Published in final edited form as:

Occup Environ Med. 2010 July ; 67(7): 479–485. doi:10.1136/oem.2008.045096.

Employee control over working times and risk of cause-specific disability pension: the Finnish Public Sector Study

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Abstract

Objective—To examine the association between worktime control and subsequent retirement on health ground (disability pension) among employees.

Methods—A prospective cohort study of 30 700 public sector employees (78% women) aged 18 to 64 at baseline. Two scores of worktime control, self-assessed and co-worker assessed, were obtained from responses to the baseline survey in 2000–2001 (score range 1 to 5). Information on cause-specific disability pension during follow-up was collected from national registers.

Results—During a mean follow-up of 4.4 years, 1178 employees were granted disability pension (incidence per 1000 person-years 9.2 in women and 8.7 in men). The most common causes of a disability pension were musculoskeletal disorders (43% of all pensions), mental disorders (25%), tumours (8%), and diseases of the circulatory system (6%) and the nervous system (6%). A 1 unit increase in self-assessed and co-worker assessed worktime control score was associated with a 41–48% lowering of the risk of disabling musculoskeletal disorders in men and 33–35% lowering in women. This association was robust to adjustment for all 17 baseline covariates (in men and women combined, adjusted hazard ratio 0.76, 95% CI 0.67–0.87 and 0.64, 95% CI 0.51–0.79 per 1 unit increase in self-assessed and co-worker assessed worktime control, respectively). Self-assessed worktime control was also associated with the risk of disability retirement due to mental disorders in women, but this association was not replicated using co-workers' assessment. Disability pensions from other disease categories were not related to control over working times.

Conclusions—In this cohort of public sector employees, high worktime control among employees was associated with reduced risk of early retirement caused by musculoskeletal disorders independent of baseline characteristics.

INTRODUCTION

Disability pensions cause a substantial economic burden on society and are usually the result of considerable suffering on the part of the individual. Early exit from the workforce due to

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Competing interests: None declared.

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work disability is normally a long process, in which stressful work aspects such as high job demands and low job control may also play a role. [1-3] There is some evidence to show that low job control is associated with increased risk of disability pension.[4] However, these studies were focused on the content-related aspects of job control, such as decision latitude and skill discretion. Aspects of controlling one's working time have not previously been studied in relation to disability pension.

The timing of activities, ie control over work times, may be an important structural aspect underlying the association between low job control and disability pension. Control over working times refers to an employee's ability to control the duration, scheduling and distribution of his/ her working time.[5] Having low worktime control may make it difficult to combine work and private life, to choose working at times that best suit an employee's resources, and optimize commuting hours. Previous studies show associations between higher worktime control and various favourable health outcomes, such as higher self-rated health, lower levels of psychological distress, and lower rates of sickness absence,[6-11] and more successful integration of domestic responsibilities and work life.[6-9] In a large study of middle-aged men, long work hours (≥ 60 hours per week) were found to be associated with subsequent disability pension,[12] but that study did not assess whether long working hours indicated low control over working time or were due to an employee's own wish to work overtime.

In this study, we examined whether high worktime control is associated with a reduced risk of subsequent disability pension independently of other risk factors for ill health. In order to reduce subjectivity bias (i.e. a bias arising from differences in individual reactivity and response styles), we measured worktime control using co-worker assessments in addition to individuals' self-reports. These two measures have different strengths and potential limitations. Self-assessment is sensitive to individual differences in worktime control, but is open to subjectivity bias. In contrast, determining individual's worktime control based on the mean level of his/her co-workers' worktime control largely protects against subjectivity bias but captures little variation in worktime control between employees in the same work unit. [13]

METHODS

Study sample

Data for this study comes from the 10 towns participating in the Finnish Public Sector Study of local government employees.[9,13] The baseline questionnaire survey was conducted in 2000-2001, 32 299 workers responded (response rate 67%). We excluded those with missing information on sex, age or occupational status in employers' registers (n=66) and missing data on worktime control (n=377). We also excluded participants who were on disability pension in the survey year (n=48) or were on sick-leave, retired for any cause or dead at the beginning of the follow-up (Jan 1 in the year following the survey, n=108). Thus, the analytic sample consisted of 30 700 employees (6 893 men and 23 807 women) at mean (SD) aged 44.8 (9.3) years. The study was approved by the Ethics Committee of the Finnish Institute of Occupational Health.

