SHORT REPORT

The fraction of long-term sickness absence attributable to work environmental factors: prospective results from the Danish Work Environment Cohort Study

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Objective: To examine the fraction of long-term sickness absence periods attributable to physical and psychosocial work environmental risk factors.

Method: A random population sample was followed for 18 months in a national register of social transfer payments. Mutually adjusted hazard ratios for onset of long-term sickness absence and aetiological fractions were computed.

Results: After mutual adjustment, no significant effect of psychosocial work environment factors remained. In men, 23% and 28% of long-term sickness absence were attributable to working mainly standing or squatting, and lifting or carrying loads, respectively. In women, 27% of long-term sickness absence was attributable to bending or twisting of the neck or back.

Conclusions: Physical work environment exposures explained between 10% and 30% of long-term sickness absence. The potential for reducing long-term sickness absence is substantial.

Long-term sickness absence is a major public health problem.[1] In previous studies we identified five psychosocial and four physical work environment factors that were independent risk factors of long-term sickness absence.[2 3] The psychosocial risk factors associated with long-term sickness absence were the demands of hiding emotions and emotional demands for men, and management quality, role conflicts, and reward among women.[2] In both genders, the physical work environment risk factors associated with long-term sickness absence were extreme bending or twisting of the neck or back, working mainly standing or squatting, lifting or carrying loads, and pushing or pulling loads.[3]

In the present study, the relative contribution of these risk factors, and thus the potential for reducing long-term sickness absence, is studied by computation of aetiological fractions.[4]

METHODS

In 2000, a random sample of 5366 Danish employees aged 18–69 years were interviewed regarding health behaviour, demographic characteristics and work environment as part of the Danish Work Environment Cohort Study.[5]

Data on long-term sickness absence, defined as ⩾8 consecutive weeks of sickness absence in a period of 18 months after baseline interview, were obtained by a linkage to a national register of social transfer payments (Danish Research Centre on Education and Advanced Medical Materials).[2] A total of 5020 (93.6%) people, who were employed and who did not have sickness absence within the past 2 months, supplied data on all risk factors and constitute the basis for analysis for this study.

The five psychosocial work environment factors that predicted long-term sickness absence were measured using multi-item scales: emotional demands, demands of hiding emotions, management quality, role conflicts and reward.[2] For the purpose of computation of aetiological fractions, the population was divided into three groups of approximately equal size, except for role conflicts, where the population was divided into those reporting no role conflicts and those reporting role conflicts.

Two physical work environmental risk factors concerned uncomfortable work positions in terms of extreme bending or twisting of the neck or back, and working mainly standing or squatting. Another two risk factors concerned physical workload in terms of lifting or carrying loads, and pushing or pulling loads.[3]

The population was divided into three groups of approximately equal size (low, medium and high score). For ''extreme bending or twisting of neck or back'', ''lifting or carrying loads'' and ''pushing or pulling loads'', the lowest exposure group consisted of the unexposed.

The study included data on gender, age and school education (<9 years; 10 years; high school). Family status was categorised using two variables: number of children living at home (categories none, 1, 2 or ⩾3) and cohabitation status (living with a partner or not). Regarding smoking status, the population was divided into non-smokers, ex-smokers, moderate smokers (<15 daily cigarettes) and heavy smokers (⩾15 daily cigarettes). Alcohol consumption was measured by weekly consumption, divided into two categories: (1) non and moderate drinkers (⩽14 units for women, ⩽21 units for men) and (2) heavy drinkers who consumed more than this (cut-points chosen in accordance with the Danish National Board of Health guidelines[6]). Regarding body mass index, four categories were used: underweight (<18.5 kg/m^2), normal (18.5–24.9 kg/m^2), overweight (25–29.9 kg/m^2), and Obesity (>30 kg/m^2). The population was classified into four groups according to leisure time physical activity: 0–2 h/week; 2–4 h/week; >4 h/week or heavy; or >4 h/week and heavy.

Because we started with a cohort of people without sickness absence, the risk of onset of long-term sickness absence was computed using time to event analysis, events being the onset of long-term sickness absence. Those who started a sickness absence period shortly before the end of the follow-up period are thus included.

The Cox proportional hazards model was used to calculate hazard ratios and 95% CIs. People who in a given week received another social benefit—for example, those on maternity leave—were not considered to be under risk, and people who died, emigrated or retired were censored. Based on these hazard ratios, the fractions of long-term sickness absence attributable to each of the studied factors were computed. These indicate the proportions of long-term sickness absence periods that would be reduced if absence levels of all persons

were moved to the level of the third of the population with the most favourable working conditions. All analyses were carried out using the proportional hazards regression procedure in SAS.

RESULTS

For the psychosocial work environmental factors, increased risk was only disclosed for the subjects with the least favourable working conditions, whereas a stepwise trend was seen for the physical work environmental risk factors.

In men, the aetiological fraction for emotional demands was 14% and for demands on hiding emotions 4% when work environmental factors were not mutually adjusted. In women, the aetiological fractions for management quality, role conflicts and rewards were 12%, 15% and 12%, respectively, when the work environmental factors were not mutually adjusted. After mutual adjustment, no significant effect of the psychosocial work environment factors remained.

In men, significant effects of working mainly standing or squatting and lifting and carrying loads remained after mutual adjustment. The aetiological fraction for working mainly standing or squatting was 23%, and that for lifting and carrying loads was 28% in the fully adjusted model. In women, a significant effect of bending or twisting of the neck or back remained after mutual adjustment; the aetiological fraction was 27% in the fully-adjusted model.

