Age differences in the associations between sick leave and aspects of health, psychosocial workload and family life: a cross-sectional study

Nathalie C G M Donders, Judith T Bos, Koos van der Velden, Joost W J van der Gulden

Department of Primary and Community Care, Radboud University Nijmegen Medical Centre, Nijmegen, the Netherlands

Correspondence to
Dr Nathalie C G M Donders;
n.donders@elg.umcn.nl

ABSTRACT

Objectives: To investigate differences in associations between sick leave and aspects of health, psychosocial workload, family life and work—family interference between four age groups (<36, 36—45, 46—55 and 55 + years).

Design: A cross-sectional study; a questionnaire was sent to the home addresses of all employees of a university.

Setting: A Dutch university.

Participants: 1843 employees returned the questionnaire (net response: 49.1%). The age distribution was as follows: <36: 32%; 36—45: 26%; 46—55: 27% and 55+: 12%.

Primary outcomes: Frequent sick leave (FSL, ≥ 3 times in the past 12 months) and prolonged sick leave (PSL, >2 weeks in total in the past 12 months). Differences between the age groups in independent variables and outcomes were investigated. Logistic regression analysis was used to calculate associations between various variables and the sick leave outcomes. Interaction terms were included to detect differences between the age groups.

Results: Age differences were found for many work- and family-related characteristics but not in the mean scores for health-related aspects. Presence of chronic disease was reported more frequently with increasing age. The 55+ age group had almost two times less chance of FSL, but 1.6 times more chance of PSL than the <36 age group. Age moderates the associations between career opportunities, partner's contribution in domestic tasks and sex, and FSL. Job security and pay, support from supervisor, challenging work and being breadwinner have different associations with PSL. However, life events in private lives and perceived health complaints are important in all age groups. FSL and PSL have some determinants in common, but there are differences between the outcomes as well.

Conclusions: Age should be treated as a variable of interest instead of a control variable. Employers and occupational physicians need to be aware that each phase in life has specific difficulties that can lead to FSL and PSL.

ARTICLE SUMMARY

Article Focus
- This article focuses on both the differences in work-related characteristics, family-related characteristics, work—family interference, health-related characteristics and frequent (FSL) and prolonged sick leave (PSL) between four age groups and their associations with two sick leave outcomes.

Key messages
- Older workers report more often PSL and presence of chronic disease but less FSL than younger workers. However, they have equally high scores on fatigue, emotional exhaustion and perceived health complaints and several psychosocial work characteristics.
- Age is important to take into consideration when investigating the associations between psychosocial workload, family-related characteristics and FSL and PSL.

Strengths and limitations of this study
- Knowledge on age differences in the relationship between psychosocial workload, family, health and sick leave is scarce. The results from our cross-sectional study may help managers and occupational physicians in supporting employees.
- Our population involved mainly knowledge workers, a rapidly growing occupational group in many modern economies.

INTRODUCTION

Sick leave is a substantial economic burden in societies where employees receive sick leave benefits.[1 2] In the light of the upcoming shortage of work force due to demographic changes,[3-5] it has become increasingly important to reduce sickness absence. Sick leave is associated with many factors. Psychosocial workload like increased job demands, low job control and low support has shown to be associated with diminished health and absence.[6-8] Family-related factors

like marital status and children at home are either controlled for (and associations are not made visible) or inconsistent results are found.[9] [10] In addition, having difficulties with combining the demands at work and in family life, possibly resulting in work—family conflict, is related to ill health and sick leave.[11] [12] To understand the factors affecting sick leave, it is important to take all these domains simultaneously into account.

Due to the tight labour market, it is important to keep employees of all ages well motivated and healthy on the job. Although some studies included factors from various domains to explain sick leave,[1] to date, it is unclear whether there are differences between age groups in the relationships between psychosocial workload, family-related factors and health and sick leave. Since dissimilarities between workers from different age groups are present, it is quite possible that determinants of sick leave vary between different age groups. For example, the presence of chronic disease is associated with increased sick leave[2] and is more prevalent in older people.[13] Perhaps the presence of a chronic disease is an important determinant for sick leave only in older employees. Work—family balance is experienced differently between age groups[14] and is found to be associated with sick leave.[10] Therefore, work—family interference (WFI) or characteristics pertaining to domestic tasks and childcare might be more strongly associated with sick leave in younger employees.

The aim of this study was to explore age differences in determinants of sick leave as this provides insight into the desirability of age-related support and interventions to reduce sick leave. Although most research on sick leave is focused on either frequent sick leave (FSL) (ie, the number of sick leave spells during 1 year) or prolonged sick leave (PSL) (ie, sick leave with a duration longer than, eg, 2 weeks in total in 1 year), this paper focuses on both FSL and PSL for several reasons. First, both sudden and long-term replacements of employees are expensive and difficult to achieve. Second, determinants of the two sick leave measures may differ.[15] [16] Moreover, FSL may have to do with motivational aspects or unwillingness to work, whereas sick leave duration can be considered as an indicator of involuntary absenteeism (inability to work).[17] Finally, age differences are seen in both FSL and PSL.[18] [19]

The research questions addressed in this article are (1) What are the differences in work-related characteristics, family-related characteristics, WFI and health-related characteristics between age groups? (2) Do FSL and PSL differ between age groups? (3) Does age moderate the associations between various characteristics and the two sick leave outcomes?

METHODS
Population
A questionnaire was mailed to the home addresses of 3881 employees at a Dutch university. Both the University Board and Works Council approved this study. No other ethical approval was required. By means of an accompanying booklet, the employees were informed about the objectives of the study and the confidential handling of their responses. A reminder was sent after 3 weeks. A total of 1843 returned questionnaires proved usable, which means a (net) response of 49.1%.

Questionnaire
The aim of the questionnaire was to obtain information about psychosocial workload, family-related characteristics and work-family interference in order to explain sick leave. The construction was based on existing questionnaires previously used in scientific research,[20] as well as on practice-based information from professionals.[21]

Demographic characteristics
Age was divided into four categories: <36, 36—45, 46—55 and 55+ years. Employment category was categorised as: lower-educated non-scientific personnel (low NSP), higher-educated NSP (level of education is college or university degree; high NSP) or scientific personnel.[22] Employment category and sex were chiefly used as control variables (table 1).

