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Sickness Presenteeism Today, Sickness Absenteeism Tomorrow? A Prospective Study on Sickness Presenteeism and Future Sickness Absenteeism

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Learning Objectives

- Review the concept of sickness presenteeism, including previous findings, its associated factors and relationship to sickness absenteeism.
- Outline the findings on sickness presenteeism as a predictor of future sickness absenteeism in the two distinct populations studied by Bergström et al.
- Discuss the implications for research and clinical practice, including the possibility that efforts to reduce sickness absenteeism could inadvertently lead to sickness presenteeism.

Objective: To prospectively investigate whether sickness presenteeism (SP), ie, going to work despite illness, has an impact on future sickness absenteeism. **Methods:** Two study populations were used, one female dominated from the public sector that included 3757 employees, and one male dominated from the private sector comprising 2485 employees. **Results:** SP on more than five occasions during the baseline year (2000) was a statistically significant risk factor for future sick leave (2002 and 2003) of more than 30 days among both populations even after adjusting for previous sick leave, health status, demographics, lifestyle, and work-related variables (2002, public sector, relative risk = 1.40; private sector, relative risk = 1.51). **Conclusions:** SP may be an important phenomenon to consider when evaluating measures aimed at decreasing sickness absenteeism because more SP may lead to future sickness absence. (J Occup Environ Med. 2009;51:629–638)

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Sickness presenteeism (SP), ie, when an employee goes to work despite feeling so ill that he or she judges that sick leave would have been proper, appears to be a prevalent phenomenon at workplaces. In different materials, 63% to 83% of employees report having gone to work despite illness on at least at one occasion during the previous year.^{1–4} During recent years, SP has been studied from an epidemiologic perspective concerning its determinants and prevalence,^{1,3–5} from a qualitative perspective addressing employees' or employers' perspectives on SP,^{6–8} and from an economic perspective related to its impact on the productivity of an organization.^{9–12} Different terms may be used for SP, one synonym is sickness presence and in studies concerning on-the-job productivity loss often the term “presenteeism” is used.

Poor health has been proposed to be a prerequisite for SP¹³ but several other factors, both related to work and to personal circumstances, have also been associated with an increased risk of SP. Examples of such work factors are low replaceability or high attendance requirements, eg, having to catch up virtually all work after a period of absence,^{1,5,13,14} lack of work resources,^{1,4} time pressure,^{1,4} job stress,³ job insecurity,⁴ and long work hours.⁴ Personal factors include financial problems,¹ individual boundarylessness,¹ over-commitment to work,⁴ conservative attitudes toward

sickness absence,⁴ age,^{1,4} and education that is limited to compulsory school.¹ Work factors in total have been suggested to have a somewhat stronger relation to SP than personal circumstances.⁴

A few studies have presented findings on how SP relates to sickness absenteeism. In a representative sample of Swedish employees, a cross-sectional analysis showed that a greater frequency of SP episodes was associated with more absenteeism⁵; a similar result has been observed in a random sample from the Danish labor market,⁴ in a Nordic population of female employees working within elderly care,³ and in a Canadian public service organization.¹⁴ Furthermore, in a Dutch study on productivity loss before or after periods of sickness absenteeism it was shown that 35% of the employees experienced SP before or after periods of sickness absenteeism.¹⁵

In a study by Grinyer and Singleton¹⁶ using both quantitative and qualitative methodology, SP was considered a hazardous work exposure potentially related to a heightened risk of poor health and subsequent prolonged sick leave. In this study, the two main factors causing employees to go to work despite illness were responsibilities or obligations toward colleagues and a “trigger” system whereby all employees reaching four periods of sickness absenteeism had to participate in an interview concerning their sick leave. According to the authors, the risk of negative health effects from SP may arise when several incidences of minor illness are not taken care of, eventually increasing the likelihood of prolonged periods of sick leave.

In another study,⁸ inflexible strategies to cut short-term sickness absenteeism again appeared to make employees more prone to work despite apparent illness. Furthermore, this seemed to prevent them from managing their ill health which, especially among those with chronic illness, may increase the risk of subsequent long-term sickness absenteeism.

In some (chronic) cases, SP may also be accompanied by concealing the illness at the workplace for fear of losing one’s job, being redeployed etc.⁸ This could also be detrimental to health in the long run because such employees may, for instance, not take medications properly, not seek available support, or make necessary work adjustments.