Worktime control

Worktime control measure, described in detail elsewhere,[8] consisted of 7 items (Cronbach alfa=0.84) requesting the extent to which the respondent was able to influence the following aspects of his/her working times:

1. Total length of a working day

2. Starting and ending times of a working day
3. Breaks during the working day
4. Taking care of private matters during the working day.
5. Scheduling of work shifts.
6. Scheduling of vacations and paid days off.
7. Unpaid leave.

All items used a 5-point Likert-type response format ranging from 1 (very little) to 5 (very much). Self-assessed worktime control was measured by the mean of the 7 items (mean 2.59, SD 0.87, range 1-5).

In addition, we constructed a co-worker assessed worktime control score based on the identification of each participant's work unit obtained from employers' administrative records used e.g., to allocate organizational resources and pay salaries.[13] Based on this information we determined 2,573 functional work units that each typically were at a single location (e.g., a school or a hospital ward). From the organizational hierarchies with multiple levels, we selected work units at the lowest organizational level, but included only units with more than two employees ($n = 2,233$). Co-worker assessed control over working times was calculated as the mean of individual co-workers' responses from the same unit excluding self-assessment (mean 2.58, SD 0.53, range 1-5). The within-group agreement index (rwg) of 0.82 indicated remarkable homogeneity in the perceptions of worktime control within work-units.

Disability pension

Data on disability pension were obtained from the Finnish Centre for Pensions.[14] This institute provides virtually complete retirement data as it coordinates all earnings-related pensions for permanent residents in Finland. All gainful employment is insured in some pension scheme and accrues a pension, thus the pension data were available for all participants and the linkage was successful for all participants. In Finland disability pension is granted after 300 reimbursed sickness absence days (Sundays excluded). We obtained information on the dates and the main diagnoses of all granted permanent or fixed-term (full-time or partial) disability pensions between January 1 of the year following the survey (2000 or 2001) and December 31, 2005, irrespective of participants' employment status or workplace at follow-up. Diagnoses of disability pensions were coded according to the International Classification of Diseases, 10th Revision (ICD-10). We analysed the 5 most common disease categories for disability pension: diseases of musculoskeletal system (ICD-10 M00-M99), mental disorders (F00-F99), diseases of the circulatory system (I00-I99), tumours (C00-D48), and diseases of the nervous system (G00-G99), from all other causes.

Baseline characteristics

Demographic characteristics were obtained from employers' registers and included participants' gender, age and socioeconomic position (higher grade non-manual, lower grade non-manual, manual; based on the Statistics Finland classification).[15]

Work characteristics were assessed with survey and included shift work, job strain and effort-reward imbalance (ERI). These characteristics have been associated with disability retirement in earlier studies.[16-18] The responses on work schedule were classified into categories of "standard hours (weekdays, daytime only)", "shift work with evening and/or weekend shifts but no night shifts", and "shift work with night shifts".[9] Job strain was

assessed by the Job Content Questionnaire, which measures psychological job demands (five items) and job control (eight items).[19] Job strain situations were cross-tabulated from the median splits of job control and job demands, and categorized as high strain (high demands with low control) versus all other combinations. We measured the employees' effort at work with a single question "How much do you feel you invest in your job in terms of skill and energy?" and rewards from work by three items capturing how much the respondents feel they get in return from work in terms of income and job benefits, recognition and prestige, and personal satisfaction. A measure of ERI was then obtained by dividing effort by rewards and categorising the resulting quotient into tertiles.[8]