Health characteristics
Fatigue was assessed with the Shortened Fatigue Questionnaire.[23] Emotional exhaustion was measured with the Dutch version of the Maslach Burnout Inventory.[24] Perceived health complaints were measured with the VOEG-13.[25] [26] The presence of chronic disease was coded as no (0) or yes (1).[12]

Work-related characteristics
Validated Dutch questionnaires using 4- or 5-point Likert-type scales were used to assess negative and positive work-related characteristics, that is, job demands and job resources (see table 2).[20] Item responses were averaged for each scale. The internal consistency of the scales was moderate to good: Cronbach's α of <0.70 was only found for unpleasant treatment, job security and pay, work variety and career opportunities.

A *work-related life event*, coded as no (0) or yes (1), meant that the respondent reported the experience of an emotional event within the work situation (eg, conflicts with colleagues or superior, reorganisation, changing of jobs).[20] *Hours worked weekly* was included as control variable. It represents the total number of hours worked, including overtime and hours worked in other jobs.[20]

Family-related characteristics
The following family-related characteristics were assessed,[20] classified in five areas: Family composition (*being married/cohabiting, children living at home*), partner's work characteristics (*partner has a job, partner working overtime and/or in shifts, being the breadwinner*), quality of relation with family members (*relationship with the partner, frequency of conflict/disagreement with the partner, relationship with children, frequency of conflict/disagreement with children, support from the partner, support from children*), help in domestic and child-rearing tasks (*partner's contribution to*

Table 1 Distribution of nominal variables (demographic, family-related characteristics and work-related characteristics; numbers and percentages) over the four age groups with results from χ^2 tests*

	<36 years (n=584)	36−45 years (n=487)	46−55 years (n=492)	55+ years (n=216)	χ^2	df	p Value
Sex					99.5	3	<0.001
Male†	237 (39.8)	257 (52.0)	288 (57.8)	170 (77.6)			
Female	358 (60.2)	237 (48.0)	210 (42.2)	49 (22.4)			
Presence of chronic disease					38.4	3	<0.001
No†	478 (82.1)	372 (77.7)	340 (70.5)	137 (63.4)			
Yes	104 (17.9)	107 (22.3)	142 (29.5)	73 (36.6)			
Employment category					57.7	6	<0.001
Lower-educated non-scientific personnel (eg, secretary, lower technician, catering)†	118 (19.9)	128 (25.9)	164 (32.9)	72 (32.9)			
Higher-educated non-scientific personnel (eg, librarians, policy, HRM, managers)	138 (23.3)	156 (31.6)	155 (31.1)	57 (25.8)			
Scientific personnel (eg, PhD students, lectures, researchers)	336 (56.8)	210 (42.5)	179 (35.8)	92 (41.6)			
Hours worked weekly					22.2	6	0.001
<25†	79 (13.3)	99 (20.2)	62 (12.6)	27 (12.2)			
25−40	326 (55.0)	245 (50.0)	257 (52.0)	104 (47.1)			
>40	188 (31.7)	146 (29.8)	175 (35.4)	90 (41.6)			
Type of contract					482.3	3	<0.001
Permanent	206 (34.7)	366 (74.2)	440 (88.2)	214 (96.0)			
Temporary	387 (65.3)	127 (25.8)	59 (11.8)	9 (4.0)			
Married/cohabiting					149.2	3	<0.001
No	261 (43.9)	101 (20.4)	85 (17.0)	27 (12.1)			
Yes	334 (56.1)	393 (79.6)	414 (83.0)	196 (87.9)			
Having children at home					295.5	3	<0.001
No	480 (80.7)	171 (34.6)	254 (50.9)	180 (80.7)			
Yes	115 (19.3)	323 (65.4)	245 (49.1)	43 (19.3)			
Partner's contribution to domestic tasks					199.4	3	<0.001
No partner or partner is doing (much) less or the same†	518 (87.1)	338 (68.4)	292 (58.5)	90 (40.4)			
Partner is doing more	77 (12.9)	156 (31.6)	207 (41.5)	135 (59.6)			
Breadwinning					99.3	6	<0.001
Partner is breadwinner†	149 (25.1)	148 (30.0)	119 (24.0)	15 (6.8)			
About the same	100 (16.9)	54 (10.9)	42 (8.5)	6 (2.7)			
Respondent is breadwinner	344 (58.0)	292 (59.1)	335 (67.5)	200 (90.5)			
Life event in private life					30.2	3	<0.001
No†	308 (53.5)	304 (63.6)	316 (67.2)	154 (70.3)			
Yes	268 (46.5)	174 (36.4)	154 (32.8)	65 (29.7)			
Work-related life event					4.8	3	0.19
No†	514 (89.2)	440 (92.1)	433 (92.1)	204 (93.2)			
Yes	62 (10.8)	38 (7.9)	37 (7.9)	15 (6.8)			
Conflict with superiors					18.4	3	<0.001
No†	392 (65.9)	278 (56.3)	274 (54.9)	143 (64.1)			
Yes	203 (34.1)	216 (43.7)	225 (45.1)	80 (35.9)			
Conflict with colleagues					29.1	3	<0.001
No†	404 (37.9)	269 (54.5)	269 (53.9)	133 (59.6)			
Yes	191 (32.1)	225 (45.5)	230 (46.1)	90 (40.4)			

*Due to missing data, the number of respondents differs per characteristic.
†Reference group for that variable in the logistic regression analysis.
HRM, human resource management.

domestic tasks, partner's contribution to child rearing, childcare arrangements, need for more childcare, having a domestic help) and characteristics representing more burden (*family care inside one's own home, family care outside one's own home, taking work home, burden of commuting, time pressure outside work, a life event in private life*).

Many family-related characteristics were not associated with either FSL or PSL and are not further described

3

Table 2 Mean scores and SE of work-related characteristics, health and work−family interference (number of items per scale; range), corrected for sex, employment category, hours worked weekly and presence of chronic disease