The above studies used cross-sectional methodologies, which are useful for detecting associations between variables but insufficient to establish any causal links between SP and sickness absence, or SP and health. Nevertheless, using a longitudinal design, Kivimäki et al¹⁷ found that men with poor health who did not take any sick leave during a period of 2 years after a baseline measurement had a higher risk of future cardiovascular disease compared with men with a moderate amount of sick leave. Assuming that no sickness absenteeism was associated with more SP among these men, this study indicates that SP may have a negative effect on the health of an individual. Furthermore, in a submitted study that also used a prospective design, we found that SP was a risk factor for future fair/poor self-reported general health even after adjusting for a number of potential confounders at baseline, including several health measures, background variables, and factors in the physical and psychosocial work environment (Bergström, Bodin, Hagberg, Nilsson, Aronsson, and Josephson). This result was found both in a male-dominated population from the processing and engineering industries ($n = 2682$) and in a female-dominated study population that included mainly healthcare workers, administrative personnel, and teachers ($n = 6901$). Both of these prospective studies indicate that SP is a risk factor for future poor health and may therefore also lead to more sickness absenteeism.^{18,19}

Aronsson and Gustafsson¹ have described a model for research where both destructive and salutogenic factors in the work environment are

considered with reference to SP and sickness absenteeism. For instance, among employees already on long-term sick leave, a work environment that provides social support and opportunities for adjustment of work tasks may constitute a health-promoting alternative to continued sick leave. On the other hand, in the acute stage of a disease the need for rest and recuperation outweigh the salutogenic effects of the work environment, that is, in this stage SP could be harmful to health. This model also suggests that the potential impact of SP on health depends on the type of health problem or diagnosis in question, the general health status of the employee, as well as physical and psychosocial characteristics of the work environment.

The primary aim of this study was to investigate whether SP has an impact on future sick leave. A secondary aim was to investigate if the potential effect of SP on future sick leave differs between groups with good/excellent health versus fair/poor health. To the authors’ knowledge, this is the first study where the potential impact of SP on future sickness absenteeism has been studied.

Materials and Methods

This prospective study used two sets of data collected from a number of Swedish workplaces within the public and the private sector between 1999 and 2003. A comprehensive survey was administered at baseline and information on sickness absence was gathered from registers during the 3- to 4-year follow-up period.

Materials and Procedure

Public Sector. This material was gathered in a study entitled Work and Sustainable Health in the Public Sector in Sweden,²⁰ the HAKuL (Swedish abbreviation) Study. The HAKuL Study was conducted in four county and six municipal healthcare systems, covering the southern, middle, and northern parts of Sweden. However, in this study data from two counties and five municipalities were used since

follow-up data from registers on sickness absence were available for these participants. The main occupational groups were registered nurses, assistant nurses, home-based personal care workers, workers in elderly care, employees at childcare centers, administrative personnel, and teachers. The baseline questionnaire was sent to 6223 employees in two counties and five municipalities; 5145 employees or 83% (83% women; 17% men) responded. Women had a response rate of 85% compared with 75% for men, and occupations requiring longer training had higher response rates than occupations requiring shorter training. During the period 1999 to 2003, three questionnaires were administered: at baseline, after 18 months, and after 3 years. Of those employed at the 18-month follow-up, information on sick leave was obtained from the employers' computer-based personnel files for the years 2000 to 2002. In four of the municipalities, sick leave data were also obtained for year 2003.

Private Sector. This material was gathered in a study entitled Work and Health in the Processing and Engineering Industries,²¹ the AHA (Swedish abbreviation) study. This study was carried out at four workplaces within the private industry sector; two were paper mills that included occupations such as operators, technicians, laboratory workers, and repairmen; one was a truck manufacturer that included jobs as assemblers, mechanics, painters, and truck drivers; and one was a steelworks with material handlers, tube workers, repairmen, and material preparers. The baseline questionnaire was sent to 4160 employees (3679 men; 481 women), of whom 2894 or 70% (2523 men; 371 women) responded. The response rates were 77% among women and 69% among men, and 66% for blue-collar workers and 89% for white-collar workers. Data on sick leave for the employees were obtained from the companies' pay registers for the years 2000 to 2003.

