

**SICK LEAVE DUE TO WORK-RELATED HEALTH COMPLAINTS  
AMONG OFFICE WORKERS IN THE NETHERLANDS.**

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In a study among 7000 office workers in 61 office buildings, the relative importance of different factors for absenteeism was estimated. The buildings were not known as sick buildings, and varied in size from 50 to 200 office workers. A questionnaire was used including questions about (work related) health complaints, absenteeism, job and job satisfaction, workplace, health in general, and type of education. Information on building characteristics, HVAC, and maintenance was collected with the aid of an inspection list. Statistical analysis of the results indicated that absenteeism is related to several building, workplace, and job related characteristics, which may constitute a considerable economic loss.

**Introduction**

In the Netherlands, occupational health services increasingly have to deal with health and indoor climate complaints of office workers. From other countries, several large scale studies have been published, among them the Danish Town Hall Study (1), and a British study (2). We performed a study which was in size comparable these studies. Generally most emphasis has been laid on factors related to the number of people complaining, while the possible economical effect has not been considered directly. A considerable loss of productivity due to discomfort or adverse health effects may result in a lower productivity while being at work or in absenteeism. Robertson (3) calculated that a loss of productivity of 1% costs much more than savings of 25% on the HVAC system. Woods (4) found that 20% of 600 randomly questioned US office workers said they were hampered in their performance by environmental conditions.

In our study among 7000 office workers in 61 office buildings, we estimated the relative importance of different factors for absenteeism. The relation with work-related health and comfort complaints is described in an accompanying paper (5).

**Materials and methods**

The study was performed in 61 office buildings during the period November 1988 until February 1989. The buildings were not known as sick buildings, and varied in size from 50 to 200 office workers. Buildings were selected to include various types of ventilation, types of occupy-

ing organizations (private or not private) and regions of the country. A self-administered questionnaire was distributed among the office workers. The questionnaire included among others questions about (work related) health complaints, absenteeism, job and job satisfaction, workplace, health in general, and type of education. Questions about sick leave were asked over the past 12 months as the number of times and the number of days in total, as well as the number of times and the number of days of sick leave because of complaints which are generally regarded as part of SBS. The questions about health included: itchy or prickly skin, itchy, prickly or watering eyes, weary eyes, blocked or runny nose, dry throat, sore throat, dry skin, skin rash, shivers, muscle or joint pain not caused by sports, fatigue, headache, heavy feeling in the head, listlessness, dizziness, problems with concentration, forgetfulness, and irritability. An inspection list was used to collect information on building characteristics, HVAC, and maintenance. A total of 7043 office workers completed the questionnaire, an average response of 75%

#### Statistical analysis

On the basis of preliminary analysis, a set of characteristics was selected for further multivariate analysis. The 17 selected variables are shown in table 1. Job satisfaction was derived from 7 questions on the subject. Allergy/CNSLD was defined as positive when people scored at least one time positive on 6 questions of a validated questionnaire on CNSLD, and/or when they reported to be allergic to housedust, pollen or animals. Fleece factors was positive when 2 or 3 of the factors 'wall to wall carpeting', 'curtains' or 'open bookshelves' were present close to the person. As dependent variables the (self reported) number of times and number of days absent in general, and due to SBS symptoms were used. Complete data for about 5000 office workers were available for multivariate logistic analyses.

#### Results

The results of the multivariate logistic analyses are shown in table 1. Only odds ratios relations significant at the 5% level are given. From this table it appears that several factors were significantly related to absenteeism in general and to sick leave due to symptoms of SBS. Several personal characteristics were related to most or all aspects of sick leave. Environmental or work related factors showed in some cases a significant relation with sick leave. People who were able to adjust the temperature in their workplace, reported less sick leave than people who could not. People working in buildings with a spray humidification reported more sick leave than their colleagues in buildings where there was no spray humidification with respect to number of days of absenteeism in general. In case of absenteeism because of symptoms regarded as being part of SBS more significant relations with environmental and work related factors were found. Both steam and spray humidification were related to the number of times and days of sick leave. People working more than 4 hours with visual displays (VDU) reported more sick leave (times and days) than people who worked less with VDU's. A significant relation existed with self adjustable temperature. Surprisingly, people working in rooms where windows could not be opened reported less sick

leave. In no case a significant relation was found with type of ventilation (natural vs mechanical), recirculation, wearing of contact lenses, passive smoking, number of people in the workplace ( $\geq 10$  vs  $< 10$ ), and fleece factors (2 or 3 present vs 0 or 1).

