

Does sickness presenteeism have an impact on future general health?

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Abstract

Purpose The primary aim of this prospective study was to investigate whether working despite illness, so called “sickness presenteeism”, has an impact on the future general health of two different working populations during a follow-up period of 3 years.

Methods The study was based on two bodies of data collected at a number of Swedish workplaces from 1999 to 2003. The first material comprised 6,901 employees from

the public sector and the second 2,862 subjects from the private sector. A comprehensive survey was issued three times: at baseline, after 18 months and after 3 years. Apart from the explanatory variable sickness presenteeism, several potential confounders were considered. The outcome variable was good/excellent versus fair/poor self-reported health.

Results Sickness presenteeism at baseline was consistently found to heighten the risk of fair/poor health at both the 18-month and 3-year follow ups even after adjusting for the detected confounders.

Conclusions To the best of the authors’ knowledge, this study is the first to show that sickness presenteeism appears to be an independent risk factor for future fair/poor general health.

The study was approved by the Ethical Committee of the Karolinska Institute (AHA; Dnr 00-012), (HaKuL Dnr 99-242).

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Introduction

During the last decade, the phenomenon of sickness presenteeism, i.e. going to work despite illness, (Grinyer and Singleton 2000; McKeivitt et al. 1997) has attracted growing interest among researchers. Research concerning its determinants, its prevalence among different occupational groups, its association with sickness absence as well as its effects on the productivity of an organisation has been presented.

In a study by Aronsson et al. (2000), it was found that at least one-third of a subsample of 3,801 Swedish employees had gone to work despite being ill two or more times during the last year. Employees working in the educational or welfare sectors, e.g. nurses, nursing-home aids and teachers at

compulsory schooling levels, reported a heightened risk of sickness presenteeism. This was interpreted as indicating that individuals are more likely to work through illness in occupations which involve caring for others where basic human needs are to be met, implying a strong demand on the employee to be present. Furthermore, sickness presenteeism was also more prevalent among employees having to catch up on work after being absent for a period. Symptoms related to presenteeism involved pain and distress, such as musculoskeletal pain, disturbed sleep, fatigue and minor depression. A positive correlation was found between sickness absence and sickness presenteeism, i.e. individuals reporting more absenteeism also tended to report more presenteeism.

In a further study carried out 3 years later, also using Swedish employees ($n = 3,136$) the proportion reporting two or more instances of sickness presenteeism showed an increase to 53% (Aronsson and Gustafsson 2005). As expected in this study, health limitations were the strongest determinant of sickness presenteeism but work-related factors such as low replaceability (work accumulates during absence), time pressure, low control over pace of work, conflicting demands and unsatisfying work resources also increased the risk of sickness presenteeism. Furthermore, individual boundarylessness, i.e. hard to say no to the wishes and demands of others, and personal financial problems were positively related to sickness presenteeism. Both these studies suggest that some sickness presenteeism during a working year may be more common than no sickness presenteeism at all and this is also in accordance with studies from other countries. In a study carried out using 237 employees at a Canadian public service organisation, only 28% of the study group reported no sickness presenteeism during the previous year (Caverley et al. 2007) and in a Dutch study 63% reported having gone to work while sick during the previous year (Vroome 2006).

Another perspective of sickness presenteeism has been to consider its potential impact on worker productivity. Loss of productivity has often been calculated based on costs for sickness absence and healthcare but recent research indicates that presenteeism appears to cause more loss in productivity than absenteeism (Hemp 2004; Stewart et al. 2003; van den Heuvel et al. 2007). In a study by Goetzel et al. (2004), the estimated costs of sickness presenteeism constituted 18–60% of the total costs for ten common medical conditions. The link between presenteeism and productivity is usually measured by the use of self-report instruments. Several such questionnaires exist and have been reviewed (e.g. Lofland et al. 2004; Prasad et al. 2004). These surveys comprise a wide array of conditions and represent a great variation in how productivity loss is estimated. Nevertheless, even though the contribution of presenteeism to the total expenditure caused by poor health

for an employer may be difficult to estimate exactly, it appears that these costs are considerable.

It has been suggested that sickness presenteeism is related to relatively mild conditions (Hemp 2004) and, accordingly, it may be a harmless phenomenon from a health perspective. However, in the study by Caverley et al. (2007) of an organisation undergoing downsizing measures, it was found that sickness presenteeism was a better predictor of health than sickness absenteeism and, furthermore, no indications could be found that sickness presenteeism was associated with milder health problems than sickness absenteeism. The authors propose that sickness presenteeism is more likely to substitute sickness absenteeism, and to predict health more accurately, during times of rising work demands and job insecurity. Particularly during uncertain times at work, the perceived risk associated with sickness absence, e.g. not meeting deadlines or being judged as “fragile” or unreliable, may outweigh the potential health risk of going to work despite illness. This study also found, as hypothesised, that sickness presenteeism was predicted by similar factors as used in earlier research to predict sickness absence, e.g. job insecurity, reduced supervisor support and job satisfaction.