Health risk behaviour assessed with standard survey measures included: *current smoking status* (smoker vs. non-smoker), *high alcohol consumption* (average weekly consumption ≥ 210 g of absolute alcohol), *obesity* (body mass index, BMI, from self-reports of height and weight ≥ 30 kg/m²), and *leisure-time physical inactivity* (<2.0 metabolic equivalent task (MET)-hours per day, corresponding to approximately 30 minutes of walking per day).[20]

Health indicators were assessed with survey and recorded data. Survey measures included self-report of having or having had a lifetime doctor-diagnosed mental disorder (depression or other), sub-optimal self-rated health status (average or worse vs. good or very good health) and psychological distress (GHQ caseness, score ≥ 4 , on the 12-item version of the General Health Questionnaire [GHQ]).[21] Register-based measures of baseline health status included the prevalence of severe and/or chronic diseases, the purchases of prescribed drugs, and sickness absence in the survey year. This information was obtained from national health registers. Data on cancer were collected from the Finnish Cancer Registry, which provides data on all cancer cases diagnosed in Finland since 1953. We extracted data on entitlements of special reimbursements, i.e. rights to receive higher than basic compensation for medication costs of a serious chronic disease from the Drug Reimbursement Register, kept by the Social Insurance Institution of Finland.[14] In Finland, the national sickness insurance scheme covers all permanent residents of the country, regardless of sex, age or occupational title, and provides at present basic reimbursement of 42% for all filled prescriptions and special reimbursement of 72% or 100% for many chronic and severe diseases. Patients who apply for special reimbursement must attach a detailed medical certificate prepared by the treating physician, who also provides data to confirm the diagnosis. We identified the participants with a prevalent somatic illness (eligible to special reimbursement due to diabetes, hypertension, coronary heart disease, asthma or chronic obstructive bronchitis, rheumatoid arthritis, or incident cancer within the 5 years preceding the beginning of the follow-up) or mental disorder (eligible to special reimbursement due to a severe mental illness or self-report of a lifetime diagnosis of a psychiatric disorder) at baseline.

Data on the consumption of analgesics and antidepressants were obtained from the Drug Reimbursement Register.[14] We selected these medications because they are used to treat musculoskeletal and mental disorders which are the leading causes of disability pensions, and because studies show an association between these medications and perceived severity of symptoms [22,23] as well as disability retirement.[14] All reimbursed outpatient prescriptions are recorded according to the World Health Organisation Anatomical Therapeutic Chemical (ATC) classification code.[24] The prescription register contains data on the exact dates and DDDs of every purchase of prescription drugs which can be used to estimate annual drug consumption. The defined daily dose (DDD) is the assumed average maintenance dose per day for a drug used for its main indication in adults. From the prescription register we measured DDDs of the purchases of prescribed analgesics (ATC codes N02 and M01A) and antidepressants (ATC code N06A) for the participants and identified those with ≥ 30 DDDs from the others.

Data on sickness absences were obtained from the Sickness Absence Register of the Social Insurance Institution of Finland. All permanent residents aged 16–67 years in Finland are entitled to daily allowances due to a sick leave based on a medical certificate after a waiting period of nine days, in addition to the first day of illness, for a period of 1 year at the most. If the employer pays the salary during the sick leave, the reimbursement is given to the employer. The information retrieved from the national register for this study covered the beginning and end dates of all reimbursed sickness absences during and after the survey year.

Statistical analysis

Descriptive statistics included mean worktime control and incidence of disability pension by baseline characteristics; differences were studied with analysis of variance and Cox proportional hazard models. Follow-up for disability pension began from the 1st January immediately after the year of survey response and ended to cause-specific disability pension, other disability pension, official retirement pension (old-age pension), death, or 31 December, 2005, whichever came first. Cox proportional hazard models were used to study the associations between worktime control, a continuous variable, and subsequent disability pension. Hazard ratios and 95% confidence intervals (CI) per 1-point increase in worktime control were sequentially adjusted for age, SES, work characteristics (shift work, job strain, ERI), health-related behaviour (smoking, alcohol consumption, obesity, leisure-time physical inactivity), and baseline health (somatic illness, mental illness, use of antidepressants and analgesics, psychological distress, suboptimal self-rated health status, and sickness absence), separately for self-assessed and co-worker assessed worktime control. All statistical analyses were performed using SAS© 9.2 software (SAS Institute, Inc., Cary, North Carolina).