	<36 years (n=577) Mean (SE)	36−45 years (n=475) Mean (SE)	46−55 years (n=475) Mean (SE)	55+ years (n=211) Mean (SE)	F	p Value
Job demands*						
Unpleasant treatment (6; 1−4)	1.08 (0.01)	1.06 (0.01)	1.06 (0.01)	1.08 (0.02)	0.45	0.714
Role conflict (5; 1−4)	1.68 (0.03)	1.70 (0.02)	1.70 (0.02)	1.58 (0.04)	2.60	0.051
Work pressure (8; 1−5)	2.85 (0.04)	3.18 (0.04)	3.16 (0.04)	3.13 (0.06)	13.11	<0.001
Role ambiguity (5; 1−4)	2.11 (0.04)	2.06 (0.03)	1.96 (0.03)	1.90 (0.05)	5.38	0.001
Physical workload (3; 1−4)	1.71 (0.03)	1.58 (0.03)	1.60 (0.03)	1.55 (0.05)	3.57	0.014
Job resources†						
Job security and pay (2; 1−5)	2.90 (0.06)	3.20 (0.05)	3.38 (0.05)	3.71 (0.09)	23.70	<0.001
Decision authority on working hours (3; 1−5)	3.60 (0.05)	3.57 (0.05)	3.59 (0.05)	3.76 (0.08)	1.46	0.224
Work variety (3; 1−5)	3.09 (0.04)	3.23 (0.04)	3.22 (0.04)	3.29 (0.06)	3.36	0.018
Information on work (3; 1−4)	3.00 (0.04)	2.86 (0.04)	2.99 (0.04)	3.01 (0.06)	3.11	0.026
Career opportunities (3; 1−4)	2.64 (0.06)	2.68 (0.05)	2.52 (0.05)	2.47 (0.08)	2.63	0.049
Communication (4; 1−4)	2.56 (0.04)	2.64 (0.04)	2.70 (0.04)	2.78 (0.06)	3.78	0.010
Professional expertise (2; 1−5)	3.85 (0.05)	4.03 (0.04)	4.11 (0.04)	4.15 (0.07)	6.69	<0.001
Opportunities for learning (4; 1−4)	2.85 (0.04)	2.78 (0.04)	2.77 (0.04)	2.83 (0.06)	1.12	0.341
Decision latitude (9; 1−4)	2.47 (0.04)	2.61 (0.03)	2.68 (0.03)	2.81 (0.05)	11.06	0.000
Autonomy (1; 1−5)	3.40 (0.04)	3.46 (0.04)	3.46 (0.04)	3.57 (0.06)	1.71	0.162
Social support superiors (4; 1−4)	3.18 (0.05)	3.05 (0.04)	3.10 (0.04)	3.19 (0.07)	1.76	0.152
Social support colleagues (4; 1−4)	3.14 (0.04)	3.12 (0.03)	3.11 (0.03)	3.21 (0.06)	0.90	0.440
Job involvement (1; 1−5)	3.84 (0.05)	4.12 (0.05)	4.27 (0.05)	4.40 (0.07)	18.82	<0.001
Challenging work (1; 1−5)	3.43 (0.06)	3.61 (0.05)	3.60 (0.05)	3.67 (0.08)	2.87	0.035
Job satisfaction (1; 1−5)	3.69 (0.06)	3.80 (0.05)	3.77 (0.05)	4.07 (0.09)	4.57	0.003
Health-related characteristics*						
Fatigue (4; 4−28)	13.36 (0.40)	13.26 (0.37)	13.18 (0.37)	11.85 (0.60)	1.68	0.170
Emotional exhaustion (4; 1−5)	2.50 (0.06)	2.54 (0.05)	2.54 (0.05)	2.45 (0.09)	0.34	0.798
Health complaints (13; 0−13)	3.09 (0.15)	3.02 (0.14)	3.29 (0.14)	2.95 (0.23)	0.84	0.472
Work-family interference*						
$W \rightarrow FI_{time}$ (3; 1−5)	2.49 (0.06)	2.69 (0.05)	2.57 (0.05)	2.61 (0.08)	2.35	0.071
$F \rightarrow WI_{time}$ (3; 1−5)	1.72 (0.05)	2.07 (0.05)	1.82 (0.05)	1.64 (0.08)	11.84	<0.001
$W \rightarrow FI_{strain}$ (3; 1−5)	2.37 (0.06)	2.45 (0.05)	2.42 (0.05)	2.26 (0.09)	1.31	0.271
$F \rightarrow WI_{strain}$ (3; 1−5)	1.64 (0.05)	1.73 (0.04)	1.66 (0.04)	1.55 (0.07)	1.95	0.120
$W \rightarrow FI_{behaviour}$ (3; 1−5)	2.32 (0.06)	2.51 (0.06)	2.52 (0.05)	2.43 (0.09)	2.46	0.061
$F \rightarrow WI_{behaviour}$ (3; 1−5)	2.37 (0.06)	2.57 (0.06)	2.58 (0.06)	2.48 (0.09)	2.48	0.059

*On these scales, a higher score is unfavourable.
†On these scales, a higher score is favourable.

(data available on request). Details about family composition and the significantly associated characteristics are presented in table 1.

Work−family interference
WFI was assessed with the 18-item scale developed by Carlson et al.[27] Each of the three forms of conflict (time-based, strain-based and behaviour-based) has two directions: work interfering with family (W→FI) and family interfering with work (F→WI). Responses could range from strongly disagree (1) to strongly agree (5). Item responses are averaged for each subscale, with higher scores indicating more WFI. The Cronbach's α indicated good internal consistency.

Sick leave
Sick leave was based on the question 'Have you ever taken sick leave because of health problems in the past 12 months?' (yes or no).[12] Open questions were posed with regard to the frequency and duration (in weeks) during the past 12 months. Frequent sick leave (FSL) was defined as three or more episodes of sick leave during the past 12 months, regardless of duration. Prolonged sick leave (PSL) was defined as more than 2 weeks of sick leave during the past 12 months (sum of the duration of all episodes of sick leave).

Analyses
All analyses were done using SPSS V.16.0. Differences between the age groups in the independent variables were investigated using χ^2 tests or general linear models (GLM) (with correction for sex, employment category, working hours/week and presence of chronic disease), followed by post hoc tests using Tukey. Significance level for these tests was set at 0.001 to detect the most relevant

differences. After this, work-related characteristics, health-related characteristics and the WFI scales were dichotomised at the 50th percentile into low and high scores.

Age differences in FSL and PSL were investigated using logistic regression analysis, with <36 years as reference category. The analyses were controlled for sex, employment category and hours worked weekly.[12 19] To gain more insight into the impact of chronic disease on sick leave, the analyses were additionally controlled for this factor.

Logistic regression analyses were applied to calculate the associations between the independent variables and FSL and PSL. Independent variables were divided over several blocks: (1) health characteristics, (2) job demands, (3) job resources, (4) family composition, (5) partner's work characteristics, (6) quality of relation with family members, (7) help in domestic and child-rearing tasks, (8) characteristics representing more burden and (9) WFI. In the first step, for each of these nine blocks, a hierarchical backward elimination procedure was applied.[28] To explore the moderating role of age, interaction terms were included: a significant interaction term indicates that age-related differences in the relation between that independent variable and the outcome exist. Non-significant interaction terms were eliminated one at a time (p>0.10). Next, non-significant variables were eliminated. However, when the variable was non-significant but the interaction term was, the variable remained in the model.[28] Sex, employment category and hours worked weekly were kept in the model regardless the significance as we considered them as potential confounders.