By definition, poor health is a prerequisite for sickness presenteeism, i.e. in a state of poor health, the employee has two alternatives—sickness absence or sickness presence (Johansson and Lundberg 2004). However, the possible effects of presenteeism on future health are unknown, even though it has been considered a potential health risk by several researchers (e.g. Grinyer and Singleton 2000; Kristensen 1991; McKeivitt et al. 1997; Munir et al. 2007; Rosvold and Bjertness 2001; Voss et al. 2004). Employees who repeatedly go to work despite being ill may not get the necessary rest and accompanying recuperation and this may lead to accumulated stress and an allostatic load (McEwen 1998). Allostatic overload has been related to several negative health effects, for instance, on the cardiovascular system, brain function and immune system as well as unhealthy behaviours such as smoking, excess alcohol consumption and disturbed sleep (McEwen 2008). Sickness presenteeism may therefore be an indication of a heightened stress level in the individual, but it may also maintain or accentuate the stress or strain. Furthermore, failure to manage an illness in its early stage (e.g. a cold) may give rise to a more severe disease (e.g. pneumonia).

In a cohort of some 5,000 men from the Whitehall II study material, Kivimäki et al. (2005) found that men with a poor health status at baseline, and who had never been sick-listed during the subsequent 3 years, displayed an increased risk of future cardiovascular disease compared to men with a moderate amount of sickness absenteeism. Provided that sickness presenteeism substituted sick-listing among individuals with no sick leave in this material, these

results point to the deleterious effects on health of presenteeism among men with poor general health. A health-protective effect of a small amount of sick leave was also identified in an earlier study by these authors (Kivimaki et al. 2003).

On the other hand, for conditions such as non-specific back pain which appear to be a prevalent reason for sickness presenteeism (Caverley et al. 2007) the evidence-based recommendations (for acute cases) are to continue everyday activities including gainful work, as far as possible, even with some level of pain (Main and Williams 2002; van Tulder et al. 2006). From the perspective of the individual, this may be experienced as sickness presenteeism. A similar situation may also be at hand in situations where individuals return to work after a long period of sickness absenteeism while still experiencing some health problems. In such cases, further sick leave may be detrimental to health and returning to work health promotive, even though initially perceived as sickness presenteeism.

The primary aim of this study was to investigate whether sickness presenteeism has an impact on the future general health of two different working populations during a follow-up period of 3 years. The secondary aim was to evaluate the potential future effect of sickness presenteeism separately among employees with fair/poor health at baseline and individuals with good health at baseline.

Methods

This prospective study employs two data materials collected at a number of Swedish workplaces from 1999 to 2003. A comprehensive survey was administered three times: at baseline, after 18 months and after 3 years.

Materials

Public sector

The first material was gathered in a study entitled Work and Sustainable Health in the Public Sector in Sweden (Lindberg et al. 2006), the HAKuL (Swedish abbreviation) Study. The HAKuL Study was conducted in four county councils and six municipalities, covering the southern, middle and northern parts of Sweden. The main occupational groups were registered nurses, assistant nurses, home-based personal care workers, workers in elderly care, employees at child care centres, administrative personnel and teachers. The baseline questionnaire was sent to 9,003 employees and 7,533, or 84% (6,472 women; 1,061 men) responded. Women had a response rate of 85% compared with 77% for men. In general, occupations requiring longer training had

higher response rates than occupations requiring shorter training.

Private sector

The second material was gathered in a study entitled Work and Health in the Processing and Engineering Industries (Bergstrom et al. 2008), the AHA (Swedish abbreviation) Study. This study was carried out at four workplaces within the private industry, two of which were paper mills including such occupations as operators, technicians, laboratory workers and repairmen; one was a truck manufacturer comprising such job designations as assemblers, mechanics, painters and truck drivers and one was a steelworks including such occupations as material handlers, tube workers, repairmen and material preparers. The baseline questionnaire was sent to 4,160 employees (3,679 men; 481 women) and 2,894, or 70% (2,523 men; 371 women) responded. The response rates were 77% among women and 69% among men and 66% among blue-collar workers and 89% among white-collar workers.

The inclusion criteria in this study (both materials) were (1) having held the current work position for at least 1 year; and (2) working at least 20 h per week and complete information on these criteria. Furthermore, in the public sector, subjects with a continuous sick-leave period longer than 3 months at the time of the baseline measurement were excluded in an earlier step of the recruitment process (see Fig. 1), and the same exclusion criterion was therefore applied in the private sector (see Fig. 1) to make the two materials more comparable. As can be seen from the Figure, 632 individuals were excluded in the public sector material and 212 in the private sector material. As shown in Table 1, the gender distribution in these two materials was very different, with 82% women in the public sector and 12% women in the private sector. Furthermore, the proportion of smokers was higher in the public sector, whereas the proportion of employees with excellent/very good health and the proportion with no sickness presenteeism at all were higher in the private sector.