RESULTS

Table 1 shows the baseline characteristics of the 30 700 participants and associations with worktime control and incident disability pension. Mean age was 44.8 years (SD 9.3, range 18–64). Of the participants, 78% were women and 79% were non-manual employees. Low self-assessed work-time control was associated with female sex, manual work, night work, and high work stress (job strain and effort-reward imbalance), but no strong associations were observed with behavioural risk factors. Low self-assessed worktime control was associated with health problems, as indicated by psychological distress, sub-optimal self-rated health status, purchases of analgesics, and sickness absence. The associations between low worktime control assessed by co-workers and baseline characteristics were weaker (although they reached statistical significance due to large sample size). Strong associations were observed only with manual and night work.

During a mean follow-up of 4.4 (SD 0.8) years, 1178 individuals were granted disability pension, incidence 8.8 per 1000 person-years (9.2 in women and 8.7 in men). Excess risk of future disability pension was observed in manual employees, shift workers, and those with high strain and effort-reward imbalance. Excess risk was also observed in smokers, in physically inactive and obese participants, and in those with health problems as indicated by psychological distress, sub-optimal self-rated health, analgesics or antidepressant purchases, physical illness, mental disorders or sickness absence.

Table 2 shows the association between worktime control and all-cause disability pension. In all participants and men and women separately, 1 unit increase in the mean score of self-assessed worktime control was associated with a 22% to 30% lowering in the risk of disability retirement. This association changed little after adjustments for baseline covariates. The only exception was observed in men, for whom the association did not reach

statistical significance at conventional levels after adjustment for all 17 baseline characteristics. The analyses using co-worker assessed worktime control revealed largely similar findings: in all participants and women, lowering of risk of disability pension was 17-29% per 1 unit increase in the mean score depending on adjustments. For men the association was weaker.

Table 3 shows the association between worktime control and the risk of cause-specific disability retirement in the total cohort and men and women separately. The most common cause of a disability pension was diseases of musculoskeletal system (43% of all pensions), followed by mental disorders (25%), tumours (8%), and diseases of the circulatory system (6%) and the nervous system (6%). Worktime control was associated with risk of disabling musculoskeletal and mental disorders, but not other diseases, such as tumours or diseases of the cardiovascular and nervous system. For early retirement due to musculoskeletal diseases, a 1 unit increase in self-assessed and co-worker assessed worktime control score was associated with a 41-48% lowering of the disability risk in men and 33-35% lowering in women. These associations were robust to adjustment for all 17 baseline covariates [in men and women combined, HR 0.76 (0.67-0.87) and 0.64 (0.51-0.79) per 1 unit increase in self-assessed and co-worker assessed worktime control]. Regarding mental disorders, only self-assessed worktime control was associated with the risk of disability retirement among women. Worktime control was not associated with pensions granted due to tumours or diseases of the cardiovascular and nervous system.

Figure 1 illustrates the cumulative hazard curves of disability retirement from all causes and due to musculoskeletal causes by the quartile of worktime control (self-assessed). The expected dispersion of hazard curves between categories of worktime control was observed across the entire follow-up period (log-rank test, $p < 0.0001$).

DISCUSSION

In this prospective cohort study of over 30 000 public sector employees, high worktime control was associated with a lowered risk of disability retirement. This finding was explained by a robust association between worktime control and disabling musculoskeletal disorders, the most common cause of disability retirement in both sexes. The findings of self-assessed and co-worker assessed control over working times were converging, a feature that gives support to the assumption that the perception of worktime control does not only depend on the characteristics of an individual but also reflects the working conditions. The association was robust to adjustment for 17 demographic, socioeconomic, work-related, and behavioural factors and health indicators. To our knowledge, this is the first study examining the association between worktime control and all-cause as well as cause-specific disability pension.