The inclusion criteria for this study (both materials) were 1) hav-

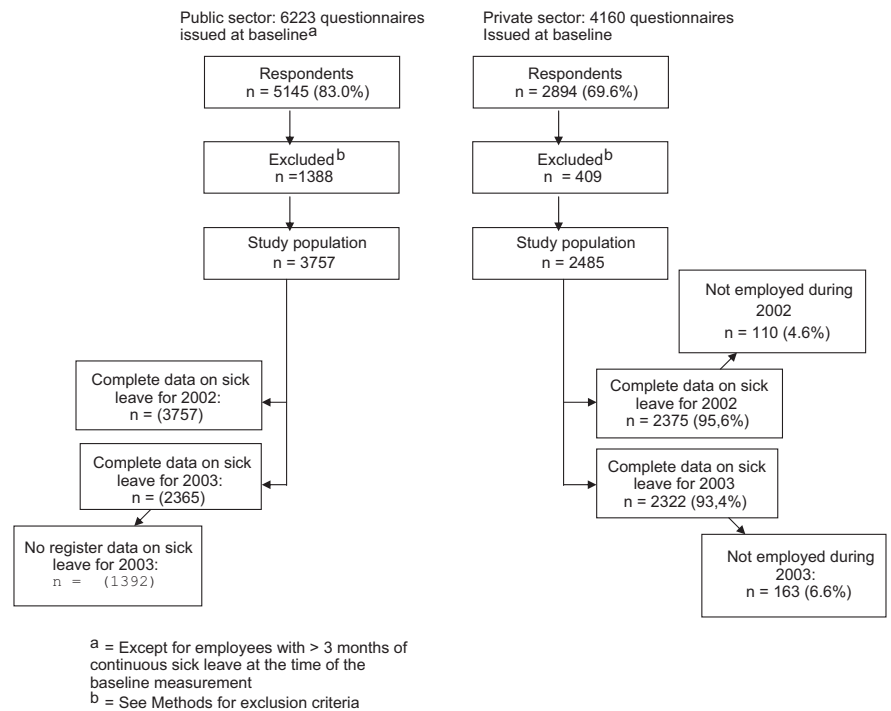


Fig. 1. Flow of subjects.

ing held the current work position for at least 1 year and complete information on this item; 2) having worked at least 20 hrs/wk and complete information on this item; 3) complete information on SP at baseline as well as 4) a complete record of sickness absence for the year of the baseline measurement. Furthermore, subjects in the public sector who had a continuous period of sick leave longer than 3 months at the time of the baseline measurement were excluded in an earlier step of the recruitment process and the same exclusion criterion was, therefore, applied to the private sector to make the two materials more comparable.

As shown in Fig. 1, 1388 individuals were excluded from the analyses in the public sector material and 409 in the private sector material. The main reason for exclusion was lack of information on sick leave during the baseline year both in the public sector ($n = 929$) and in the private sector ($n = 181$). As shown in Table 1, the gender distribution in these two materials was very different, with 85% women in the public sector and 13% women in the private sec-

tor. Furthermore, the proportion of smokers was higher in the public sector, and the proportion of employees with excellent/very good health and the proportion with no SP at all were higher in the private sector.

Measurements

Except for the outcome variable sick leave, all data used in this study were self-reported in questionnaires.

Predictor (Explanatory) Variable. SP 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 you really should have taken sick leave because of your state of health? The response format was 1) "No, never," 2) "Yes, once," 3) "Yes, 2 to 5 times," 4) "Yes, >5 times." This question has been used in earlier research on SP.^{1,5} In the analyses, three categories were used: 0 to 1 times (0), 2 to 5 times (1), and >5 times (2).

Outcome Variable. Data on sick leave were obtained from the participating organizations' registers for the years 2002 and 2003. In the main analyses, this variable was coded as dichotomous; ≤ 30 days (0) and >30

TABLE 1
Baseline Characteristics From Year 2000 for the Study Populations

Characteristics	Public Sector (n = 3,757)	Private Sector (n = 2,485)
Background/demographic factors at baseline		
Age, n (%)		
<34	706 (19)	654 (26)
35–54	2,252 (60)	1,425 (57)
>55	799 (21)	406 (16)
Gender, n (%)		
Female	3,186 (85)	314 (13)
Male	571 (15)	2,171 (87)
Education, n (%)		
Compulsory school (1–9 yr)	482 (13)	816 (33)
Secondary school (10–12 yr)	1,317 (36)	1,414 (57)
University education (13 yr or more)	1,412 (38)	236 (10)
Other form of education	490 (13)	—
Smokers, n (%)	1,127 (30)	500 (20)
Work status ^a , n (%)		
Blue-collar worker		1,932 (78)
White-collar worker		551 (22)
Leadership role	136 (4)	—
Theoretical expert competence	609 (16)	—
Shorter University education	767 (20)	—
Skilled work	2,075 (55)	—
Unskilled work	157 (4)	—
General health, n (%)		
Excellent/very good	1,300 (35)	1,128 (45)
Good	1,525 (41)	949 (38)
Fair/poor	918 (24)	405 (16)
Occasions of sickness presenteeism during the previous year		
None	765 (20)	1,010 (41)
One occasion	695 (18)	345 (14)
2–5 occasions	1,568 (42)	808 (32)
More than five occasions	729 (19)	322 (13)

^aFor the public sector categories according to International Standard Classification of Occupations-88 were used.

days, 1) however, in some complementary analyses it was also coded as a trichotomous variable according to the following categories: ≤ 7 days (0), 7 to 30 days (1), and > 30 days (2).