Measurements

Except for sick-listing all data used in this study were self-report data gathered by use of questionnaires. As far as possible, questionnaires and items shown to have an acceptable validity in Swedish materials were chosen.

Predictor (explanatory) variable

Sickness presenteeism was measured by means of the following question: has it happened over the previous 12 months that you have gone to work despite feeling that

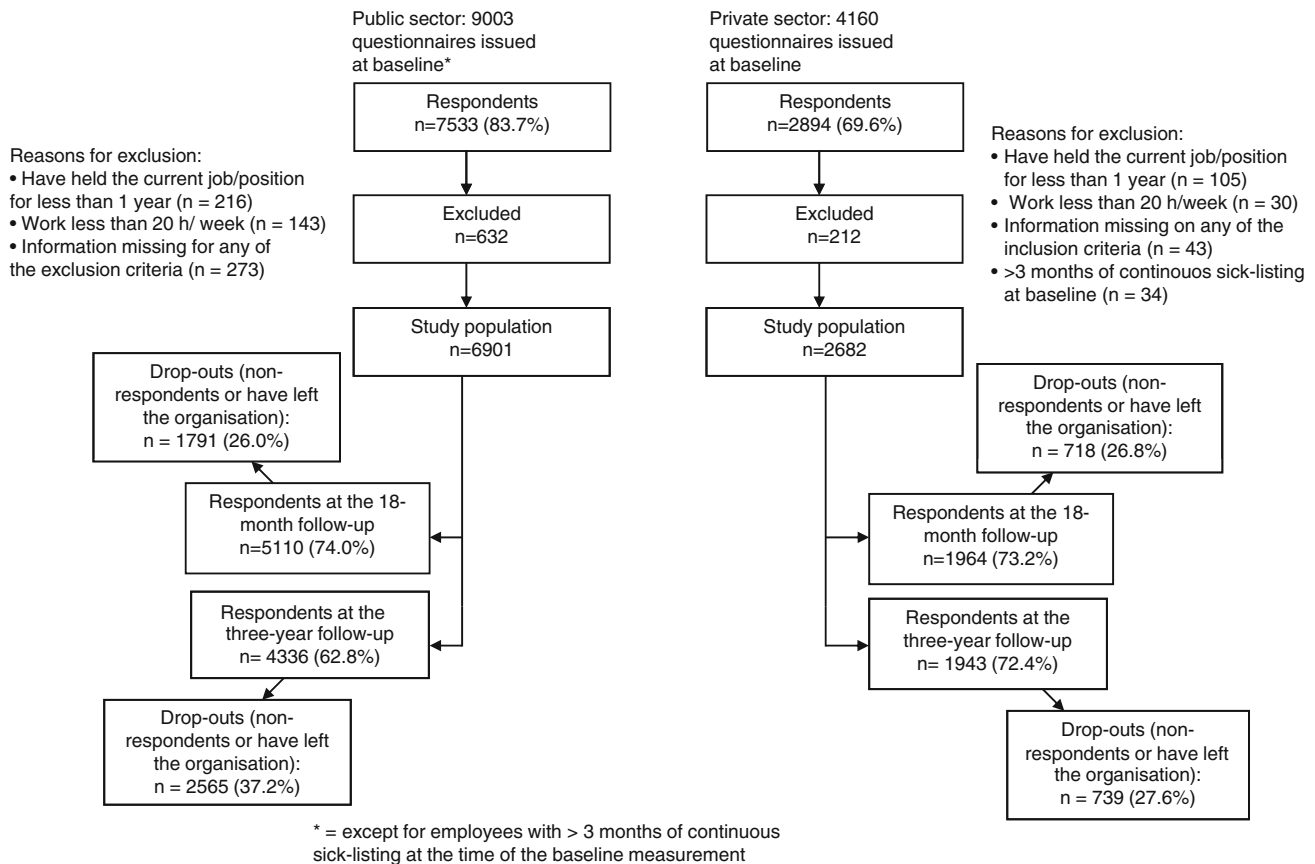


Fig. 1 Flow of subjects

you really should have taken sick leave due to your state of health? The response format was (1) “No, never”, (2) “Yes, once”, (3) “Yes, 2–5 times”, (4) “Yes, more than five times”. This question has been used in earlier research on sickness presenteeism (Aronsson and Gustafsson 2005; Aronsson et al. 2000).

Outcome variable

The outcome variable general health at the 18-month and 3-year follow ups was measured by one item included in the Short Form-36 (McHorney et al. 1994; Sullivan et al. 1995). This item is formulated as follows: “In general, would you say your health is:” The response format is “excellent”, “very good”, “good”, “fair” and “poor”. In the analyses the outcome was coded as a binary variable, good/very good/excellent (0) and fair/poor (1).

