason

	Musculoskeletal disorders (n = 468) IRR* (95% CI)	Mental health problems (n = 358) IRR* (95% CI)	Cardiorespiratory disorders† (n = 293) IRR* (95% CI)	Neurological disorders (n = 99) IRR* (95% CI)	Accidents/ poisoning (n = 163) IRR* (95% CI)	Other (n = 253) IRR* (95% CI)
Age (years)						
16–24	1.0	1.0	1.0	1.0	1.0	1.0
25–29	1.2 (0.7 to 2.0)	0.8 (0.4 to 1.6)	0.8 (0.4 to 1.6)	2.3 (0.6 to 8.4)	0.8 (0.5 to 1.5)	0.9 (0.5 to 1.6)
30–34	1.1 (0.6 to 1.8)	1.5 (0.8 to 2.6)	0.4 (0.1 to 0.9)	2.2 (0.6 to 8.3)	0.8 (0.4 to 1.5)	0.5 (0.2 to 1.0)
35–39	0.8 (0.5 to 1.4)	1.3 (0.7 to 2.3)	0.8 (0.4 to 1.7)	2.5 (0.6 to 9.5)	0.6 (0.3 to 1.2)	0.8 (0.4 to 1.5)
40–44	1.2 (0.7 to 1.9)	1.7 (0.9 to 3.0)	1.4 (0.7 to 2.8)	4.2 (1.1 to 15.4)	0.7 (0.4 to 1.4)	1.4 (0.8 to 2.6)
45–49	1.6 (1.0 to –2.5)	2.1 (1.2 to 3.6)	2.4 (1.2 to 4.8)	5.7 (1.5 to 20.8)	0.8 (0.4 to 1.5)	1.2 (0.7 to 2.3)
50–54	2.3 (1.4 to 3.6)	3.0 (1.7 to 5.2)	5.9 (3.1 to 11.2)	7.1 (1.9 to 26.2)	0.9 (0.5 to 1.8)	2.3 (1.3 to 4.2)
55–59	2.7 (1.6 to 4.3)	2.8 (1.6 to 5.1)	10.4 (5.4 to 20.1)	10.8 (2.9 to 40.0)	0.8 (0.4 to 1.8)	2.5 (1.3 to 4.7)
60–64	3.5 (2.1 to 5.9)	1.7 (0.8 to 3.5)	16.1 (8.0 to 32.3)	8.0 (1.8 to 35.2)	0.4 (0.1 to 1.5)	5.3 (2.8 to 10.2)
Calendar period						
1949–59	0.0 (0.0 to 0.2)	0.0 (0.0 to 0.3)	0.8 (0.3 to 2.3)	0.9 (0.1 to 5.9)	0.1 (0.0 to 0.6)	0.4 (0.2 to 1.1)
1960–64	0.1 (0.0 to 0.3)	0.1 (0.0 to 0.4)	0.6 (0.2 to 1.8)	0.3 (0.0 to 2.2)	0.4 (0.2 to 1.1)	0.5 (0.2 to 1.2)
1965–69	0.1 (0.0 to 0.2)	0.0 (0.0 to 0.2)	0.4 (0.1 to 1.2)	0.3 (0.1 to 1.5)	0.2 (0.1 to 0.6)	0.3 (0.1 to 0.7)
1970–74	0.1 (0.0 to 0.2)	0.2 (0.1 to 0.4)	0.7 (0.3 to 1.6)	0.3 (0.1 to 1.2)	0.3 (0.1 to 0.7)	0.5 (0.2 to 0.9)
1975–79	0.2 (0.1 to 0.3)	0.2 (0.1 to 0.3)	0.6 (0.3 to 1.4)	0.5 (0.2 to 1.3)	0.4 (0.2 to 0.9)	0.2 (0.1 to 0.4)
1980–84	0.2 (0.2 to 0.4)	0.1 (0.1 to 0.3)	0.7 (0.4 to 1.3)	0.2 (0.1 to 0.6)	0.3 (0.1 to 0.6)	0.2 (0.1 to 0.5)
1985–89	0.4 (0.2 to 0.5)	0.3 (0.2 to 0.4)	0.8 (0.5 to 1.3)	0.4 (0.2 to 0.9)	0.5 (0.3 to 1.0)	0.6 (0.3 to 0.9)
1990–94	0.7 (0.5 to 1.0)	0.7 (0.5 to 0.9)	0.9 (0.6 to 1.4)	0.8 (0.4 to 1.4)	1.0 (0.6 to 1.8)	0.9 (0.6 to 1.3)
1995–99	0.8 (0.6 to 1.1)	0.8 (0.6 to 1.0)	1.0 (0.7 to 1.3)	0.7 (0.4 to 1.2)	1.1 (0.6 to 1.9)	0.8 (0.5 to 1.1)
2000–04	1.0	1.0	1.0	1.0	1.0	1.0