Potential Confounders. Sick leave for the year of the baseline measurement (year 2000) was regarded as an a priori confounder.

Health-Related Variables

Mental health, vitality, physical and psychological role function, and general health (one item) from the Short Form-36^{22,23} exhaustion from the Maslach Burnout Inventory (MBI) General Survey,²⁴ and unwinding and recuperation.²⁵

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-88, whereas in the private sector employees were categorized as either white or blue-collar workers.

Lifestyle factors were smoking,²⁶ hazardous alcohol consumption,²⁷ and perceived stress in everyday life.²⁸

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.²⁹

Psychosocial factors at work in the public sector were control, demand, and social support,^{30,31} interaction

between work and private life,³² and satisfaction with leadership. Psychosocial factors in the private sector were quantitative work demands, control of work pace, support from superior, support from coworkers, empowering leadership, social climate at work, commitment to the organization, and interaction between work and private life; these were assessed by use of the General Nordic Questionnaire for Psychological and Social Factors at Work, QPSNordic.³² The reason for using different measurements and variables concerning psychosocial factors at work was that there were differences in the questionnaires used in the HAKuL and AHA studies.

Statistical Analyses

As previously described, the outcome variable sick leave was primarily coded as a dichotomous variable. Relative risks (RRs) with 95% confidence intervals (CIs) were estimated by using a modified Poisson regression³³ in SPSS 16.0. First, associations between the explanatory variable (SP) and the potential confounders were examined (Spearman's rho). Second, we used each one of the potential confounders together with SP to estimate RRs. Confounders that changed the crude RR of SP less than 10% were not included in subsequent analyses. To check for collinearity and illustrate the associations between the independent variables, structural plots (graphs) were drawn between the variables.³⁴ We then used a mixture of best subset regression, backward selection, and forward selection together with Akaike's information criterion to obtain equally good statistical models with a limited number of explanatory variables. Indices (from the questionnaires) were analyzed alternatively both as continuous and categorized variables to minimize the risk of leaving out any essential confounder.

The fully adjusted final model was also used in the stratified analyses where employees with fair/poor health and employees with good/

excellent health at baseline were studied, respectively. Complementary analyses were also carried out using a nominal logistic regression with three outcome categories to relax the dependence on a single cutoff on 30 days of sickness absence. The chosen cutoffs were 7 days and 30 days of sick leave.

Statistical inference was judged from CIs and *P* values in three different ways. First, an overall significance was determined indicating whether a significant contribution to the model was achieved by SP. Then CIs for the RRs were determined. Finally, we used the ordinal nature of the three SP categories described earlier to estimate a linear trend between the outcome and these categories, coded as 0, 1, and 2. This trend analysis gave an estimate of the average change in the RRs for a one-unit (one category) increase in SP and a complimentary overall significance as well. Overall effects and trend analyses are presented for analyses related to the primary aim of the study.

Attrition

As shown in Fig. 1, data on 2365 employees were available for the year 2003 in the public sector. A short description based on baseline data of those 1392 employees that were not included in these analyses (year 2003) showed that 87% were females and the mean age was 45 years (SD = 10). As listed in Table 1, these figures are similar to that of the entire study population. In the private sector, 110 individuals terminated their employment before or during 2002; this group consisted of 24% women and the mean age was 47 years (SD = 13). For the 163 individuals, who were not employed during 2003, 20% were women and the mean age was 47 years (SD = 13). Consequently, among the proportionally small group that had stopped working during the follow-up years, a somewhat higher percentage were women compared with the whole study population.

Results

Table 2 describes the amount of sick leave in days during years 2000, 2002, and 2003 compared with the frequency of SP at baseline. More SP at baseline is consistently related to more sick leave at both baseline and during years 2002 and 2003, especially this was the case for those with >5 times of SP. As indicated in Table 2, the number of individuals varies since some employees had left the organization (private sector) or because data were not collected during 2003 at three of the workplaces in the public sector.