Table 1. Adjusted odds ratio estimates and 95 % confidence intervals of sick leave with respect to selected building, workplace, job and personal characteristics.

	# times general > 1 vs $\leq 1$	# days general > 1 vs $\leq 1$	# times SBS > 1 vs $\leq 1$	# days SBS > 1 vs $\leq 1$
spray humid no vs yes		0.80 (0.64-0.99)	0.69 (0.50-0.97)	0.72 (0.55-0.94)
steam humid no vs yes			0.58 (0.42-0.79)	0.69 (0.53-0.89)
self adjust temp no vs yes	1.19 (1.03-1.37)		1.51 (1.21-1.88)	1.45 (1.21-1.73)
openable windows no vs yes				0.82 (0.67-1.00)
VDU work $\geq 4$ h vs $< 4$			1.24 (1.01-1.53)	1.20 (1.00-1.43)
gender fem vs male	1.57 (1.36-1.81)	1.39 (1.21-1.61)	1.94 (1.58-2.38)	1.78 (1.50-2.11)
age $< 30$ vs $\geq 40$	1.48 (1.25-1.75)	1.24 (1.05-1.46)	1.35 (1.04-1.74)	
age $< 30$ vs 30-39		0.83 (0.71-0.97)		0.78 (0.65-0.95)
education high vs medium	0.76 (0.65-0.89)	0.72 (0.62-0.83)	0.77 (0.61-0.97)	0.69 (0.57-0.84)
education high vs low	0.62 (.62-.89)	0.62 (0.52-0.74)	0.73 (0.57-0.95)	0.67 (0.54-0.83)
smoking yes vs no	1.25 (1.05-1.49)		1.44 (1.09-1.89)	1.37 (1.10-1.70)
allergy/CNSLD yes vs no	1.62 (1.42-1.84)	1.39 (1.22-1.58)	2.01 (1.67-2.42)	1.76 (1.51-2.05)
job satisfaction neg vs pos	1.57 (1.39-1.79)	1.49 (1.31-1.69)	1.84 (1.53-2.22)	1.72 (1.48-2.01)

### Discussion and conclusions.

In this study we analyzed self reported absenteeism as a measure of possible economical effects of SBS. Probably the economical effect is underestimated by only measuring sick leave. One effect of an uncomfortable and more or less unhealthy office environment might be loss of productivity, without people staying home from work. In this study we asked for the number of times and days of total sick leave, and because of health complaints generally regarded as symptoms of SBS. We did not ask specifically for work relatedness of those complaints with respect to sick leave.

We found several environmental, building and work-related factors which were associated with sick leave. Associations were found with different types of humidification, VDU-work, and self adjustable temperature. More and stronger significant associations were found for sick leave because of SBS symptoms instead of overall sick leave. For steam humidification and VDU work, no associations could be found for sick leave in general, while they were found for sick leave due to SBS symptoms. For self adjustable temperature, the association became stronger.

For type of ventilation (natural vs mechanical), no association could be found, although it was related to some symptoms (5). This was also true for the wearing of contact lenses. Apparently those complaints were not so severe that they could result in more sick leave. Passive smoking did not show a relation with sick leave, although it was associated with complaints about the indoor climate and air quality. Apparently passive smoking did not result in increased sick leave either. The number of people in the workplace was not associated with sick leave. This factor is usually mentioned as one of the factors which may increase the number of health complaints, and was found to be related to some health complaints (5). The presence of fleece factors did not account for more sick leave.

In conclusion, absenteeism, and especially absenteeism related to sick building related symptoms was related to several building, workplace, and job related characteristics, which may constitute a considerable economic loss in addition to the adverse consequences for the health of the involved office workers.

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