Potential confounders

General health at baseline, measured by the same item as described above, was regarded as an a priori confounder. Potential confounders were:

Health-related variables: Mental health, vitality, physical and psychological role function from the Short Form-36,

the SF-36, (McHorney et al. 1994; Sullivan et al. 1995), exhaustion from the Maslach Burnout Inventory (MBI) General Survey (Schutte et al. 2000), unwinding and recuperation (Aronsson et al. 2003) and sick-listing data from pay registers for the year the baseline measurement was carried out. For the public sector material access to complete register data on absence from work were available in three county councils and five municipalities ($n = 5,013$). For the private sector, register data on sickness absence were available for 2,500 employees (93%).

Demographic/background variables: Gender, age, education and type of employment. For the public sector different occupations were subsumed under five categories according to the International Standard Classification of Occupations (ISCO-88) whereas in the private sector employees were classified into white- or blue-collar workers.

Lifestyle factors comprised smoking (Setterlind and Larsson 1995), hazardous alcohol consumption (Saunders et al. 1993) and perceived stress in everyday life (Burell 2002).

Physical load at work: Heavy lifting, working with hands above the shoulder, proportion of the day exposed to whole-body vibrations, and proportion of the day working with handheld vibrating tools (Wiktorin et al. 1999).

Table 1 Baseline characteristics for the study populations

Characteristics	Public sector (<i>n</i> = 6,901)	Private sector (<i>n</i> = 2,682)
Background/demographic factors		
Age, <i>n</i> (%)		
–34	1,098 (16)	755 (28)
35–54	4,274 (62)	1,506 (56)
55–	1,529 (22)	421 (16)
Gender, <i>n</i> (%)		
Female	5,694 (82)	335 (12)
Male	1,207 (18)	2,347 (88)
Education, <i>n</i> (%)		
Compulsory school (1–9 years)	1,077 (16)	855 (32)
Secondary school (10–12 years)	2,029 (30)	1,545 (58)
University education (13 years or more)	2,834 (42)	260 (10)
Other form of education	862 (13)	
Smokers, <i>n</i> (%)		
	1,852 (27)	536 (20)
Type of employment, <i>n</i> (%)		
Blue-collar worker	–	2,073 (78)
White-collar worker	–	598 (22)
Leadership role	278 (4)	–
Theoretical expert competence	1,410 (20)	–
Shorter University education	1,457 (21)	–
Skilled work	3,386 (49)	–
Unskilled work	356 (5)	–
General health, <i>n</i> (%)		
Excellent/very good	2,662 (39)	1,232 (46)
Good	2,732 (40)	1,010 (38)
Fair/poor	1,480 (21)	434 (16)
Occasions of sickness presenteeism during the previous year		
None	1,614 (24)	1,075 (40)
One occasion	1,335 (20)	373 (14)
2–5 occasions	2,758 (40)	873 (33)
More than five occasions	1,154 (17)	345 (13)

Psychosocial factors at work: Public sector; control, demand and social support (Karasek and Theorell 1990; Waldenstrom et al. 2002), the interaction between work and private life (Dallner et al. 2000) and a single question concerning satisfaction with leadership. Private sector; quantitative work demands, control of work pace, support from superior, support from co-workers, empowering leadership, social climate at work, commitment to the organisation and interaction between work and private life were assessed by use of the General Nordic Questionnaire for Psychological and Social Factors at Work, QPSNordic (Dallner et al. 2000). The reason for using different measurements and variables concerning psychosocial factors at work was differences in the questionnaires used in the HAKuL and AHA studies.

Statistical analyses

As previously mentioned, the outcome variable general health was coded as a binary variable (see above). Relative risks (RRs) with 95% confidence intervals (CIs) were estimated by using a modified Poisson regression (Zou 2004) in SPSS 15.0. First, associations between the explanatory variable (sickness presenteeism) and the potential confounders were examined (Spearman's rho). Second, we used each one of the potential confounders together with sickness presenteeism in order to estimate RRs. Confounders that changed the crude RR of sickness presenteeism less than 10% were not included in subsequent analyses. In order to check for collinearity and illustrate the associations between the independent variables, structural plots (graphs) were drawn between the variables (Frank 2000). Then we used a mixture of best subset regression, backward selection, and forward selection together with Akaike's information criterion to obtain statistically equally good models with three or four explanatory variables. Indexes (from the questionnaires) were analysed alternatively both as continuous and categorised variables to minimise the risk of leaving out any essential confounder.

The final fully adjusted model was also employed in the stratified analyses where employees with fair/poor health and employees with good/excellent health at baseline were studied, respectively.

Dropouts

Public sector

As depicted in Fig. 1, 5,110 subjects (74%) responded to the 18-month follow-up questionnaire and 4,336 (63%) responded at the 3-year follow up. Based on baseline data, the drop-outs were slightly younger than the respondents at both the 18-months follow up (mean age 43.7 years, SD = 11.5 vs. 46.7 years, SD = 9.4) and the 3-year follow up (44.7, SD = 11.4 vs. 46.7, SD = 9.1 years) and the gender distribution was relatively similar between dropouts and respondents at both the 18-month follow up (drop-outs 80% women vs. respondents 83% women) and the 3-year follow up (dropouts 80% women vs. respondents 84% women). Fifteen hundred and seventy-five individuals terminated their employment contract during the study period.