The overall effect of SP (fully adjusted model) was significant in

both the public (*P* = 0.001) and the private (*P* = 0.031) sector for 2002, but not for 2003 (private sector, *P* = 0.061; public sector, *P* = 0.21). As listed in Tables 3 and 4, a frequency of SP >5 times during the baseline year increases the risk of >30 days of sickness absenteeism during the second year (2002) of follow-up in both the public and private sectors (compared with the reference category 0 to 1 times of SP). During the third year of follow-up, SP >5 times at baseline remains a risk factor for sickness absenteeism (compared with the reference category) in the private sector but not in the public sector. Trend analyses showed a sig-

TABLE 2
Days of Registered Sick Leave During the Baseline Year (2000), 2002, and 2003 Related to Frequency of Self-Reported Sickness Presenteeism at Baseline

	Frequency of Sickness Presenteeism at Baseline (2000)		
	0-1 Times	2-5 Times	>5 Times
Public sector			
Sick leave, number of days			
Year 2000—baseline, n (%) (n = 3,757)			
0 < d ≤ 7	1,093 (75)	1,106 (70)	396 (54)
7 < d ≤ 30	214 (15)	245 (16)	131 (18)
30 < d ≤ 365	153 (10)	217 (14)	202 (28)
Year 2002, n (%) (n = 3,757)			
0 < d ≤ 7	1,008 (69)	948 (60)	365 (50)
7 < d ≤ 30	231 (16)	302 (19)	119 (16)
30 < d ≤ 365	221 (15)	318 (20)	245 (34)
Year 2003, n (%) (n = 2,365)			
0 < d ≤ 7	650 (71)	660 (65)	253 (57)
7 < d ≤ 30	148 (16)	184 (18)	69 (16)
30 < d ≤ 365	112 (12)	169 (17)	120 (27)
Private sector			
Sick leave, number of days			
Year 2000—baseline, n (%) (n = 2,485)			
0 < d ≤ 7	1,029 (76)	510 (63)	148 (46)
7 < d ≤ 30	264 (19)	236 (29)	99 (31)
30 < d ≤ 365	62 (5)	62 (8)	75 (23)
Year 2002, n (%) (n = 2,375)			
0 < d ≤ 7	934 (72)	471 (60)	136 (45)
7 < d ≤ 30	276 (21)	230 (30)	96 (32)
30 < d ≤ 365	84 (7)	77 (10)	71 (23)
Year 2003, n (%) (n = 2,322)			
0 < d ≤ 7	938 (74)	504 (66)	139 (47)
7 < d ≤ 30	250 (20)	182 (24)	90 (31)
30 < d ≤ 365	82 (6)	73 (10)	64 (22)

TABLE 3

RRs for >30 d of Sick Leave During Respective Year of Follow-Up in Relation to Baseline Figures From 2000 on Sickness Presenteeism and the Detected Confounders for Public Sector

	Total Study Group		
	n (Cases)	Crude RRs Only given for the Explanatory Variable	RR (95% CI) Fully Adjusted Model ^a
Baseline figures (2000)	Year 2002		
Sickness presenteeism	(n = 3,470)		
0–1 times	1,376 (201)	1.0	1.0
2–5 times	1,452 (294)	1.39 (1.18–1.63)***	1.18 (1.00–1.40)*
>5 times	642 (209)	2.23 (1.88–2.64)***	1.40 (1.17–1.69)***
Sick leave during the year of the baseline measurement (2000)			
0 < d ≤ 7	2,467 (355)		1.0
7 < d ≤ 30	529 (133)		1.61 (1.35–1.92)***
30 < d ≤ 365	474 (216)		2.50 (2.15–2.90)***
General health			
Excellent/very good	1,255 (171)		1.0
Good	1,420 (258)		1.14 (0.95–1.36)
Fair/poor	795 (275)		1.59 (1.30–1.93)***
Physical role functioning ^b			
76–100	2033 (320)		1.0
–75	1437 (384)		1.17 (1.01–1.35)*
Baseline figures (2000)	Year 2003		
Sickness presenteeism	(n = 2,188)		
0–1 times	862 (102)	1.0	1.0
2–5 times	932 (153)	1.39 (1.10–1.75)**	1.11 (0.88–1.41)
>5 times	394 (103)	2.21 (1.73–2.83)***	1.29 (0.97–1.70)
Sick leave during the year of the baseline measurement (2000)			
0 < d ≤ 7	1,656 (215)		1.0
7 < d ≤ 30	289 (63)		1.49 (1.16–1.91)**
30 < d ≤ 365	243 (80)		1.84 (1.46–2.32)***
General health			
Excellent/very good	790 (67)		1.0
Good	895 (146)		1.73 (1.31–2.28)***
Fair/poor	503 (145)		2.46 (1.81–3.33)***
Physical role functioning ^b			
76–100	1,283 (165)		1.0
–75	905 (193)		1.14 (0.93–1.40)

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

^aRRs for sickness presenteeism were adjusted for baseline characteristics concerning sick leave the year of the baseline measurement, general health, and physical role functioning. For a specification of all considered potential confounders, see Methods section.