IRR; incidence rate ratio.
Analysis was based on the 10 559 men who provided usable information about long-term jobs
*IRRs were mutually adjusted and adjusted also for area of residence. Statistical models assumed that the effects of age, calendar period and area of residence were multiplicative.
†Cardiovascular disease, stroke and respiratory disorders.

problems, and much less prominent for cardiorespiratory and neurological diseases.

In the case–control analysis, each of the 1408 cases was successfully matched with four controls. Table 4 summarises the associations between health-related loss of a long-term job and various potential risk factors, overall, and separately for job loss because of musculoskeletal disorders and mental health problems. In comparison with other occupations, HRJL was markedly less frequent in agricultural workers (OR 0.6, 95% CI 0.5 to 0.8), and markedly more common in policemen (OR 2.4, 95% CI 1.6 to 3.7) and teachers (OR 2.0, 95% CI 1.5 to 2.7), this differential being even greater for loss of a job because of mental health problems. The risk of HRJL was also higher in employees than in self-employed workers (OR 2.0, 95% CI 1.7 to 2.3), and tended to be somewhat greater in workers who had held their job for <15 years. After adjustment for these other risk factors, risk was significantly increased in jobs that entailed shift work (especially job loss because of mental health problems) and demanding physical activities. In particular, the risk of leaving a long-term job because of a musculoskeletal disorder was increased by a factor of 2.6 (95% CI 2.0 to 3.5) if the work entailed regularly lifting weights of at least 25 kg by hand.

Of the 1408 men who left a long-term job for health reasons, 862 (61%) subsequently obtained further long-term employment, most (>88%) within 1 year. The probability of further long-term employment was markedly higher for younger age at initial job loss and for earlier calendar period of initial job loss (table 5). However, after adjustment for these risk factors, there was little difference according to the type of job left or the nature of the underlying health problem.

DISCUSSION

In the population that we studied, HRJL was common, particularly at older ages. Moreover, the incidence of job loss because of musculoskeletal disorders and mental health problems had increased disproportionately over time. As might be expected, the risk of HRJL varied according to the ergonomic stresses that jobs imposed, but after allowance for this, rates differed substantially by occupation, and according to whether participants were employees or self-employed. Most men who left a long-term job for health reasons were successful in obtaining further employment, usually within 1 year.

Our survey was restricted to three rural areas of England and Wales, and although these areas were geographically dispersed, they may not be representative of Britain more widely, or even of all rural locations. The study was also limited to men. This was to maximise statistical efficiency in relation to its main questions, which were related to hazards of work in agriculture (census data indicated that a much higher proportion of men than women would have worked in agriculture). Thus, the findings cannot necessarily be extrapolated to female workers.