In the second step, the remaining job demands and job resources were combined into one block, again using hierarchical backward elimination. The same was applied to the family-related characteristics.

In the third step, the remaining variables of the blocks 'health', 'work characteristics', 'family-related characteristics' and 'WFI' were simultaneously entered in a final logistic regression model (p<0.05). When age differences occurred (indicated by a significant interaction term), age-specific analyses were done.

RESULTS

Age differences in independent variables

More women and temporary contracts were found in the youngest group (table 1). The two youngest groups showed the lowest percentages regarding low NSP. With increasing age, more presence of chronic disease occurred. Working >40 h/week most commonly occurred in the oldest group. In the 36−45 age group, the highest percentages of <25 h/week was found. A work-related life event did not show age differences, as opposite to the family-related characteristics.

The groups differed from each other regarding job security and pay, job involvement and decision latitude: the mean scores were higher with increasing age (table 2). The <36 age group reported less work pressure and more use of professional expertise than the other groups. The 55+ age group reported less role ambiguity than the other groups. No differences were found in the health-related characteristics. The 36−45 age group reported more $F \rightarrow WI_{time}$ than the other groups.

Age differences in FSL and PSL

Table 3 presents the ORs (and 95% CIs) for FSL and PSL in four age groups. Unadjusted figures showed no significant association between age and FSL. Statistically significant results were found for PSL: 55+ employees had 1.6 times more chance of PSL than the <36. Adjustment for sex, employment category and hours worked weekly had minimal effect on FSL. For PSL, the OR remained significant among the 55+ age group and became significant among the 46−55 age group. Additional adjustment for presence of chronic disease resulted in a decrease of more than 10% in the ORs for FSL and PSL among the 46−55 age group (although no statistically significant results) and the 55+ age group: this group shows almost half as much chance of FSL, but 1.6 times more chance of PSL than the <36 age group.

Determinants of FSL

Table 4 shows ORs and 95% CIs for significantly associated characteristics with FSL. The upper part presents

Table 3 ORs (and 95% CIs) for FSL and PSL

	<36 years*	36−45 years OR (95% CI)	46−55 years OR (95% CI)	55+ years OR (95% CI)
FSL (not corrected)	1	0.88 (0.59 to 1.31)	0.82 (0.55 to 1.22)	0.58 (0.32 to 1.04)
Corrected for sex, employment category and hours worked weekly	1	0.82 (0.55 to 1.23)	0.75 (0.49 to 1.14)	0.60 (0.33 to 1.10)
Corrected for sex, employment category, hours worked weekly and chronic disease	1	0.79 (0.53 to 1.19)	0.67 (0.44 to 1.02)	**0.51 (0.27 to 0.94)**
PSL (not corrected)	1	1.19 (0.84 to 1.70)	1.35 (0.96 to 1.91)	**1.58 (1.04 to 2.43)**
Corrected for sex, employment category and hours worked weekly	1	1.24 (0.86 to 1.79)	**1.46 (1.02 to 2.10)**	**2.01 (1.27 to 3.19)**
Corrected for sex, employment category, hours worked weekly and chronic disease	1	1.22 (0.84 to 1.77)	1.29 (0.88 to 1.87)	**1.64 (1.02 to 2.63)**

*The group of <36 years was used as reference.
Bold indicates significant association at p≤0.05.
FSL, frequent sick leave; PSL, prolonged sick leave.

Table 4 Final logistic regression models for frequent sick leave (≥3 episodes in the past 12 months)

	Total population OR (95% CI)	<36 years OR (95% CI)	36–45 years OR (95% CI)	46–55 years OR (95% CI)	55+ years OR (95% CI)
Career opportunities	2.29 (0.99 to 5.28)	**1.91** (1.01 to 3.63)	**0.39** (0.18 to 0.86)	0.70 (0.33 to 1.48)	*0.24* (0.04 to 1.33)
Partner is doing more in domestic tasks	**7.34** (2.66 to 20.24)	**3.95** (1.80 to 8.65)	1.29 (0.51 to 3.23)	1.07 (0.44 to 2.60)	*0.25* (0.06 to 1.01)
Sex (being female)	**3.79** (1.52 to 9.47)	**2.19** (1.08 to 4.41)	0.86 (0.36 to 2.05)	**0.34** (0.12 to 0.98)	*0.19* (0.03 to 1.18)
Perceived health complaints	**2.64** (1.79 to 3.90)	**3.06** (1.61 to 5.80)	**2.99** (1.37 to 6.55)	1.79 (0.81 to 3.94)	3.37 (0.80 to 14.24)
Conflict with colleagues	**1.48** (1.04 to 2.11)	1.34 (0.73 to 2.45)	1.66 (0.83 to 3.29)	1.36 (0.68 to 2.73)	*3.41* (0.89 to 13.12)
Communication	**1.71** (1.17 to 2.50)	0.91 (0.49 to 1.69)	**3.06** (1.43 to 6.55)	**2.89** (1.26 to 6.61)	1.30 (0.28 to 6.03)
Life event in private life	**2.11** (1.49 to 2.99)	**1.98** (1.09 to 3.59)	**2.40** (1.20 to 4.81)	**2.29** (1.15 to 4.54)	*2.99* (0.86 to 10.45)
W→FI$_{strain}$	**1.70** (1.15 to 2.51)	1.42 (0.75 to 2.65)	1.65 (0.75 to 3.62)	**3.66** (1.57 to 8.52)	0.91 (0.23 to 3.66)
Employment category					
High NSP vs low NSP	1.34 (0.87 to 2.08)	1.48 (0.68 to 3.22)	1.28 (0.54 to 3.01)	1.07 (0.45 to 2.54)	2.34 (0.53 to 10.31)
SP vs low NSP	0.66 (0.41 to 1.07)	0.46 (0.21 to 1.01)	0.53 (0.19 to 1.45)	1.08 (0.40 to 2.93)	1.94 (0.32 to 11.69)
Decision latitude	**0.52** (0.35 to 0.78)	**0.50** (0.25 to 1.00)	**0.21** (0.09 to 0.51)	0.92 (0.41 to 2.10)	0.52 (0.11 to 2.50)
Hours worked weekly					
24–40 vs <24	0.72 (0.44 to 1.19)	1.31 (0.53 to 3.25)	0.69 (0.28 to 1.68)	**0.27** (0.09 to 0.84)	0.79 (0.12 to 5.31)
>40 vs <24	**0.49** (0.26 to 0.92)	1.09 (0.37 to 3.18)	0.54 (0.17 to 1.79)	**0.13** (0.03 to 0.54)	*0.09* (0.01 to 1.04)
Age	**1.76** (1.23 to 2.53)				
Interaction term career opportunities × age	p=0.008				
Interaction term partner's contribution × age	p<0.001				
Interaction term sex × age	p=0.001				
Nagelkerke R²	0.184	0.203	0.263	0.205	0.335