The mechanisms underlying the association between control over working times and disability pension are not known. Because disability pension is granted for medical reasons only, and this study excluded reasons other than medical conditions for early retirement, we expect that the effect of worktime control was at least in part mediated by poor health. For example, employees may find it particularly difficult to continue working when having both health problems and little control over working time. Indeed, adding health related covariates to the regression model attenuated the association between self-reported worktime control and disability pension, but did not weaken the association between co-worker assessed worktime control and disability pension. Interestingly, cause-specific analyses revealed that disability retirement resulting from other categories of diseases than those of the musculoskeletal system were not associated with preceding control over working times. The only exception was found for self-assessed worktime control and

retirement due to mental disorders, an association, however, which was not observed in relation to co-worker assessed worktime control.

A potential explanation for associations between psychosocial measures and disease outcomes is subjectivity bias, that is, a dispositional tendency of an individual to report both psychosocial adversity and more symptoms. In our study, indicators of perceived work stress and self-reported health problems were strongly correlated with self-assessed worktime control but showed no correlation with worktime control based on co-workers' assessment, a mismatch which could be related to individual disposition affecting reporting of worktime control and health. Bias in the association between self-assessed worktime control and disability retirement is likely if the same disposition also affects the probability of seeking disability benefits. Thus, the association between worktime control and disabling mental disorders should be interpreted cautiously as this association was only observed with self-assessed worktime control, but not with co-worker assessed worktime control. In contrast, subjectivity bias is an unlikely explanation for the association between worktime control and early retirement due to musculoskeletal disorders as this association was observable with all indicators of worktime control and even, when self-assessment was excluded from the measure of this exposure.

The robust association between worktime control and early retirement from diseases of the musculoskeletal system is important. Chronic musculoskeletal symptoms substantially increase the risk of subsequent work disability. It has been estimated that in most developed countries 0.5%-2 % of gross national product is attributed to the costs of back pain in terms of work loss, sickness absence and other indirect costs.[25] The risk of long-lasting or permanent work disability among patients with chronic back pain is high. In the UK, for example, 20% of all incapacity benefit claims filed were due to musculoskeletal disorders in 2006.[26] In Finland and Sweden, over 30% of new long-term sick leaves and disability pensions have been granted based on musculoskeletal disorders,[27-30] a figure well in line with our data. To date, however, little evidence exists on effective measures to reduce early retirement caused by musculoskeletal disorders, but our findings suggest that high worktime control might be such a measure. The specificity of the association between worktime control and early disability retirement supports causal interpretation. We did not observe associations with disabilities from causes that are more likely to result from confounding in this context, such as cancer and diseases of the nervous system.

The fact that the association between worktime control and future disability pension was not entirely attributable to baseline health suggests that other mechanisms may also be important. For example, previous evidence suggests that high work stress is associated with an increased risk of disability pension.[1] High worktime control might work as a buffer against stress[8] by improving opportunities to balance the demands of work and private life (i.e. child care, domestic demands, hobbies, and education). It may also reduce stress by allowing people to plan their working times in a way that better suits their circadian type and their currently available psychological and physical resources. Furthermore, optimal timing makes it easier for people to avoid traffic jam on their way to and from work and thus to have more time for other activities. In addition to its value as a means of better timing, worktime control may be regarded as a reward of efforts at work and/or as a sign of mutual trust between the employer and the employee. In this way, it may decrease perceived stress at work and increase well-being.