Private sector

At the 18-month follow up 1,964 employees (73%) responded to the questionnaire and at the 3-year follow up 1,943 (72%) responded (Fig. 1). As in the public sector the drop-outs were somewhat younger than the respondents at both the 18-month (mean age 39.9 years, SD = 11.6 vs. 43.3 years, SD = 10.2)

Table 2 The proportion of subjects reporting fair/poor health at baseline and at both follow ups in relation to different amounts of sickness presenteeism at baseline (T0)

Public sector—frequency of sickness presenteeism during the previous year (at baseline, T0)				
Fair/poor health, <i>n</i> (%)	0 (<i>n</i> = 1,246) ^a	1 (<i>n</i> = 1,007) ^a	2–5 (<i>n</i> = 2,008) ^a	>5 (<i>n</i> = 823) ^a
T0	96 (8)	88 (9)	416 (21)	415 (51)
T18 ^c	130 (10)	124 (12)	488 (24)	394 (48)
Fair/poor health, <i>n</i> (%)	0 (<i>n</i> = 1,056) ^b	1 (<i>n</i> = 858) ^b	2–5 (<i>n</i> = 1,708) ^b	>5 (<i>n</i> = 696) ^b
T0	87 (8)	78 (9)	345 (20)	358 (52)
T36 ^d	154 (15)	153 (18)	519 (31)	397 (57)
Private sector—Frequency of sickness presenteeism during the previous year (at baseline, T0)				
Fair/poor health, <i>n</i> (%)	0 (<i>n</i> = 817) ^a	1 (<i>n</i> = 273) ^a	2–5 (<i>n</i> = 625) ^a	>5 (<i>n</i> = 239) ^a
T0	52 (6)	19 (7)	104 (17)	121 (51)
T18 ^c	83 (10)	29 (11)	139 (22)	127 (55)
Fair/poor health, <i>n</i> (%)	0 (<i>n</i> = 811) ^b	1 (<i>n</i> = 271) ^b	2–5 (<i>n</i> = 619) ^b	>5 (<i>n</i> = 232) ^b
T0	46 (6)	20 (7)	105 (17)	116 (50)
T36 ^d	109 (14)	34 (12)	175 (28)	135 (58)

^a These participants have responded to both the baseline and the 18-month follow-up measurements

^b These participants have responded to both the baseline and the 3-year follow-up measurements

^c 18-month follow up

^d Three-year follow up

and the 3-year follow up (41.4, SD = 12.0 vs. 42.7 SD = 10.2). Again, the gender distribution was similar between drop-outs and respondents at both the 18-month (drop-outs 13% women vs. respondents 12% women) and 3-year follow up (drop-outs 14% women vs. respondents 12% women). Four hundred and forty-four employees terminated their employment during the study period.

In both materials there was also a tendency towards a higher non-response rate at the follow ups among employees with more sickness presenteeism at baseline, especially among those who also reported fair/poor health.

Results

Table 2 describes the proportion of employees reporting fair/poor health at baseline and at both follow ups in relation to the amount of sickness presenteeism at baseline. More presenteeism was clearly related to less good health and at baseline (T0) at least half of the employees reporting more than five instances of presenteeism during the past year (right-hand column) also reported fair/poor health, whereas the corresponding proportions at baseline among those with no presenteeism (left-hand column) were 8% in the public sector and 6% in the private sector.

Sickness presenteeism and future health

At both the 18-month and 3-year follow ups, sickness presenteeism remained an independent predictor of future general health even after adjusting for general health, sick-listing and vitality at baseline (fully adjusted model). The results were similar in both materials (Tables 3 and 4). When the materials were stratified by health status at baseline, the impact of sickness presenteeism on future health was only statistically significant among employees with good/excellent health at baseline in the public sector whereas, in the private sector, sickness presenteeism was related to a heightened risk of future fair/poor health regardless of health status at baseline (Table 5). It should also be noted that a dose-response gradient was visible for sickness presenteeism in that more presenteeism consistently rendered larger RRs.