Bold values indicate significant associations at p<0.05; italicised values indicate significant associations at p<0.10.
NSP, non-scientific personnel; SP, scientific personnel.

characteristics that are significantly differently associated with FSL between the age groups (the p value for the interaction terms is placed at the bottom). The middle part shows the characteristics associated with more FSL; characteristics in the lower part are associated with less FSL.

Differences between the age groups are found for career opportunities, partner's contribution to domestic tasks and sex. In the <36 age group, more career opportunities are associated with more FSL, whereas in the 36−45 age group, more career opportunities are associated with less FSL. When the partner is doing more in domestic tasks, this is associated with more FSL in the <36 age group. In the 55+ age group, this is associated with less FSL. Sex (ie, being female) is associated with more FSL in the <36 age group. In the 46−55 and 55+ age groups, being female is associated with less FSL.

Table 4 also shows the other characteristics relevant for explaining FSL common for all age groups (first column). More perceived health complaints, conflicts with colleagues, more communication, a life event in private life and more $W \rightarrow FI_{strain}$ are associated with more FSL. More decision latitude and more hours worked weekly are associated with less FSL.

Determinants of PSL
The characteristics associated with PSL are presented in table 5, which is designed in the same way as table 4. Higher scores on job security and pay are associated with less PSL in the younger groups, whereas it is associated with more PSL in the two oldest groups. Support from superiors is associated with less PSL in the <36 age group, while in the two older groups, the value of the OR indicates that more support from superiors is associated with more PSL. Having challenging work is associated with less PSL in the 55+ age group. The three other groups do not show a statistically significant association, but the values of ORs indicate that with increasing age, the association gets stronger. Being the breadwinner is associated with less PSL in the youngest group. Earning about the same as the partner is associated with more PSL in the 46−55 age group. The OR (although not statistically significant) in the 55+ age group indicates that being the breadwinner is associated with more PSL.

Other factors associated with more PSL are more perceived health complaints, more fatigue, the presence of chronic disease, more physical workload, conflict with superiors, a work-related life event and a life event in private life. More job satisfaction and more hours worked weekly are associated with less PSL.

DISCUSSION
This study was conducted to explore determinants of sick leave at different ages. To our knowledge, this was the first study that simultaneously investigated the associations between characteristics from various domains (work, family life, health) and two sick leave measures, taking age differences into consideration. Our regression analyses showed differences in associations between the age groups, indicating that age-specific measures to reduce sick leave seem worthwhile. However, the expected differences in associations regarding family-related characteristics and WFI were not confirmed.

Differences in independent variables
Presence of chronic disease is found more often by older employees, which is reported elsewhere.[13][29] Age differences occurred in the work and family-related aspects, which may be explained by variations in career stage, personal circumstances and stage of life. Our results show that older employees report equal scores on career opportunities, opportunities for learning, challenging work and job satisfaction and higher scores on job security and pay, professional expertise, decision latitude and job involvement compared with younger employees. Many managers fear that older employees are less motivated and involved in their work.[30] Such stereotypical thinking is, however, not confirmed in our study.

Despite age differences in family-related aspects, very few differences in WFI were seen. The only difference concerns more $F \rightarrow WI_{time}$ among the 36−45-year-olds. These employees find it difficult to spend enough time on work-related tasks due to family demands. The presence of younger children (which is more time-consuming than older children) may explain this result.[14][20]

Surprisingly, no age differences were found for fatigue, emotional exhaustion and perceived health complaints after correction for sex, employment category and hours worked weekly. This may partly be explained by the healthy survivor effect[2][31]: employees with deteriorated health may have already left the organisation. However, several other studies did not find an association with age after correction for sex in subjective health complaints[32] or emotional exhaustion in men.[33] This indicates that it is important to do separate analyses for men and women to obtain a good understanding about age differences. However, the power of our study was not sufficient to perform this.

Differences in FSL and PSL between age groups
Older workers reported more PSL than the <36 age group after correction for sex, employment category and hours worked weekly. For FSL, lower ORs were found with increasing age, although no statistical differences were found. Additional adjustment for the presence of a chronic disease resulted in an over 10% lower chance of both FSL and PSL in the two oldest age groups. This means that sick leave in these age groups can partly be attributed to the presence of chronic diseases, supporting other reports that chronic diseases are a major cause of long-term sickness absence and job loss.[34] Compared with the <36 age group, the 55+ age group had almost two times less chance of FSL, but 1.6 times more chance of PSL. These results are expected from earlier studies: older people are absent less

Table 5 Final logistic regression models for prolonged sick leave (>2 weeks in total in the past 12 months)