Strengths and limitations

The specific strengths of this study were the use of co-worker assessment, in addition to self-assessment, in determining worktime control, prospective study design, large employee data, acceptable response rates, control over a number of potential confounding or mediating

factors, and measurement of disability pension and related diagnoses independently of the assessment of worktime control. However, at least two limitations need to be considered when interpreting the findings. First, our findings are based on data from a cohort of public sector employees and thus cannot necessarily be generalized to more male-dominated working populations or other sectors of work. Second, we can not rule out residual confounding from unmeasured factors at work and private life. For example, controlling for occupational status can not fully capture the wide variety of unfavourable work conditions related to inflexible work schedules and physical work exposures, which have been associated with disability pension in other studies.[1,4,12] Third, we measured worktime control at one point in time only.

CONCLUSIONS

Data from a large cohort of public sector employees show that high worktime control is associated with decreased risk of early retirement caused by musculoskeletal disorders. Further research is needed to examine whether interventions increasing employees' control over the duration, scheduling and distribution of their working time may reduce the risk of subsequent disability pension.

Acknowledgments

This study was supported by the Academy of Finland (projects 117604, 124271, 124322 and 129262), the Social Insurance Institution of Finland and the participating organisations. Mika Kivimäki is supported by the BUPA Foundation, UK, the National Institute on Aging (R01AG034454-01) and the National Heart, Lung, and Blood Institute (R01HL036310-20A2), NIH, USA.

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Summary box

What is already known on this subject?

- Previous studies show high worktime control to be associated with better self-rated health, less psychological distress, and lower rates of sickness absence.
- Disability pensions cause a substantial economic burden on society and are usually the result of considerable suffering on the part of the individual.

What does this study add?

- In this study of over 30,000 public sector employees, high worktime control was associated with lower risk of disability retirement due to diseases of the musculoskeletal system.
- Worktime control was not consistently associated with other causes of disability, such as mental disorders, tumours, diseases of the circulatory system, or diseases of the nervous system.

Figure 1. Cumulative hazard of early retirement on health ground in general (upper part) and specifically due to musculoskeletal disorders by quartile of worktime control.

Table 1

Baseline characteristics of the study sample. Figures are numbers (percentages) unless otherwise stated. *P*-values of the differences by sample characteristics are derived from analysis of variance for worktime control and Cox proportional hazard models for disability retirement.