The RRs for the confounders presented in Tables 3 and 4 indicate that the strongest predictor of future general health was the a priori confounder general health at baseline but also that sickness absenteeism, as well as sickness presenteeism, independently predicted future general health status. In general, the sizes of the RRs for sickness presenteeism and sickness absenteeism were relatively

Table 3 Public sector

	Total study group		
	<i>n</i> (cases) ^a	Crude RR (95% CI) only given for the explanatory variable	RR (95% CI) fully adjusted model ^b
Baseline figures	18-month follow up		
Sickness presenteeism			
0–1 times	1,599 (172)	1.0	1.0
2–5 times	1,477 (350)	2.20 (1.86; 2.61)***	1.37 (1.17; 1.62)***
>5 times	626 (300)	4.46 (3.78; 5.24)***	1.59 (1.33; 1.89)***
General health			
Excellent/very good	1,459 (91)		1.0
Good	1,478 (268)		2.28 (1.79; 2.89)***
Fair/poor	765 (463)		5.52 (4.31; 7.07)***
Sick-listing during the previous year			
No days	1,480 (199)		1.0
0 < days ≤ 7	966 (154)		1.03 (0.87; 1.23)
7 < days ≤ 365	1,256 (469)		1.61 (1.40; 1.86)***
Vitality ^c			
–40	921 (409)		1.0
40.1–60	1,036 (237)		0.88 (0.77; 1.00)
60.1–75	930 (105)		0.67 (0.55; 0.82)***
75.1–100	815 (71)		0.69 (0.54; 0.89)**
Baseline figures	3-year follow up		
Sickness presenteeism			
0–1 times	1,378 (217)	1.0	1.0
2–5 times	1,267 (390)	1.96 (1.69; 2.26)***	1.27 (1.11; 1.46)**
>5 times	533 (313)	3.73 (3.24; 4.30)***	1.49 (1.28; 1.73)***
General health			
Excellent/very good	1,246 (109)		1.0
Good	1,265 (342)		2.49 (2.02; 3.06)***
Fair/poor	667 (469)		4.94 (3.96; 6.15)***
Sick-listing during the previous year			
No days	1,262 (240)		1.0
0 < days ≤ 7	819 (185)		1.04 (0.90; 1.22)
7 < days ≤ 365	1,097 (495)		1.42 (1.26; 1.61)***
Vitality ^c			
–40	805 (432)		1.0
40.1–60	869 (272)		0.94 (0.83; 1.05)
60.1–75	806 (132)		0.73 (0.61; 0.87)**
75.1–100	698 (84)		0.68 (0.54; 0.85)**

Relative risks (RRs) for fair/poor general health at both follow ups in relation to baseline figures on sickness presenteeism and the detected confounders

95% CI = 95% Confidence interval; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

^a The numbers do not add up to the figures given in Fig. 1 mainly since sick-listing data from pay-registers, as pre-planned, were not gathered for all workplaces included (see “Methods”). A small proportion of individuals were also excluded from these analyses due to missing data on single items

^b Adjusted for baseline characteristics concerning sickness presenteeism, general health, sick-listing and vitality. For a specification of all considered potential confounders, see Methods section

^c From the Short Form-36, SF-36 (McHorney et al. 1994; Sullivan et al. 1995), ranged from 0 to 100, where higher scores indicate higher vitality

Table 4 Private sector

	Total study group		
	<i>n</i> (cases) ^a	Crude RR (95% CI) Only given for the explanatory variable ^a	RR (95% CI) fully adjusted model ^b
Baseline figures	18-month follow up		
Sickness presenteeism			
0–1 times	1,057 (110)	1.0	1.0
2–5 times	614 (136)	2.13 (1.69; 2.68)***	1.29 (1.04; 1.60)*
>5 times	232 (127)	5.26 (4.25; 6.50)***	1.76 (1.41; 2.20)***
General health			
Excellent/very good	875 (44)		1.0
Good	745 (143)		2.84 (2.01; 4.02)***
Fair/poor	283 (186)		6.72 (4.64; 9.72)***
Sick-listing during the previous year			
No days	735 (88)		1.0
0 < days ≤ 7	587 (117)		1.38 (1.10; 1.74)**
7 < days ≤ 365	581 (168)		1.27 (1.03; 1.56)*
Vitality ^c			
–55	395 (184)		1.0
55.1–70	527 (115)		0.80 (0.67; 0.96)*
70.1–85	671 (52)		0.49 (0.36; 0.66)***
85.1–100	310 (22)		0.62 (0.39; 0.97)*
Baseline figures	3-year follow up		
Sickness presenteeism			
0–1 times	1,062 (138)	1.0	1.0
2–5 times	613 (174)	2.18 (1.79; 2.67)***	1.39 (1.14; 1.69)**
>5 times	230 (134)	4.84 (3.71; 5.42)***	1.71 (1.39; 2.12)***
General health			
Excellent/very good	881 (66)		1.0
Good	742 (187)		2.51 (1.89; 3.32)***
Fair/poor	282 (193)		4.68 (3.45; 6.35)***
Sick-listing during the previous year			
No days	733 (102)		1.0
0 < days ≤ 7	591 (135)		1.40 (1.13; 1.73)**
7 < days ≤ 365	581 (209)		1.48 (1.21; 1.81)***
Vitality ^c			
–55	395 (205)		1.0
55.1–70	523 (135)		0.81 (0.68; 0.96)*
70.1–85	673 (81)		0.61 (0.48; 0.79)***
85.1–100	314 (25)		0.54 (0.35; 0.81)**