	Total population OR (95% CI)	<36 years OR (95% CI)	36–45 years OR (95% CI)	46–55 years OR (95% CI)	55+ years OR (95% CI)
Job security and pay	0.54 (0.25 to 1.21)	0.76 (0.39 to 1.47)	0.92 (0.48 to 1.77)	1.61 (0.89 to 2.92)	2.80 (0.80 to 9.81)
Support from superiors	**0.40** (0.19 to 0.85)	*0.59* (0.32 to 1.09)	0.56 (0.27 to 1.18)	1.25 (0.64 to 2.42)	1.19 (0.36 to 3.87)
Challenging work	1.82 (0.83 to 3.98)	1.12 (0.55 to 2.29)	0.82 (0.41 to 1.62)	0.59 (0.31 to 1.15)	**0.27** (0.09 to 0.82)
Breadwinner					
About equal vs partner is breadwinner	**0.18** (0.05 to 0.69)	*0.43* (0.18 to 1.05)	0.70 (0.22 to 2.17)	*2.61* (0.87 to 7.80)	1.51 (0.03 to 66.52)
Being breadwinner vs partner is breadwinner	**0.29** (0.12 to 0.67)	*0.52* (0.27 to 1.01)	1.12 (0.48 to 2.61)	1.54 (0.69 to 3.45)	4.30 (0.34 to 53.57)
Perceived health complaints	**2.25** (1.55 to 3.27)	*1.85* (0.90 to 3.77)	**2.51** (1.25 to 5.02)	**2.54** (1.21 to 5.31)	2.16 (0.66 to 7.07)
Fatigue	**1.55** (1.07 to 2.24)	*1.83* (0.88 to 3.81)	1.42 (0.69 to 2.91)	1.29 (0.63 to 2.66)	*2.83* (0.92 to 8.65)
Presence of chronic disease	**1.96** (1.42 to 2.71)	1.15 (0.59 to 2.27)	**2.52** (1.34 to 4.75)	**2.03** (1.11 to 3.71)	**5.64** (2.00 to 15.90)
Physical workload	**1.40** (1.03 to 1.92)	*1.72* (0.92 to 3.18)	1.23 (0.68 to 2.22)	1.35 (0.75 to 2.44)	1.28 (0.47 to 3.51)
Conflict with superiors	**1.54** (1.09 to 2.16)	*1.81* (0.98 to 3.35)	1.13 (0.58 to 2.20)	1.33 (0.70 to 2.53)	**4.83** (1.34 to 17.50)
Work-related life event	**2.42** (1.55 to 3.79)	*1.80* (0.84 to 3.85)	**2.93** (1.29 to 6.64)	*2.82* (0.97 to 8.21)	**6.96** (1.40 to 34.57)
Life event in private life	**1.76** (1.29 to 2.40)	1.36 (0.76 to 2.43)	**2.54** (1.39 to 4.63)	**2.22** (1.23 to 4.01)	0.92 (0.32 to 2.67)
Job satisfaction	**0.69** (0.48 to 0.98)	0.59 (0.30 to 1.14)	0.98 (0.49 to 1.97)	**0.46** (0.24 to 0.87)	1.30 (0.36 to 4.68)
Hours worked weekly					
24–40 vs <24	0.94 (0.61 to 1.46)	0.96 (0.42 to 2.18)	0.96 (0.42 to 2.19)	0.87 (0.34 to 2.21)	1.43 (0.31 to 6.49)
>40 vs <24	**0.44** (0.25 to 0.77)	*0.34* (0.12 to 0.97)	0.53 (0.17 to 1.65)	0.61 (0.19 to 1.92)	**0.18** (0.03 to 1.09)
Employment category					
High NSP vs low NSP	0.89 (0.60 to 1.34)	1.32 (0.55 to 3.14)	1.36 (0.63 to 2.92)	**0.35** (0.16 to 0.75)	*2.16* (0.60 to 7.82)
SP vs low NSP	0.85 (0.55 to 1.32)	1.48 (0.63 to 3.48)	0.85 (0.35 to 2.04)	**0.38** (0.16 to 0.90)	2.25 (0.50 to 10.19)
Sex (being female)	1.44 (1.00 to 2.07)	*1.87* (0.92 to 3.78)	1.59 (0.76 to 3.29)	1.29 (0.65 to 2.55)	1.26 (0.34 to 4.65)
Age	1.11 (0.64 to 1.93)				
Interaction term job security and pay × age	p=0.048				
Interaction term support superiors × age	p=0.040				
Interaction term challenging work × age	p=0.010				
Interaction term breadwinner × age	p=0.006				
Nagelkerke R^2	0.246	0.256	0.269	0.250	0.427

Bold values indicate significant associations at p<0.05; italicised values indicate significant associations at p<0.10.
NSP, non-scientific personnel; SP, scientific personnel.

frequently,[15] but their absence is often more prolonged compared with younger workers.[16 18] Younger workers seem to stay out of work due to minor health complaints more often.[2] The health problems that older workers are confronted with (not necessarily chronic conditions) often take more time to recover from; therefore, older workers report more PSL.

Age differences in determinants of FSL

This study showed that age-specific measures to reduce FSL are recommendable since some determinants were significantly differently associated with FSL for the age groups. More career opportunities were associated with more FSL in the <36 age group, whereas it was associated with less FSL in the 36−45 age group. Within a university, only those employees who proved to have sufficient capacities are offered permanent jobs. For younger employees, more career opportunities might go with an increased effort to pursue an (academic) career, which may be difficult to achieve as there are not that many higher positions available.[35]

The association between more contributions of partner to domestic tasks with more FSL in the youngest group may be explained by the cross-sectional design of the study. FSL may indicate a decreased overall health, and because of that, a lower participation in such tasks, implying that the partners have to do more to keep the household running.

Many studies have shown that women report more sick leave.[9] We found that women in the <36 age group reported more FSL, whereas women in the 46−55 age group reported less FSL. Apparently, the age of women is important to consider.

Other determinants did not show statistically significant differences between the age groups, although the separate analyses sometimes presented different ORs, for example, communication is differently associated with FSL in the 36−45 and 46−55 age groups compared with the other two age groups. The lack of statistical difference may be explained by variance within age groups and different group sizes.

Generally, our results indicate that is it important to take the domains of work, family and health into consideration when investigating the determinants of FSL. Managers and occupational physicians may benefit from this knowledge in supporting employees: life events in work and in private life and perceived health complaints are indicators for higher chance of FSL, whereas more decision latitude seems protective to FSL. Regarding WFI, we found only an association between strain-based interference from work to family ($W \rightarrow FI_{strain}$) and FSL. Some studies found an association between family interference with work ($F \rightarrow WI$) and sick leave.[10] As the younger employees reported more $F \rightarrow WI_{time}$, we had expected an association for this factor, but it was not remained in our model. Time-based WFI seems better manageable, for example, by managing work hours better or to reduce working overtime.[36] Among university employees, the high level of autonomy and flexibility probably facilitates resolving (time-concerning) family-related difficulties.[20] Moreover, several Dutch measures (eg, parental leave or leave to take care of ill family members) are currently available to facilitate combing paid work with family-related tasks. It is questionable whether these (time-related) measures are sufficient to reduce the mental strain that university employees have to cope with.

Age differences in determinants of PSL

The analyses on PSL also indicate that age-specific measures to reduce sick leave are advisable. Younger persons with higher scores on job security and pay showed less chance of PSL, while in older employees, there is more chance of PSL. An explanation may be that older employees have such secure positions in the organisation that they do not fear dismissal despite their sick leave. Support from superiors seems particularly important for younger employees. These employees lack some work experience and help of superiors makes them function better. A remarkable finding in the light of the stereotypical image of older employees is the association of more challenging work with less PSL in the oldest workers. Older workers are often associated with a lack of adaptability and a resistance to innovation.[30] Being breadwinner was associated with less sick leave in the younger workers, which is in line with research into return to work after back complaints.[37] However, we found an opposite association for older employees: older employees with deteriorated health may see themselves forced to continue working for financial reasons.

