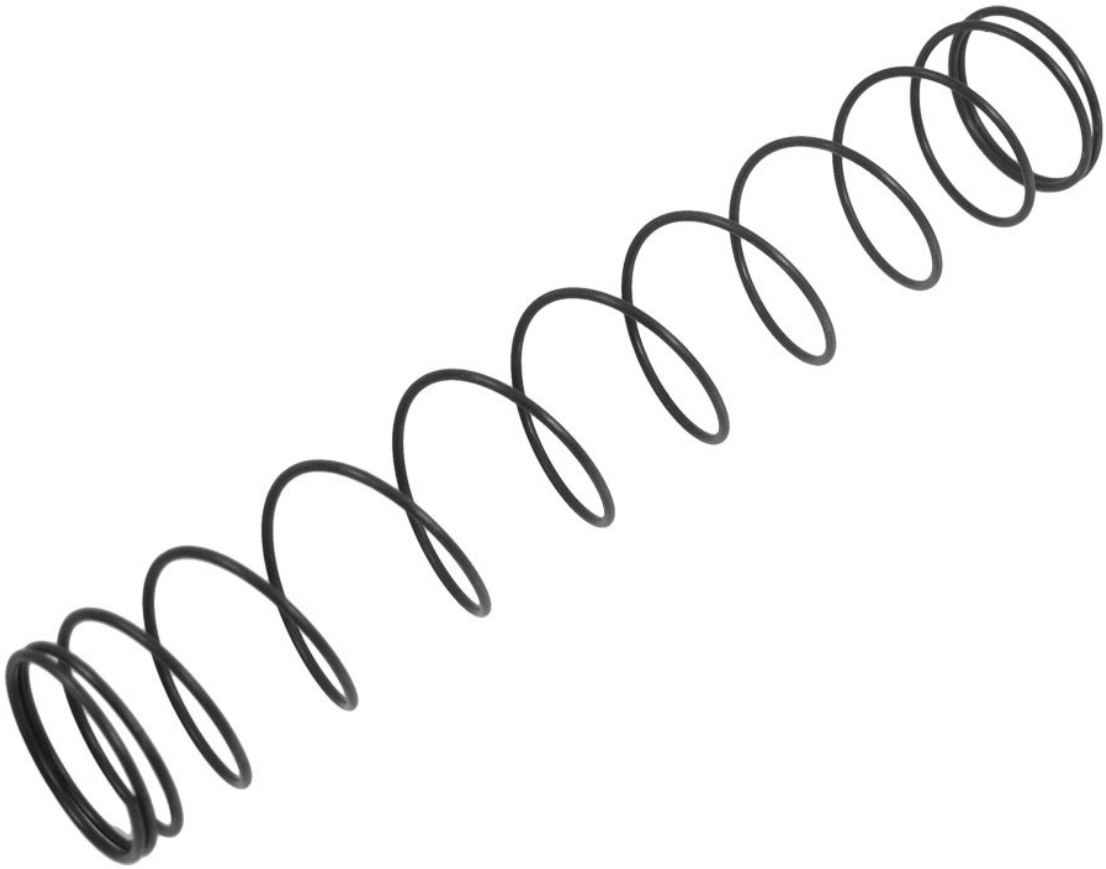
Stressforskningsrapport nr 308

Work hour flexibility and the ability to sustain working life to retirement

Torbjörn Åkerstedt, Michael Ingre & Claire Eriksen



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Editor-in-Chief: Töres Theorell

Psychosocial Medicine

is the comprehensive term for interdisciplinary research on various human en-vironments, how they are perceived and experienced and their influence on the human organism both positively and negatively.

Our environment abounds with psychosocial risk situations. Many of them may cause emotional as well as physical disorders, dysfunctions and/or diseases. *The goal of psycho-social medical research* is to study the influence of these risk situations, on the one hand, and man´s emotional, behavioural and physiological reactions on the other, as well as their relation to mental and somatic morbidity and mortality. Our research is therefore interdisciplinary and comprises experimental studies both in the laboratory and in real life, as well as epidemiological surveys and analyses.