^bFrom the Short Form-36^{22,23} ranged from 0 to 100, where higher scores indicate better physical role functioning.

nificant increase in the RRs (fully adjusted model) in the public sector for 2002 (RR = 1.18, CI 1.08–1.30) but not for 2003 (RR = 1.13, CI 0.98–1.30). In the private sector, the trend analyses were significant both for 2002 (RR = 1.22, CI 1.04–1.44) and 2003 (RR = 1.22, CI 1.03–1.44).

During the statistical analyses, different constellations of confounders

meeting the described criteria were tested together with SP. However, the impact of SP on future sickness absenteeism remained throughout the analyses. As listed in Tables 3 and 4, figures are also given for the confounders in the models with the best fit according to Akaike's criterion.

To analyze whether the effect of SP on sickness absenteeism may dif-

fer depending on the perceived health status at baseline, analyses of a potential interaction between general health and SP were carried out. These analyses rendered not significant interaction terms at both follow-ups and in both materials; thus, no such interaction was found. Furthermore, in accordance with the second aim of the study, employees were stratified into those with fair/poor health at baseline and those with good/very good or excellent health; these results are listed in Table 5. Taken together, RRs of the same magnitude and in the same directions as for the total study population were found for those with fair/poor health and those with good/excellent health, respectively even though the majority of RRs were not significant.

Complementary analyses for 2003 were also carried out separately for women in the public sector and for men in the private sector (the number of men in the public sector and women in the private sector were deemed too small). These analyses rendered not significant figures for an overall effect of SP on sick leave both in the public ($P = 0.22$) and in the private sector ($P = 0.16$). Again, RRs of the same size and directions were found as in the total study population. Furthermore, the nominal logistic regression using three outcome categories (see Statistical methods) did not indicate that an alternative cutoff of >7 days of sick leave for the outcome variable would have changed the results (data not shown).

Discussion

The results of this study showed that SP was a risk factor for future sick leave in two gainfully used study groups, one female-dominated population from the public sector and one male-dominated population from the private sector. These results remained even after adjusting for several confounders including previous sick leave, perceived health status, work-related variables, lifestyle, and demographics. Analyses, where

TABLE 4

RRs for >30 d of Leave During Respective Year of Follow-Up in Relation to Baseline Figures on Sickness Presenteeism and the Detected Confounders for Private Sector

	Total Study Group		
	n (Cases)	Crude RRs Only given for the Explanatory Variable	RR (CI) Fully Adjusted Model ^a
Baseline figures (2000)	Year 2002		
Sickness presenteeism	(n = 2,361)		
0–1 times	1,284 (84)	1.0	1.0
2–5 times	776 (77)	1.52 (1.13–2.04)**	1.11 (0.83–1.49)
>5 times	301 (69)	3.50 (2.61–4.70)***	1.51 (1.10–2.08)*
Sick leave during the year of the baseline measurement (2000)			
0 < d ≤ 7	1,597 (76)		1.0
7 < d ≤ 30	579 (85)		2.54 (1.88–3.45)***
30 < d ≤ 365	185 (69)		5.38 (3.94–7.34)***
General health			
Excellent/very good	1,074 (52)		1.0
Good	912 (97)		1.79 (1.26–2.55)**
Fair/poor	375 (81)		2.02 (1.33–3.06)**
Vitality ^b			
0–55	518 (103)		1.0
55.1–70	658 (50)		0.63 (0.46–0.86)**
70.1–85	811 (50)		0.73 (0.52–1.04)
85.1–100	374 (27)		1.07 (0.67–1.72)
Working with arms above the shoulder			
Never/almost never	1,371 (116)		1.0
5–30 (min/d)	619 (57)		0.85 (0.64–1.13)
31–60 (min/d)	177 (27)		1.58 (1.11–2.24)*
>60 (min/d)	194 (30)		1.14 (0.80–1.63)
Baseline figures (2000)	Year 2003		
Sickness presenteeism	(n = 2,308)		
0–1 times	1,260 (80)	1.0	1.0
2–5 times	757 (73)	1.52 (1.12–2.06)**	1.14 (0.84–1.56)
>5 times	291 (63)	3.41 (2.52–4.62)***	1.49 (1.06–2.08)*
Sick leave during the year of the baseline measurement (2000)			
0 < d ≤ 7	1,565 (85)		1.0
7 < d ≤ 30	568 (78)		2.02 (1.51–2.71)***
30 < d ≤ 365	175 (53)		3.61 (2.64–4.93)***
General health			
Excellent/very good	1,053 (54)		1.0
Good	893 (82)		1.59 (1.11–2.27)*
Fair/poor	362 (80)		2.32 (1.54–3.49)***
Vitality ^b			
0–55	505 (95)		1.0
55.1–70	644 (47)		0.66 (0.48–0.91)*
70.1–85	792 (43)		0.70 (0.47–1.04)
85.1–100	367 (31)		1.30 (0.82–2.05)
Working with arms above the shoulder			
Never/almost never	1,332 (108)		1.0
5–30 (min/d)	611 (48)		0.79 (0.58–1.08)
31–60 (min/d)	174 (20)		1.28 (0.84–1.96)
>60 (min/d)	191 (40)		1.64 (1.18–2.29)**