In addition, the study had two other potentially important limitations. Firstly, although the sample size was large, the response to the questionnaire was relatively low. Ideally, we would have mailed participants directly rather than through health agencies, and we would have included a covering letter of support from the participant's general practitioner, a method that has previously produced higher response rates.[6–8] However, we were prevented from doing so by the ethics committee that reviewed our protocol, who took the view that names and addresses should not be released to the study team without prior permission from participants. Nevertheless, we think it unlikely that the incomplete response will have caused serious bias. Some participants may have been more inclined to take part if they had previously had a health problem that impinged on their capacity to work, but the survey was broad in its scope, and HRJL was only one of many issues that it considered. Furthermore, even if rates of health-related job loss were inflated by response bias, there is no obvious reason why responders should have been atypical with regard to associations between job loss and risk factors such as occupational activity and employment status.

Secondly, inaccuracies may have arisen from errors of recall, particularly where subjects were asked to remember events many years in the past. In general, this would be expected to

Table 4 Risk factors for health-related job loss by type of health problem

Risk factor	All health problems (% exposed)			Musculoskeletal disorders (% exposed)			Mental health (% exposed)		
	Cases	Controls	OR* (95% CI)	Cases	Controls	OR* (95% CI)	Cases	Controls	OR* (95% CI)
Type of work									
Agriculture	14	25	0.6 (0.5 to 0.8)	20	24	0.8 (0.6 to 1.1)	7	26	0.4 (0.2–0.7)
Police	3	1	2.4 (1.6 to 3.7)	3	2	2.5 (1.2 to 5.1)	4	1	2.1 (1.0–4.6)
Teaching	6	4	2.0 (1.5 to 2.7)	3	3	1.4 (0.7 to 2.7)	14	4	2.6 (1.7–4.0)
Other	77	70	1.0	75	71	1.0	75	68	1.0
Employment status									
Employed	76	62	2.0 (1.7 to 2.3)	73	61	2.1 (1.6 to 2.8)	86	62	2.4 (1.7–3.5)
Self-employed	24	38	1.0	27	39	1.0	14	38	1.0
Duration in job (years)									
1–5	27	26	1.2 (1.0 to 1.5)	24	25	1.1 (0.7 to 1.5)	26	24	1.0 (0.7 to 1.6)
6–15	32	29	1.3 (1.1 to 1.6)	30	31	1.0 (0.7 to 1.4)	31	28	1.0 (0.7 to 1.5)
16–25	18	20	1.0 (0.8 to 1.2)	20	20	0.9 (0.6 to 1.2)	20	22	0.8 (0.5 to 1.2)
>25	23	25	1.0	26	25	1.0	23	25	1.0
Activities in job†									
Shift work	22	12	1.4 (1.2 to 1.7)	23	13	1.3 (1.0 to 1.8)	22	13	1.5 (1.1 to 2.2)
Lifting/moving weights of at least 25 kg by hand	56	49	1.7 (1.4 to 2.0)	71	50	2.6 (2.0 to 3.5)	34	48	0.9 (0.6 to 1.2)
Kneeling or squatting for >1 h	30	21	1.4 (1.1 to 1.6)	40	21	1.7 (1.3 to 2.3)	17	19	1.1 (0.7 to 1.7)
Work with hands above shoulder height for > 1 h	20	13	1.3 (1.1 to 1.6)	28	13	1.3 (0.9 to 1.7)	12	13	1.4 (0.9 to 2.3)

Analysis was based on 1408 cases and 5632 controls.
*For each category of health problem, all risk estimates were derived from a single logistic regression model, and thus are mutually adjusted.
†Activities in an average working day. Risk estimates are for those reporting an activity relative to those who did not report it.

cause under-ascertainment of HRJL rather than spuriously to inflate incidence rates, and incomplete recall may have contributed to the apparent rise in incidence over time (table 2). However, it seems less likely that errors of recall would differ importantly according to the type of health problem that precipitated job loss, and we have no reason to expect that recall bias would account for the differential time trends in job loss for musculoskeletal disorders and mental health problems compared with cardiorespiratory and neurological diseases.