As with FSL, characteristics from various areas were relevant for PSL in all age groups, although some ORs diverge between the age groups, for example, presence of chronic disease and conflict with superiors seem even more relevant in the 55+ age group than in the other groups. Perceived health complaints, presence of chronic disease and life events in both work and private lives were strongly associated with more PSL in all groups. More job satisfaction was associated with less PSL, which is in line with results reported elsewhere.[37] Paying attention to signals of deteriorated health and decreased job satisfaction by superiors and act upon those signals (discuss work and/or family problems with the employee) may prevent sick leave.

Similarities and differences between FSL and PSL

Our findings illustrate that determinants of both FSL and PSL are important to consider when managers intend to increase the productivity among employees and reduce the financial burden. Both FSL and PSL are associated with hours worked weekly, perceived health complaints and life events in private life. More hours worked weekly is associated with less sick leave, which may indicate a healthy survivor effect: employees in good health are able to work that amount of hours, while persons with deteriorated health may opt for smaller contracts. Managers should be aware of requests for changing the contract and of signals of diminished

health and discuss possibilities to maintain or improve employee's well-being and productivity.

Several differences are also found: conflict with colleagues is associated with more FSL, but conflict with superiors is associated with more PSL. Conflicts with superiors might be more serious than with colleagues and therefore leads to longer sick leave. Work-related life events were associated with more PSL but not with FSL: It might be that the threshold to return to work is high in such cases. Being a breadwinner is associated with less PSL but not associated with FSL. Previous research has revealed the importance of an economic incentive to return to work: employees with a higher financial need return to work more often.[37]

Methodological considerations

Our response of 49.1% was comparable with other questionnaire studies.[2 17 38] The cross-sectional design impedes to establish causality. However, it provides a rough notion of the relationship between psychosocial workload and diminished health and sick leave in different age groups.[39] The results provide managers and occupational physicians indications for adjustments in earlier stages, so diminished health and sick leave is reduced or even prevented.

Our population involved university employees. Although a quarter of the population had only low or middle level education, most of the respondents were knowledge workers. Knowledge workers cover a rapidly growing occupational group in many modern economies. Our results might be relevant for, for example, other research institutes or financial organisations but may be less applicable to blue-collar occupational groups, as they may report more sick leave.[2] Future studies should include various occupations.

The anonymous design of the study prevented an indepth non-response analysis. We found that somewhat less employees of <36 years and somewhat more 55+ employees returned the questionnaire. The number of 55+ employees that reported FSL was rather small. This weakens the power of the study and possible significant effects may be missed. Also due to the anonymous design, it was impossible to link up with the university's sick leave register, which is considered to be a reliable source to obtain sick leave data.[40] Ferrie *et al*[40] reported that more than two thirds of their respondents had a discrepancy of 2 days or less. We expect that the influence of misclassification regarding sick leave was rather limited, as we dichotomised our outcome measures due to the skewness of the data,[41] and because our cut-off points were rather high.[40]

It is possible that employees who were on long-term sick leave were under-represented, even though we send the questionnaire to the home addresses to reduce such selective non-response. Moreover, people with deteriorated health may already have left the labour force and therefore were limitedly included in our study. In the near future, more persons with decreased health will still be working. Several changes have already been made in Dutch social legislation to reduce the number of people who take early retirement or depend on disability pensions, as solutions to deal with the scanty labour force. Moreover, the pension date will be extended to the age of 67. Repeating this study in a few years may lead to other results.

CONCLUSIONS

Our study showed that several differences between age groups exist in the work- and family-related characteristics, but not in the health characteristics. Compared with <36 employees, the 55+ employees have a decreased risk of FLS and an elevated risk of PSL. Presence of chronic disease partly explains sick leave in the two older groups.

Our multivariate analyses revealed differences in associations between the age groups. Research implications are that age should be treated as a variable of interest instead of as a control variable. Differences will be missed by simply controlling for age. Practical implications are that supervisors, managers and occupation physicians should be aware of specific interventions for employees of different ages. Measures and interventions aimed at preventing or reducing sick leave should keep the differences between age groups into account, for example, career opportunities, job security and pay, and challenging work. Moreover, adjustments in tasks or in working hours, different discussion topics during annual progress interviews, taking the private situation of employees into consideration or simply offer a genuine listening ear every now and then may be efficacious to maintain or improve the workability of employees.

Both FSL and PSL may partially be prevented by increasing job resources like decision latitude. For managers and superiors, it is important to be alert to (health) symptoms and life events and discuss possible causes and solutions with the employees. Finally, FLS and PSL differ in the found associations indicating that it is important to pay attention to determinants of both outcomes to improve employees' health and productivity.