*P < 0.05; **P < 0.01; ***P < 0.001.

^aRRs for sickness presenteeism were adjusted for baseline characteristics concerning sick leave the year of the baseline measurement, general health, and vitality and working with hands above the shoulder. For a specification of all considered potential confounders, see Methods section.

^bFrom the Short Form-36^{22,23} ranged from 0 to 100, where higher scores indicate better vitality.

the study groups were stratified into groups with fair/poor health and good/excellent health and analyzed separately, showed similar results as for the total study population although fewer RRs were statistically significant.

As described in the Introduction section, SP has been positively correlated in previous studies with sickness absence in cross-sectional analyses.^{3–5,14} In this study, this association was also shown prospectively because both the trend analyses and the RRs indicate that a greater number of SP episodes independently was related to higher RRs for future sickness absenteeism. This suggested dose-response gradient underscores that the number of SP episodes matters and that, in this study, a frequency of more than five SP episodes was needed during the previous year to reach a critical incidence of SP that was predictive of more sickness absence (compared with the reference of SP 0 to 1 times at baseline). A frequency of 5 times or more SP should, however, be seen as tentative, since this was the maximum possible rating and a different response format may have modified the results. Furthermore, since no information on the duration of SP episodes was gathered it was not possible to balance frequency against duration in the analyses. Nonetheless, the results support the indication that the incidence of SP is of importance for the risk of future sickness absence.

Analyses of a potential interaction between perceived general health and SP rendered not significant results, thus, indicating that the effects of SP on future sickness absence did not differ between employees with fair/poor health and those with good/excellent health. Furthermore, separate analyses for these two strata rendered results similar to those of the total population. Consequently, though it may seem plausible that individuals with poor health would be more vulnerable to the “stress” that SP reasonably entails, and would

TABLE 5

RRs for >30 d of Sick Leave During Respective Year of Follow-Up in Relation to Baseline Figures on Sickness Presenteeism, Adjusted for Confounders. Stratified by Health Status at Baseline

	Employees With Fair/Poor Health at Baseline		Employees With Good/Excellent Health at Baseline	
	n (Cases)	RR (CI) Fully Adjusted Model ^a	n (Cases)	RR (CI) Fully Adjusted Model ^a
Public sector				
Baseline figures (2000)	Year 2002			
Sickness presenteeism	(n = 795)		(n = 2,675)	
0–1 time	128 (36)	1.0	1248 (165)	1.0
2–5 times	332 (103)	1.09 (0.79–1.49)	1120 (191)	1.21 (1.00–1.46)
>5 times	335 (136)	1.30 (0.96–1.77)	307 (73)	1.39 (1.08–1.78)*
Baseline figures (2000)	Year 2003			
Sickness presenteeism	(n = 503)		(n = 1,685)	
0–1 time	72 (20)	1.0	790 (82)	1.0
2–5 times	218 (57)	0.92 (0.60–1.41))	714 (96)	1.17 (0.88–1.55)
>5 times	213 (68)	1.00 (0.66–1.52)	181 (35)	1.46 (1.00–2.14)
Private sector				
Baseline figures (2000)	Year 2002			
Sickness presenteeism	(n = 375)		(n = 1,986)	
0–1 time	79 (10)	1.0	1,205 (74)	1.0
2–5 times	138 (22)	1.17 (0.60–2.27)	638 (55)	1.13 (0.81–1.56)
>5 times	158 (49)	1.57 (0.87–2.84)	143 (20)	1.34 (0.85–2.12)
Baseline figures (2000)	Year 2003			
Sickness presenteeism	(n = 362)		(n = 1,946)	
0–1 time	77 (9)	1.0	1,183 (71)	1.0
2–5 times	133 (24)	1.52 (0.83–2.79)	624 (49)	1.07 (0.75–1.53)
>5 times	152 (47)	1.92 (1.12–3.23)*	139 (16)	1.22 (0.72–2.05)

**P* < 0.05.

^aWithin the public sector the RRs were adjusted for baseline characteristics concerning general health, sick leave and physical role functioning. Within the private sector the RRs were adjusted for general health, sick leave, vitality and working with hands above the shoulder. For a specification of all considered potential confounders, see Methods section.

therefore be at elevated risk of deteriorated health and sickness absence, the results did not support this assumption.