A rising trend of job loss because of musculoskeletal disorders and mental health problems is consistent with findings from social security statistics nationally. Thus, between 1953 and 1992, rates of incapacity for work because of back problems increased more than sevenfold in Britain.[9] However, since the mid-1990s, this trend has started to reverse,[10] and back disorders have been overtaken by mental illness as the major cause of incapacity.[11] The fact that the rise was steeper than for other types of health problem such as cardio-respiratory and neurological diseases suggests that it is

Table 5 Predictors of further long-term employment after initial health-related job loss

Predictor	Men (n)*	Achieved further long-term employment, n(%)	RR† (95% CI)
Age at initial job loss (years)			
17–24	123	121 (98)	2.4 (1.8 to 3.3)
25–34	211	185 (88)	2.2 (1.7 to 2.9)
35–44	261	187 (72)	1.9 (1.5 to 2.5)
45–54	457	251 (55)	1.5 (1.2 to 1.9)
55–64	356	118 (33)	1.0
Year of initial job loss			
1953–74	117	116 (99)	1.6 (1.2 to 2.2)
1975–84	129	110 (85)	1.5 (1.2 to 2.1)
1985–89	154	111 (72)	1.5 (1.1 to 2.0)
1990–94	339	201 (59)	1.4 (1.1 to 1.7)
1995–99	396	219 (55)	1.4 (1.1 to 1.7)
2000–03	273	105 (38)	1.0
Health problem leading to initial job loss‡			
Musculoskeletal	468	280 (60)	0.9 (0.8 to 1.2)
Mental health	358	235 (66)	1.0 (0.8 to 1.3)
Cardio-respiratory	293	148 (51)	0.9 (0.7 to 1.1)
Other	491	306 (62)	0.9 (0.7 to 1.1)
Type of job left			
Agriculture	203	124 (61)	0.9 (0.8 to 1.2)
Police	44	25 (57)	0.9 (0.6 to 1.3)
Teaching	85	41 (48)	0.9 (0.6 to 1.2)
Other	1076	672 (62)	1.0

Analysis was based on 1408 men who left a long-term job for health reasons.
*Numbers of men by health problem total to >1408, as some reported more than one health problem for the job they had left.
†All risk estimates are mutually adjusted.
‡Risks presented compare men whose job loss was for the specified category of health problem with the remainder (ie, those who left jobs for other types of health problem).

not attributable only to changes in the job market or in pension and social security provisions, although better prospects for income replacement may have contributed. Nor can the rise be explained by increases in the physical demands of work, although this was clearly a risk factor for HRJL. In Britain, as in other developed countries, the trend over recent decades has been to a reduction in the manual labour force and an increase in non-manual jobs. Possibly the main determinants of the trend are cultural changes in societal beliefs, expectations and values. Evidence is emerging that disability from musculoskeletal disorders is importantly influenced by health beliefs and expectations,[12 13] and cultural factors have been proposed to underlie, for example, a major epidemic of disabling upper limb pain, which occurred in Australia in the early 1980s.[14] Similarly, the rise in incapacity for work because of mental health problems may reflect a growing perception that occupational stress is a common hazard to health, and an increasing willingness to admit to symptoms of mental illness that in the past might have led to social stigma.

It is also possible that cultural differences between occupations have contributed to the 5–6-fold higher risk of HRJL for mental health problems that we found in policemen and teachers compared with in agricultural workers (table 4). This striking differential contrasts with that for suicide, rates of which are unusually high in agricultural workers.[15]

It is likely, however, that the higher rates of HRJL among policemen and teachers are also strongly influenced by the rules of their occupational pension schemes. Achieving the optimal balance in provisions for ill-health retirement is a challenge. If a regimen is too restrictive, some individuals may undergo unreasonable hardship. On the other hand, if pension schemes are too generous, they may be an encouragement not only to malingering but also (through psychological mechanisms) to genuine disability that would not otherwise occur.