Relative risks (RRs) for fair/poor general health at both follow ups in relation to baseline figures on sickness presenteeism and the detected confounders

95% CI = 95% Confidence interval; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

^a The numbers do not fully add up to the figures given in Fig. 1 due to missing data on single items for a small proportion of individuals

^b Adjusted for baseline characteristics concerning sickness presenteeism, general health, sick-listing and vitality. For a specification of all considered potential confounders, see “Methods” section

^c From the Short Form-36, SF-36 (McHorney et al. 1994; Sullivan et al. 1995), ranged from 0 to 100, where higher scores indicate higher vitality

Table 5 Relative risks (RRs) for fair/poor general health at both follow ups in relation to baseline figures for sickness presenteeism during the previous year, adjusted for confounders

	Employees with fair/poor health at baseline		Employees with good/excellent health at baseline	
	<i>n</i> (cases)	RR (95% CI) fully adjusted model ^a	<i>n</i> (cases)	RR (95% CI) fully adjusted model ^a
Public sector				
Baseline figures	18-month follow up			
Sickness presenteeism				
0–1 time	129 (65)	1.0	1,470 (107)	1.0
2–5 times	309 (177)	1.08 (0.90; 1.32)	1,168 (173)	1.52 (1.20; 1.93)***
>5 times	327 (221)	1.17 (0.96; 1.42)	299 (79)	2.12 (1.60; 2.82)***
Baseline figures	3-year follow up			
Sickness presenteeism				
0–1 time	117 (72)	1.0	1,261 (145)	1.0
2–5 times	263 (174)	1.04 (0.88; 1.23)	1,004 (216)	1.38 (1.13; 1.68)**
>5 times	287 (223)	1.15 (0.98; 1.35)	246 (90)	1.90 (1.49; 2.44)***
Private sector				
Baseline figures	18-month follow up			
Sickness presenteeism				
0–1 time	68 (32)	1.0	989 (78)	1.0
2–5 times	100 (61)	1.17 (0.87; 1.58)	514 (75)	1.33 (1.00; 1.77)
>5 times	115 (93)	1.50 (1.13; 1.98)**	117 (34)	2.08 (1.47; 2.94)***
Baseline figures	3-year follow up			
Sickness presenteeism				
0–1 time	63 (26)	1.0	999 (112)	1.0
2–5 times	104 (72)	1.49 (1.08; 2.07)*	509 (102)	1.31 (1.03; 1.67)*
>5 times	115 (95)	1.71 (1.25; 2.35)**	115 (39)	1.79 (1.30; 2.45)***

95% CI = 95% Confidence interval; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

^a Adjusted for baseline characteristics concerning sickness presenteeism, general health, sick-listing and vitality. For a specification of all considered potential confounders, see “Methods” section

similar even though, in the public sector, small amounts of sick-listing had no significant effect on future general health. Two highly related variables (Spearman's $\rho > 0.5$) also appeared repeatedly in the model in both materials, namely vitality and recuperation (i.e. being recuperated after two days away from work). Since vitality consistently changed (i.e. decreased) the impact of sickness presenteeism on future health to a somewhat higher degree, this variable was chosen to be included in the final fully adjusted model.

Complementary analyses were also carried out for men and women separately for the public sector material and for men in the private sector (the number of women was deemed to be too small in the private sector material) at the 3-year follow up. These analyses rendered similar results as for the total group even though, for men in the public sector, the relatively small study group rendered a wide confidence interval which contributed to a non-significant RR for the effect of sickness presenteeism on future general health (data not shown).

Discussion

To the best of the authors' knowledge, this is the first published study in which sickness presenteeism has been studied prospectively concerning its potential effect on future general health status. In this material, comprising two gainfully employed populations in Sweden, the results showed that sickness presenteeism at baseline was an independent risk factor for fair/poor health at both the 18-month and 3-year follow ups even when a number of potential confounders, including several measures of baseline health status, were considered.

Stratified analyses where the potential contribution of sickness presenteeism on future general health was studied separately among employees with fair/poor health at baseline, and employees with good or excellent health, yielded somewhat inconsistent results. In the public sector, presenteeism appeared as a risk factor for future fair/poor health only among employees with good/excellent health at baseline, whereas in the private sector presenteeism was a risk

factor for fair/poor health within both these strata. Speculatively, these results may reflect differences in the materials, for instance, the possibility that the underlying potential illnesses cited in the reporting of fair/poor general health may differ to some degree between these populations and, subsequently, the impact of sickness presenteeism may interact with these underlying health conditions. However, it should also be remembered that the drop-out rates at the follow ups tended to be higher among employees exhibiting the combination of fair/poor health and more presenteeism at baseline. If sickness presenteeism has a negative impact on future health, as suggested by the results in the total study group, this could have contributed to a selection leading to an underestimation of the relative risks in both populations for workers with fair/poor health at baseline.