One could argue that mutual adjustment of psychosocial environmental variables could tend to be over adjustment, as some measures are conceptually overlapping. For example, people rating the management quality as low would most likely tend to also report a low degree of reward in work, as the latter measure includes items assessing appreciation and acknowledgement from the management. The same applies for the physical work environmental factors, where people experiencing heavy lifting or carrying would be more likely to also have work including heavy pushing and pulling.

The presented estimates and aetiological fractions in the fully adjusted models should thus be considered conservative.

With regard to interpretation of the aetiological fractions, this estimate of the potential for reduction in sickness absence

Table 1 Hazard ratios and mutually adjusted hazard ratios (and 95% CIs) for onset of long-term sickness absence

Men (n = 2586)				Women (n = 2448)			
	n	HR* (95% CI)	HR† (95% CI)		n	HR* (95% CI)	HR** (95% CI)
Emotional demands				Management quality			
Low	871	1.00	1.00	High	784	1.00	1.00
Medium	780	1.04 (0.67 to 1.61)	1.10 (0.70 to 1.75)	Medium	901	0.97 (0.66 to 1.44)	0.90 (0.60 to 1.35)
High	935	1.41 (0.94 to 2.12)	1.57 (0.98 to 2.52)	Low	763	1.38 (0.95 to 2.00)	1.09 (0.71 to 1.65)
Demands on hiding emotions				Role conflicts			
Low	1075	1.00	1.00	Low	1653	1.00	1.00
Medium	864	0.87 (0.58 to 1.32)	0.87 (0.58 to 1.32)	High	795	1.54 (1.13 to 2.10)	1.36 (0.99 to 1.87)
High	647	1.33 (0.89 to 1.99)	1.17 (0.74 to 1.84)				
				Rewards,			
				High	869	1.00	1.00
				Medium	937	0.95 (0.65 to 1.39)	0.86 (0.58 to 1.27)
				Low	642	1.59 (1.10 to 2.30)	1.30 (0.86 to 1.97)
Extreme bending or twisting of neck or back				Extreme bending or twisting of neck or back			
Low	1053	1.00	1.00	Low	865	1.00	1.00
Medium	643	1.63 (1.00 to 2.65)	1.35 (0.81 to 2.24)	Medium	673	1.34 (0.85 to 2.10)	1.16 (0.72 to 1.86)
High	890	2.48 (1.61 to 3.82)	1.58 (0.94 to 2.65)	High	910	2.36 (1.60 to 3.50)	1.86 (1.19 to 2.91)
Working mainly standing or squatting				Working mainly standing or squatting			
Low	845	1.00	1.00	Low	815	1.00	1.00
Medium	828	1.27 (0.77 to 2.12)	1.05 (0.61 to 1.81)	Medium	790	1.50 (0.99 to 2.27)	1.26 (0.80 to 1.98)
High	913	2.51 (1.57 to 4.03)	1.80 (1.02 to 3.16)	High	843	1.92 (1.29 to 2.86)	1.36 (0.84 to 2.19)
Lifting or carrying loads				Lifting or carrying loads			
Low	806	1.00	1.00	Low	919	1.00	1.00
Medium	663	1.41 (0.95 to 2.10)	1.07 (0.58 to 1.98)	Medium	816	1.41 (0.95 to 2.10)	1.11 (0.71 to 1.73)
High	1117	1.93 (1.30 to 2.85)	1.85 (1.04 to 3.29)	High	713	1.93 (1.30 to 2.85)	1.24 (0.76 to 2.03)
Pushing or pulling loads				Pushing or pulling loads			
Low	1418	1.00	1.00	Low	1437	1.00	1.00
Medium	710	1.11 (0.72 to 1.69)	0.69 (0.43 to 1.09)	Medium	546	1.47 (1.01 to 2.12)	1.05 (0.69 to 1.61)
High	458	2.00 (1.33 to 3.03)	1.04 (0.65 to 1.67)	High	465	1.58 (1.08 to 2.31)	0.90 (0.57 to 1.42)

*Adjusted for age, family status, school education, smoking, alcohol use, leisure time physical activity and body mass index.
†Adjusted for age, family status, school education, smoking, alcohol use, leisure time physical activity, body mass index and other work environmental factors.

Main messages

- Differences in work environment exposures accounted for a large fraction of the long-term sickness absence.
- Physical work environmental factors account for a larger proportion of long-term sickness absence than psychosocial work environmental factors.
- For the physical factors, findings were very similar for men and women.

Policy implications

- The physical work environmental risk factors seem to have the largest potential for reducing long-term sickness absence.
- This study suggests a potential for reducing long-term sickness absence through interventions towards mainly physical work environmental exposures.
- The effect of psychosocial work environment factors on long-term sickness absence was smaller, and results indicate that interventions directed at the highly exposed are likely to have the largest impact.

is based on the assumption that absence levels for everyone should move to the level of those with the lowest exposure. In reality, this would be difficult to obtain for some exposures. For example, some occupations are defined by having lifting and carrying (eg, removal men, scaffold builders). In that case, the concept of the aetiological fraction is more theoretical than practical, and the calculated aetiological fractions should be considered as an expression of attributable risk and as an indication of a potential for prevention, rather than as a measure of the exact magnitude of this potential.

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