The latter is likely to manifest more in relation to some types of health problems than in others. For example, in an earlier study, we found that among patients undergoing hip and knee surgery, job loss because of the underlying joint disorder was more common among those working in small businesses, and that after this was taken into account, risk did not vary according to whether the individual was self-employed or an employee.[16] In this study, however, HRJL was considerably more frequent in employees (OR 2.0). This may be because self-employed workers are generally more motivated to make light of any disability that they have, but where their work capacity is seriously limited by organic pathology such as osteoarthritis, there is less scope to modify their occupational activities in a way that enables them to continue in the same job.

It is reassuring that although the frequency of HRJL was high, most men who left a job for health reasons subsequently found further long-term employment, usually within 1 year. As might be expected, the chances of re-employment were higher when job loss occurred at younger ages and in earlier calendar periods (the cross-sectional design of the study meant that those who lost a job in earlier time periods had had longer in which to find further work). Interestingly, after allowance for age and time period, the chances of further employment did not seem to depend greatly on the type of job left or the nature of the underlying health problem. However, health problems were classified only in fairly broad categories, and it is possible that in some of the categories examined, there were diagnostic subgroups with a worse prognosis for re-employment.

Few other studies have explored the frequency of re-employment in people who leave jobs for medical reasons, but in follow-up of a cohort of British healthcare staff 12 months after ill-health retirement, only 13% were working, most of them part time.[17] The cohort included a high proportion of women (73%), but this does not explain the much lower rate of re-employment than in our study. Possibly the difference reflects a requirement for more permanent disability before ill-health retirement from the health service is permitted. As in our study, re-employment was more common at younger ages, and there was no major difference according to the nature of the underlying medical condition.

Most important for occupational health practice, and for the planning of social security policy, is the minority of workers who leave a job for health reasons and do not return to further work. Future research should focus particularly on this group, looking at factors that might enable and encourage more of them to become economically active again. Meanwhile, our findings suggest that the high rates of ill-health retirement in the police force and teachers are driven by cultural influences and generous occupational pension schemes.

Main messages

- Health-related job loss has become increasingly common in the population studied.
- Rates were particularly high in policemen and teachers.
- In addition to being associated with ergonomic stresses in the workplace, health-related job loss may have been importantly influenced by cultural and economic factors.
- After health-related job loss, most people obtained further long-term employment.

Policy implications

- Efforts to maximise employment should focus particularly on the minority of workers who leave a job for health reasons and do not rapidly return to further work.

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Answer to question on *The use of salivary biomarkers in occupational and environmental medicine* by Koh and Koh, on pages 202–10

The measurement of salivary biomarkers has the potential to be used for various occupational and environmental medicine studies.

For example, with DNA being obtainable from saliva, the genetic susceptibility of workers to toxins can be studied by analysing single-nucleotide polymorphisms and DNA adduct products. Salivary biomarkers of the internal dose of toxins and their metabolites can also be quantitatively measured, as illustrated by lead and cotinine. Early physiological changes can also be detected using salivary biomarkers such as hormones (eg, cortisol), cytokines and other chemicals. Biomarkers of early health effects may also be detectable using salivary protein markers. For example, salivary levels of eosinophil cationic protein, a biomarker of asthma (including occupational asthma,[1] which is usually measured in sputum, has recently been found to correlate with asthma severity.[2] Currently, several research groups have developed (eg, HIV testing) or are developing qualitative point-of-care salivary diagnostic technologies and are deciphering the salivary proteome, illustrating that the future of salivary biomarkers research will be driven by genomics, proteomics and nanotechnology.[3]

However, before the use of salivary biomarkers can gain widespread acceptance, further basic research needs to be carried out. The experience with cortisol shows this truism. Much of our current understanding of cortisol was achieved through years of basic research in normal subjects, and it was only recently that its relationship with occupational stress has been studied. More definitive work is also needed to show the correlations between salivary biomarkers and end points of clinical and occupational health interest.

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