This study used two large and clearly divergent materials, most apparently pertaining to work content and gender distribution where the female-dominated public sector represented occupations within the social care and educational sectors, whereas the male-dominated private sector mainly comprised blue-collar industrial workers. Despite these differences, the results were similar in both these populations which indicate that the findings can be generalised and applied to different types of work and working conditions. However, this does not preclude that the effects of sickness presenteeism may interact with varying working conditions as outlined below. It should also be noted that since the analyses did not include employees with a continuous sick-leave period longer than three months at baseline, it may not be possible to generalise the results to this group.

The strengths of this study were the use of two large data materials with diverse basic characteristics, two follow ups which underlined the stability of the results and a careful consideration of several potential confounders including health-related variables, background factors, lifestyle and a number of variables related to the physical and psychosocial work environment.

One major challenge with this study has been to control for the initial health status of the employees since, as earlier mentioned, sickness presenteeism by definition should be an indication of poor health. Despite of the scrutinisation of a wide array of potential confounders there may be residual confounding that influence, or at the worst, explains the result. As we also have discussed in a further study on sickness presenteeism and future sickness absenteeism (Bergström et al. 2009), sickness presenteeism as measured here may to some degree be a complementary health measurement that represent aspects of health that is not captured in other health measurements. It should be noted that for instance vitality and general health describes the individuals' perception of her-/himself as having a certain health (or vitality) status whereas the sickness presenteeism item refers to the behaviour going to work in specified situations,

i.e. when having poor health. This may mean that some variations in health is more sensitively captured in the sickness presenteeism item than in the described confounders. Therefore, this study needs replication in other materials and with further refined methods. However, despite of these challenges the present study brings new and empirically based scientific knowledge concerning sickness presenteeism.

A further way to think about the result may also be that sickness presenteeism is an expression of a strenuous life-situation in total for some individuals, and/or one behavioural strategy among a wider set of stress-related behaviours. A person that goes to work despite illness, for instance because of job insecurity or a troublesome personal economic situation, may also experience strain due to these circumstances in many other areas of life which may affect this person's biological system and health directly, or indirectly due to less healthy and/or more health impairing behaviours (Baum and Posluszny 1999). This situation may also have long-term consequences for health. In the present study the possible influence of a number of lifestyle and stress-related variables were adjusted for (see "Methods") but, nevertheless, this discussion may be of importance.

Limitations of this study included the fact that sickness presenteeism was measured only with a single item and no information on the number of days for reported instances of presenteeism was available. Also, except for sick-listing data from payrolls, all variables were self-reported which could have introduced common-method bias (Podsakoff et al. 2003). Finally, as earlier described the drop-outs could have skewed the results.

Although it is still too early to draw any definite conclusions, both this study and the cited study by Kivimäki et al. (2005) show that sickness presenteeism has negative effects on different aspects of future health. This suggests the emergence of sickness presenteeism as an issue to be considered not only from the perspective of lost productivity (Goetzel et al. 2004) but also as a health issue for employers and the occupational health services, as well as other possible stakeholders. For instance, as earlier reported, some measures aimed at decreasing sickness absence (Grinyer and Singleton 2000; Munir et al. 2007) may instead increase sickness presenteeism and, in the long-term, lead to detrimental health effects among employees, finally giving rise to more sickness absence. The challenge here would be to develop strategies that promote the health of employees while remaining profitable and attractive to employers.

Separate complementary analyses for men and women were carried out for the public sector and similar tendencies were found across gender. However, for men the study group was relatively small and the RR associated with sickness presenteeism for future poor health was not

statistically significant. Larger study groups and a simultaneous consideration of different occupational groups would be needed for more conclusive results concerning potential differences for men and women related to sickness presenteeism.

Several important research issues pertaining to sickness presenteeism remain to be studied. Among other things, future research needs to tease out the potential interaction between different health conditions and sickness presenteeism. For instance, is sickness presenteeism an independent risk factor for future health problems regardless of the particular state of health concerned (e.g. sickness presenteeism in connection with cardiovascular disease or presenteeism caused by back pain)? Another line of research refers to the possible interaction between sickness presenteeism and different working conditions, such as work demands and the level of control over, and flexibility in, the work situation. It seems reasonable that working while sick under high pressure and in a non-flexible work situation may pose a greater risk to health than a flexible situation with less work demands. Eventually, one variable of special interest in relation to sickness presenteeism is sickness absence since, as mentioned in the introduction, these are the alternatives for an employee in a situation of poor health and there may be a risk that those “who are present when sick today are the ones who will be sick and absent in the future” (Aronsson and Gustafsson 2005, p. 965). Therefore, in a forthcoming study we will analyse the potential relationship between sickness presenteeism and future sick leave (Bergström et al. 2009).

In conclusion, this study showed that sickness presenteeism is an independent risk factor for future fair/poor health and highlights the importance of further studies on the relationship between sickness presenteeism and health.

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