In Stockholm this research is conducted through the unique collaboration of:

- **IPM - The National Swedish Institute for Psychosocial Factors and Health,**
- **the Division of Psychosocial Factors and Health** at **the Karolinska Institutet,**
- **WHO´s Psychosocial Centre** and
- **the Centre for Suicide Research and Prevention** at **the Stockholm County Council.**

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Introduction

Work hours have been shown to influence health, particularly night work, but also long work hours (Costa, 1998; Åkerstedt, 1998; Knutsson and Bøggild, 2000). Another aspect of work hours is flexibility. Flexibility has during the second half of the last century mainly referred to "flextime", that is the ability to vary the time for starting or finishing work according to the individual needs (Wade, 1974). Well-being seems improved but the amount of systematic studies is low (Torsvall and Åkerstedt, 1977; Tepas, 1985; Kogi, 1995; Kogi, 1997).

Also in connection with shift work the effects seem positive (McEwan Young, 1980; Knauth et. al., 1984). Sickness absence has been found to decrease in at least two studies (Golembiewski et. al., 1974; Narayanan and Nath, 1982). On the whole, however, there is very little systematic research on the connection between influence on work hours and health.

Although not based on individual choice, there is also the employer's flexibility in using overtime, adding a second or a third shift, or using annual work hours. At least overtime and night work has been the focus of much research and will not receive any emphasis here. They will, however, be included in the analyses.

Initially, it was observed that there is a strong tendency towards a type of flexibility of work hours that requires the worker to extend or reduce the amount of work hours per week depending on the needs of production. At present we know too little of the effects of such arrangements but the there does not seem to be any advantage for the individual in this type of arrangement, rather the opposite since it reduces the influence of the individual (Knauth, 1998). However, such disadvantages may be compensated for by increasing the freedom of the individual to choose when to work

The present paper is part of a larger project on flexible work hours within the framework of the SALTSA program (Costa et. al., in press). It uses as dependent variable the self-reported ability to remain in the work force until the normal time of retirement, short and long-term sick leave. It relates this variables to the perceived influence on work hours but also on other factors related to employer flexibility such as shift work, overtime work and others. A particular effort was made to control for as many background and work-related variables as possible.

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Summary

Åkerstedt, T., Ingre, M., Eriksen, C. Work hour flexibility and the ability to sustain working life to retirement. Stress Research Report no 308, Stockholm 2003. ISSN 0280-2783

Irregular work hours, particularly night work, have negative effects on health. Another work hour aspect, flexibility, has seen very little research but should logically have positive effects on health. The present paper is part of a larger project on flexible work hours within the framework of the SALTSA program. It uses the self-reported ability to remain in working life until normal time of retirement as dependent variable and investigates its relation to influence on work hours, other flexibility-related factors such as shift work, overtime and others, while controlling for as many background and work-related variables as possible. The main investigation involves randomly selected men and women, who on October 1 2000 were between that ages of 25-75 years old and were registered as Swedish citizens. The total number of respondents was 3493 (53% response rate).

For this purpose was used logistic regression analysis. In the first step a series of crude regression analyses were carried out using background variables, psychosocial work indicators and work hour variables. The dependent variables were the self-estimated ability to remain in the working force until normal retirement; the self-estimated inability to remain in the working force because of too high demands, number of sickdays exceeding 24 the last year, and being on a sick leave that had lasted in excess of 3 months. In a second step the analysis was controlled for background factors and in a third step also for psychosocial work factors.