Because SP appeared to be a risk factor for future sickness absenteeism in both the female-dominated public sector, including occupations within the social care and educational sectors, and in the male-dominated private sector represented mainly by blue-collar industrial workers, the results appear to be generally applicable to both men and women and to the different types of work. Furthermore, this study underlines the high rate of sick leave in Sweden. During the period 2000 to 2004, approximately 14% of everyone in the age group 20 to 64 years in Sweden were receiving either sickness benefits or a disability pension on an ordinary weekday.³⁵ There is a higher sick leave rate in the public sector compared with the private sec-

tor, both in our study group and in national data.³⁶ A high rate of employment both among men and women, a high participation of people older than 60 years in the workforce and a liberal social insurance system may partially explain the high number of persons sick listed in Sweden.

One question that needs to be raised is whether SP, as measured in this study, mirrors other aspects of an individual's health than what can be captured in the variables used as confounders. SP is both an indirect measure of health as well as it measures self-reported behavior in specific situations (going to work despite feeling so unwell that sickness absence would have been an alternative). For instance, some individuals may score "good" health in the general health item from Form-36 but, nevertheless, indicate that he or she had gone to work

several times during the last year despite feeling ill. Consequently, the health of these individuals has probably been fair or poor on several occasions despite a self-report of good health in general. From this perspective, SP may be seen as a complementary measurement, capturing aspects of health other than those reflected by conventional measures of general health, vitality or mental health, for example. In addition, because SP measures behavior in specific situations it may be a sensitive measure of possible changes or fluctuations in an individual's health that are not immediately captured in health measurements based on an individual's perception of his or her average health status during a defined time period. If there is some truth in this discussion, it may well be that it is not only the behavior itself, ie, to go to work despite illness, that has a negative impact on future health but

also a matter of previous health status predicting future sickness absence.

Even though a number of potential confounders were considered in our analyses, it is possible that another constellation of variables would have changed the results. Because researches on SP or studies that focus simultaneously on SP and sickness absenteeism are scarce, the theoretical and empirical knowledge concerning the associations between these constructs is relatively limited. This situation makes it more challenging to choose relevant potential confounders. Furthermore, the outcome variable sickness absence was analyzed only as the total amount of sickness absence per year with no regard to absence incidence, ie, the number of absence periods during the year. This may be considered as a limitation to the study. There are also several strengths in the study, such as the use of two relatively large populations with clearly different characteristics, the prospective design, the use of register data for sickness absenteeism, and the scrutiny of several potential confounders.

The findings in this study lend some support to the concerns expressed in earlier studies^{8,16} that some measures intended to decrease sickness absence, if they lead to an increase in SP, may in the long run inadvertently increase sick leave. This underscores the importance of including SP in the evaluations of such interventions and considering the effects from a long-term perspective. The results may also indicate the health-promoting aspects of taking sick leave in certain situations, which also has been shown or discussed in earlier studies.^{1,17,18,37} In addition, although the scope of this study was not to consider SP from an economic or productivity perspective, the results suggest that SP may also cause future increases in costs for the employee, the employer, and the society due to sickness absenteeism.

Future research concerning the effects of SP on sickness absenteeism need, among other things, to address

whether the type of health problem or diagnose that underlies the SP interacts with the outcome. For instance, is SP a risk factor for future sickness absence regardless of the specific state of health concerned (eg, SP due to cardiovascular disease or SP caused by back pain)? Furthermore, a closer look at how various work characteristics may affect the potential effects of SP would also be needed. As an example, it seems reasonable that better possibilities to make adjustments and to cope with health problems at work, may be also in combination with high social support, could modify a potential impact on health from SP.¹

Taken together, this study indicates that several episodes of SP during the previous year is a risk factor for future sickness absenteeism even after adjusting for several health-related, lifestyle, demographic, and work-related variables at baseline. We recommend that more interest is focused on SP from researchers, employers, and occupational health services to gain more knowledge on this issue.

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