REFERENCES

1. Voss M, Floderus B, Diderichsen F. How do job characteristics, family situation, domestic work, and lifestyle factors relate to sickness absence? A study based on Sweden Post. *J Occup Environ Med* 2004;46:1134—43.
2. Taimela S, Läärä E, Malmivaara A, et al. Self-reported health problems and sickness absence in different age groups predominantly engaged in physical work. *Occup Environ Med* 2007;64:739—46.
3. Kinsella K, Phillips DR. *Global Aging: The Challenge of Success.* Washington, DC: The Population Reference Bureau, 2005. http://www.prb.org/pdf05/60.1GlobalAging.pdf
4. Keese M, Hirsch D, Bednarzik R. *Live Longer, Work Longer: A Synthesis Report.* Paris: OECD/OCDE, 2006. http://www.oecd.org/dataoecd/32/50/36318997.pdf
5. De Lange AH, Taris TW, Jansen P, et al. On the relationships among work characteristics and learning-related behavior: does age matter? *J Organ Behav* 2010;31:925—50.
6. North FM, Syme SL, Feeney A, et al. Psychosocial work environment and sickness absence among British civil servants: the Whitehall II study. *Am J Public Health* 1996;86:332—40.
7. Head J, Kivimäki M, Martikainen P, et al. Influence of change in psychosocial work characteristics on sickness absence: the Whitehall II study. *J Epidemiol Community Health* 2006;60:55—61.
8. Ishizaki M, Kawakami N, Honda R, et al. Psychosocial work characteristics and sickness absence in Japanese employees. *Int Arch Occup Environ Health* 2006;79:640—6.
9. Allebeck P, Mastekaasa A. Chapter 5. Risk factors for sick leave—general studies. *Scand J Public Health* 2004;32 (63 suppl):49—108.
10. Jansen NWH, Kant I, Van Amelsfoort LGPM, et al. Work-family conflict as a risk factor for sickness absence. *Occup Environ Med* 2006;63:488—94.
11. Clays E, Kittel F, Godin I, et al. Measures of work-family conflict predict sickness absence from work. *J Occup Environ Med* 2009;51:879—86.
12. Roskes K, Donders NCGM, van der Gulden JWJ. Health-related and work-related aspects associated with sick leave: a comparison of chronically ill and non-chronically ill workers. *Int Arch Occup Environ Health* 2005;78:270—8.
13. De Klerk MMY. Aantal chronisch zieken en gehandicapten [Number of chronically ill and disabled] (In Dutch). In: De Klerk MMY, ed. *Rapportage ouderen 2000 Arbeidsmarktpositie en financiële situatie van mensen met beperkingen en/of chronische ziekten [Report on the Disabled 2000]* (In Dutch). Den Haag: Sociaal en Cultureel Planbureau, 2000:25—56.
14. Matthews RA, Bulger CA, Barnes-Farrell JL. Work social supports, role stressors, and work-family conflict: the moderating effect of age. *J Vocat Behav* 2010;76:89—90.
15. Beemsterboer WGM, Groothoff JW, Nijhuis FJN. A literature review on sick leave frequency determinants of the past decades. *Arch Public Health* 2008;66:26—34.
16. Dekkers-Sanchez PM, Hoving JL, Sluiter JK, et al. Factors associated with long-term sick leave in sick-listed employees: a systematic review. *Occup Environ Med* 2008;65:153—7.
17. Derycke H, Vlerick P, Van de Ven B, et al. The impact of effort-reward imbalance and learning motivation on teachers' sickness absence. *Stress Health*. Published Online First: 15 February 2012. doi:10.1002/smi.2416
18. De Zwart BCH, Frings-Dresen MHW, van Duivenbooden JC. Senior workers in the Dutch construction industry: a search for age-related work and health issues. *Exp Aging Res* 1999;25:385—91.
19. Wynne-Jones G, Mallen CD, Mottram S, et al. Identification of UK sickness certification rates, standardised for age and sex. *Br J Gen Pract* 2009;59:510—16.
20. Donders NCGM. *Psychosocial workload, work-family interference and health. Determinants of sick leave in university employees* [Thesis]. Nijmegen: Radboud Universiteit Nijmegen, 2005. http://repository.ubn.ru.nl/bitstream/2066/27030/1/27030.pdf
21. Boot CRL, Donders NCGM, Vonk P, et al. Development of a student health questionnaire: the necessity of a symbiosis of science and practice. *Glob Health Promot* 2009;16:35—44.
22. Donders NCGM, van der Gulden JWJ, Furer JW, et al. Work stress and health effects among university personnel. *Int Arch Occup Environ Health* 2003;76:605—13.
23. Alberts M, Smets EMA, Vercoulen JHMM, et al. 'Verkorte vermoeidheidsvragenlijst': een praktisch hulpmiddel bij het scoren van vermoeidheid. ['Abbreviated fatigue questionnaire': a practical tool in the classification of fatigue] (In Dutch). *Ned Tijdschr Geneeskd* 1997;141:1526—30.
24. De Jonge J, Bosma H, Peter R, et al. Job strain, effort-reward imbalance and employee well-being: a large-scale cross-sectional study. *Soc Sci Med* 2000;50:1317—27.
25. Dirken JM. *Arbeid en Stress [Work and Stress]* (In Dutch). Groningen: Wolters Noordhoff, 1969.
26. Geurts S, Rutte C, Peeters M. Antecedents and consequences of work-home interference among medical residents. *Soc Sci Med* 1999;48:1135—48.
27. Carlson DS, Kacmar KM, Williams LJ. Construction and initial validation of a multidimensional measure of work-family conflict 12. *J Vocat Behav* 2000;56:249—76.
28. Kleinbaum DG. *Logistic regression: A Self-learing Text*. New York: Springer-Verlag, 1994.
29. Von Korff M, Wagner EH, Saunders K. A chronic disease score from automated pharmacy data. *J Clin Epidemiol* 1992;45:197—203.
30. Henkens K. Stereotyping older workers and retirement: the managers' point of view. *Can J Aging* 2005;24:353—66.
31. Baillargeon J, Wilkinson GS. Characteristics of the healthy survivor effect among male and female Hanford workers. *Am J Ind Med* 1999;35:343—7.
32. Ihlebaek C, Eriksen HR. Occupational and social variation in subjective health complaints. *Occup Med (Lond)* 2003;53:270—8.
33. Helkavaara M, Saastamoinen P, Lahelma E. Psychosocial work environment and emotional exhaustion among middle-aged employees. *BMC Res Notes* 2011;4:101.
34. Detaille SI, Heerkens YF, Engels JA, et al. Common prognostic factors of work disability among employees with a chronic somatic disease: a systematic review of cohort studies. *Scand J Work Environ Health* 2009;35:21.
35. Bos JT, Donders NCGM, Bouwman-Brouwer KM, et al. Work characteristics and determinants of job satisfaction in four age groups: university employees' point of view. *Int Arch Occup Environ Health* 2009;82:1249—59.
36. Van Hooff MLM, Geurts SAE, Kompier MAJ, et al. Work-home interference: how does it manifest itself from day to day? *Work Stress* 2006;20:145—62.
37. Van der Giezen AM, Bouter LM, Nijhuis FJ. Prediction of return-to-work of low back pain patients sicklisted for 3-4 months. *Pain* 2000;87:285—94.
38. Kinman G. Work stressors, health and sense of coherence in UK academic employees. *Educ Psychol* 2008;28:823—35.
39. Zoer I, Ruitenburg MM, Botje D, et al. The associations between psychosocial workload and mental health complaints in different age groups. *Ergonomics* 2011;54:943—52.
40. Ferrie JE, Kivimäki M, Head J, et al. A comparison of self-reported sickness absence with absences recorded in employers' registers: evidence from the Whitehall II study. *Occup Environ Med* 2005;62:74—9.
41. Streiner DL. Breaking up is hard to do: the heartbreak of dichotomizing continuous data. *Can J Psychiatry* 2002;47:262—6.