The main impression of the results is that work hours seem to be important for all the variables analyzed in this study, but to a varied degree. Part-time work showed increased risk for short-term sick leave and quitting work before normal retirement. Temporary employment status was associated with an over risk for long-term sick leave but, an under risk for short-term sick leave. Irregular work hours with night work and work hours with varied shift length were associated with quitting work due to mental strain. Low influence over work-hours was associated with a higher risk for long-term & short-term sick leave and to quit work due to mental strain. Low influence over work hours also indicated an under risk for quitting work before normal age of retirement. Overtime work seems to be mainly associated with an under risk for sick leave. The combination of overtime without interest or with force increased, however, the risk of quitting work before normal age of retirement. Unpaid overtime increased the risk for quitting work before normal retirement but paid overtime decreased the risk.

Sammanfattning

Åkerstedt, T., Ingre, M., Eriksen, C. Flexibla arbetstider och förmågan att stanna i arbetsliver fram till pensionering. Stressforskningsrapport nr 308. Stockholm 2003. ISSN 0280-2783

Oregelbundna arbetstider, speciellt nattarbete, påverkar hälsan negativt. En annan arbetstidsaspekt, flexibilitet, har inte forskats kring i någon större utsträckning men borde rimligen ha positiva effekter på hälsan. Föreliggande rapport är en del av ett större projekt under SALTSAS (SACO, TCO, LO) ram. I denna studie används självrapporterad förmåga att kvarstå i arbetslivet till pensionen som beroende variabel (även sjukfrånvaro analyseras). Dessa variabler ställs i relation till inflytande över arbetstiden, men även andra faktorer som övertidsarbete eller skiftarbete. Dessutom kontrolleras för en rad bakgrundsvariabler och psykosociala arbetsmiljövariabler. Undersökningen omfattar 3493 personer mellan 25 och 75 års ålder, utgörande ett slumpmässigt urval av svenska medborgare. Antalet svarande motsvarar en svarsfrekvens på 53%.

Data analyserades med hjälp av logistisk regressionsanalys i flera steg. I det första steget gjordes en analys utan hänsyn till andra oberoende variabler ("crude"). I ett andra steg kontrollerades för bakgrundsvariabler och i ett tredje steg kontrollerades också för psykosociala arbetsmiljövariabler (krav, inflytande, socialt stöd m.fl.).

Resultaten visar att arbetstiderna hade betydelse för den självrapporterade förmågan att kvarstå i arbetslivet fram till pensionsåldern samt för sjukfrånvaron. Deltidsarbete visade en ökad risk för sjukfrånvaro och att sluta arbeta före pensionsåldern. Att vara temporärt anställd visade på en överrisk för långtidssjukskrivning men en underrisk för korttidssjukfrånvaro. Oregelbundna arbetstider visade en ökad risk att sluta före pensionsåldern på grund av mental påfrestning. Lågt inflytande över arbetstiderna var associerat med en underrisk att sluta arbeta i förtid. Övertid var i huvudsak associerat med en underrisk för sjukfrånvaro men i kombination med tvång eller avsaknad av lust var övertid associerat med en överrisk att sluta arbeta före pensionsåldern. Obetald övertid ökade risken och betald övertid minskade risken att sluta arbeta i förtid.

Method

Sample and population

The sample was made up of randomly selected men and women, who on October 1 2000 were between the ages of 25 and 75 years and were registered as Swedish citizens. A selection from the Statistics Sweden (SCB) was drawn in 20 strata, defined by sex, age (5 groups), and place of residence (2 groups).

The age groups were 25-34 years, 35-44 years, 45-54 years, 55-64 years, and 65-75 years. The place of residence was divided into an urban and a rural area. A person was considered to be a resident in an urban area if he was registered as living on a property in a place with a connected set of buildings with at the most 200 meters apart and with at least 200 inhabitants. The remainder was considered residents of rural areas.

Within each stratum there was a random selection of 340 individuals, that is, a total of 6800 individuals. The number of individuals in each stratum was based on an estimated participation frequency of 60 percent and a target of 200 people per stratum.