Characteristic	N(%) of participants (n=30 700)	Self-assessed worktime control Mean (SE)	Co-worker assessed worktime control Mean (SE)	Incidence of disability pension per 1000 person-years (n=1178)
Sex		<i>p</i> <0.0001	<i>p</i> =0.003	<i>p</i> =0.37
Men	6893 (22)	2.67 (0.01)	2.56 (0.01)	8.72
Women	23807 (78)	2.56 (0.01)	2.59 (0.01)	9.22
Socioeconomic position		<i>p</i> <0.0001	<i>p</i> <0.0001	<i>p</i> <0.0001
Upper non-manual	10462 (34)	2.62 (0.01)	2.50 (0.01)	4.56
Lower non-manual	13863 (45)	2.69 (0.01)	2.72 (0.00)	8.83
Manual	6375 (21)	2.30 (0.01)	2.41 (0.01)	16.03
Shift work		<i>p</i> <0.0001	<i>p</i> <0.0001	<i>p</i> <0.0001
No	22809 (75)	2.63 (0.01)	2.60 (0.00)	8.03
Evening	4832 (16)	2.55 (0.01)	2.60 (0.01)	11.90
Night	2888 (9)	2.33 (0.02)	2.43 (0.01)	9.90
High job strain		<i>p</i> <0.0001	<i>p</i> <0.0001	<i>p</i> <0.0001
No	22816 (75)	2.70 (0.01)	2.60 (0.00)	7.05
Yes	7612 (25)	2.25 (0.01)	2.52 (0.01)	13.92
Effort-reward imbalance		<i>p</i> <0.0001	<i>p</i> =0.022	<i>p</i> <0.0001
Low	9313 (31)	2.75 (0.01)	2.59 (0.01)	7.10
Intermediate	11217 (37)	2.62 (0.01)	2.58 (0.01)	8.09
High	9844 (32)	2.40 (0.01)	2.57 (0.01)	11.10
Current smoker		<i>p</i> <0.0001	<i>p</i> <0.0001	<i>p</i> =0.003
No	23981 (81)	2.57 (0.01)	2.57 (0.00)	8.42
Yes	5804 (19)	2.64 (0.01)	2.61 (0.01)	10.41
Heavy drinker [*]		<i>p</i> <0.0001	<i>p</i> =0.20	<i>p</i> =0.26
No	27606 (90)	2.57 (0.01)	2.58 (0.00)	8.94
Yes	2932 (10)	2.70 (0.02)	2.59 (0.01)	7.93
Physically inactive [†]		<i>p</i> =0.0004	<i>p</i> =0.40	<i>p</i> <0.0001
No	22568 (74)	2.60 (0.01)	2.58 (0.00)	7.26
Yes	7833 (26)	2.56 (0.01)	2.58 (0.01)	13.39
Obese (BMI ≥ 30 kg/m ²)		<i>p</i> =0.58	<i>p</i> =0.50	<i>p</i> <0.0001
No	26407 (88)	2.58 (0.01)	2.58 (0.00)	7.55
Yes	3617 (12)	2.59 (0.01)	2.59 (0.01)	18.20
Psychological distress [‡]		<i>p</i> <0.0001	<i>p</i> =0.001	<i>p</i> <0.0001
No	22285 (73)	2.62 (0.01)	2.58 (0.00)	6.76
Yes	8284 (27)	2.51 (0.01)	2.60 (0.01)	14.55
Suboptimal self-rated health		<i>p</i> <0.0001	<i>p</i> =0.82	<i>p</i> <0.0001
No	21496 (71)	2.65 (0.01)	2.58 (0.00)	3.37
Yes	8807 (29)	2.42 (0.01)	2.58 (0.01)	22.77

Characteristic	N(%) of participants (n=30 700)	Self-assessed worktime control Mean (SE)	Co-worker assessed worktime control Mean (SE)	Incidence of disability pension per 1000 person-years (n=1178)
Prescribed antidepressants		$p=0.02$	$p<0.0001$	$p<0.0001$
No	29544 (96)	2.58 (0.01)	2.58 (0.00)	7.90
Yes	1156 (4)	2.65 (0.03)	2.68 (0.02)	32.99
Prescribed analgesics		$p=0.0002$	$p=0.009$	$p<0.0001$
No	27923 (91)	2.59 (0.01)	2.58 (0.00)	7.43
Yes	2777 (9)	2.53 (0.02)	2.61 (0.01)	22.83
Somatic illness [§]		$p=0.03$	$p=0.006$	$p<0.0001$
No	26676 (87)	2.59 (0.01)	2.58 (0.00)	6.66
Yes	4024 (13)	2.56 (0.01)	2.60 (0.01)	24.37
Mental disorder		$p=0.09$	$p<0.0001$	$p<0.0001$
No	26552 (86)	2.59 (0.01)	2.57 (0.00)	6.75
Yes	4148 (14)	2.56 (0.01)	2.63 (0.01)	22.65
Sickness absence		$p<0.0001$	$p=0.007$	$p<0.0001$
No	25351 (83)	2.61 (0.01)	2.59 (0.00)	4.84
Yes	5349 (17)	2.46 (0.01)	2.56 (0.01)	29.00

* Average weekly consumption ≥ 190 g of absolute alcohol for women and >275 g for men = heavy drinker

[†] Leisure time physical activity < 2 metabolic equivalent task hr/d = physically inactive

[‡] Individuals scoring ≥ 4 using 12-item version of the General Health Questionnaire (GHQ) are classified as psychologically distressed

[§] Diabetes, asthma or chronic obstructive bronchitis, hypertension, coronary heart disease, rheumatoid arthritis, cancer

Table 2

Worktime control and risk of all-cause disability pension risk. Hazard ratios (95%CI) for a 1 unit increase in the mean score of worktime control (range 1-5) derived from Cox proportional hazard models.

Worktime control	Hazard ratio (95% CI), adjustment in addition to age			
	None	SES	Work characteristics*	Health risk behaviours [†] Health indicators [‡] All aforementioned
Self-assessed				
All	0.76 (0.71-0.81)	0.80 (0.74-0.86)	0.83 (0.77-0.89)	0.76 (0.71-0.81) 0.84 (0.78-0.90) 0.87 (0.80-0.94)
Men	0.70 (0.61-0.80)	0.84 (0.72-0.98)	0.79 (0.68-0.91)	0.73 (0.63-0.83) 0.79 (0.69-0.91) 0.97 (0.82-1.15)
Women	0.78 (0.72-0.85)	0.80 (0.73-0.87)	0.85 (0.78-0.92)	0.77 (0.71-0.84) 0.86 (0.79-0.93) 0.86 (0.78-0.94)
Co-worker assessed				
All	0.79 (0.71-0.88)	0.80 (0.70-0.90)	0.83 (0.74-0.93)	0.77 (0.69-0.86) 0.76 (0.68-0.85) 0.76 (0.67-0.87)
Men	0.82 (0.67-1.02)	1.02 (0.80-1.31)	0.90 (0.72-1.12)	0.83 (0.67-1.03) 0.80 (0.64-1.00) 0.94 (0.72-1.23)
Women	0.78 (0.69-0.89)	0.75 (0.65-0.86)	0.81 (0.71-0.92)	0.75 (0.66-0.85) 0.74 (0.65-0.85) 0.71 (0.61-0.83)

* shiftwork, job strain and effort-reward imbalance

[†] smoking status, alcohol consumption, leisure-time physical activity and obesity

[‡] somatic illness (diabetes, asthma or chronic obstructive bronchitis, hypertension, coronary heart disease, rheumatoid arthritis, cancer), mental disorder, purchases of prescribed antidepressants and analgesics, psychological distress, suboptimal self-rated health status, sickness absence

Table 3

Worktime control and cause-specific disability pension risk. Hazard ratios (95%CI) for a 1 unit increase in the mean score of worktime control (range 1-5) derived from Cox proportional hazard models adjusted for age and SES. Number of events for men/women is shown in parenthesis.

Worktime control	Diseases of musculoskeletal system n=505 (104/401)	Mental disorders n=291 (53/238)	Tumours n=90 (10/80)	Diseases of the circulatory system n=72 (29/43)	Diseases of the nervous system n=70 (22/48)	Other causes n=145 (50/95)
Self-assessed						
All	0.63 (0.57-0.71)	0.81 (0.71-0.93)	0.88 (0.69-1.12)	0.78 (0.59-1.02)	1.17 (0.90-1.51)	0.89 (0.73-1.09)
Men	0.52 (0.41-0.66)	0.89 (0.66-1.19)	1.00 (0.58-2.10)	0.70 (0.47-1.06)	1.12 (0.73-1.73)	0.69 (0.50-0.95)
Women	0.67 (0.59-0.76)	0.79 (0.68-0.92)	0.84 (0.65-1.10)	0.83 (0.57-1.19)	1.19 (0.86-1.64)	1.04 (0.82-1.31)
Co-worker assessed						
All	0.64 (0.54-0.75)	0.96 (0.77-1.19)	0.67 (0.45-1.01)	0.70 (0.45-1.09)	1.24 (0.81-1.99)	1.10 (0.82-1.48)
Men	0.59 (0.41-0.84)	1.35 (0.86-2.13)	0.42 (0.13-1.44)	0.61 (0.31-1.20)	1.77 (0.89-3.55)	0.93 (0.57-1.52)
Women	0.65 (0.54-0.79)	0.87 (0.68-1.11)	0.71 (0.46-1.09)	0.76 (0.42-1.37)	1.01 (0.59-1.72)	1.23 (0.85-1.79)