SCB made the selection as well as the data collection. The latter was done by questionnaire mailed to the participants during October 20 2000 – February 23 2001. Reminders were sent out on two occasions to those who had not filled out the questionnaire. The questionnaire was enclosed with the second reminder. Variables identifying individuals were removed after closing the collection procedure.

Drop-outs

163 individuals that did not fit the criteria for age were removed. 6637 (3306 men and 3331 women) remained for analysis. The questionnaire was returned by 3493 (53 percent) individuals, 1631 (49 percent) of the men and 1862 (56 percent) of the women. In a previous report the drop-outs were analyzed. The women answered to a greater extent than the men, older people (45 years and older) more so than young people (under the age of 45), and residents of rural areas to a greater extent than residents of urban areas. The proportion of people who did not have an income (tax- year 1999) was lower among the ones who filled out the questionnaire than the ones who did not. This difference was more prominent among the women (25 percent filled it out, 38 percent did not) in comparison with the men (24 percent filled it out, 28 did not). The size of the taxable income for 1999 only differed marginally between those who filled out the questionnaire and those who did not among the men (filled out: SEK 216798, did not fill out: SEK 213594), but it differed somewhat more among the women (filled out: SEK 160066, did not fill out: SEK 143574).

The rate of participation differed also in relation to marital status and country of birth. Regarding marital status the questionnaire was filled out to the highest extent by married people (58 percent) and to the lowest extent by unmarried people (46 percent) whereas divorced and widows/widowers fell in between. Regarding place of birth the questionnaire was filled out by 54 percent that were born in Sweden and by 44 percent (305 subjects) that were born abroad.

This report only includes people who belonged to the active workforce at the time they filled out the questionnaire. This means that only those who stated that they currently were employees or self-employed were included in the analyses. A total of 1071 women and 1076 men (mean age 46 years) were analyzed.

A special case constituted the analyses of long-term sick leave (over 3 months). A total of 100 participants were on a long-term sick leave however, the majority (n=70) did not state that they were currently active in the workforce. The latter were added to the analyses of long -term sick leave, which then included a total of 2217 participants (1125 women and 1092 men, mean age 46 years).

Questionnaire

The questionnaire included a total of approximately 300 sub-questions. Reference to a particular question in the questionnaire is given with the number of the question within a parenthesis. Most of the questions concerned working life and the participants were asked to base their answers on their current job, or on their latest job if they were not working at the time they filled out the questionnaire. In the following text, only those variables that were of current interest for this report are described.

Dependent variables

1) Quit working before the normal age of retirement. The respondent was asked to take a position on the statement "I will probably work until the normal age of retirement". Those who answered with a 4 or a 5 on a five-point scale (1="agree fully", 5="disagree completely") were defined as those who do not think that they will work until the age of 65 (n=479). Those who answered with the alternatives 1, 2 or 3 constitute the control group (n=1550).

2) Quit working due to mental strain? These results are based on the question: "My current work is too mentally/psychologically straining for me to be able to continue until the normal age of retirement" (1="agree fully", 5="disagree completely"). Those who answered with a 1 or a 2 constitute cases (n=415). Those who had answered with a 3, 4 or a 5 constitute the reference group (n=1587).

3) Short-term sick leave. Participants were asked to estimate their total absence from work due to sickness during the last 12 months. Response alternatives were "no day", "1-7 days", "8-24 days", "25-99 days" and "100-365 days". Those who had indicated 25 days or more constitute cases (n=175 and those who indicated up to 24 days constitute the reference group (n=1843).

4) Long-term sick leave. Participants that had indicated that they currently were on sick leave for more than three months constitute cases (n=100) and the rest constitute the reference group (n=2117).

Background factors

Variables describing *age*, *gender*, *marital status* and *having children under 16 years of age* were used in the analyses to control for background factors together with variables describing different aspects of socio-economic status (se below).

Education. One question asked for the respondent's highest education. Three groups were formed: elementary school, high school and university level.

Sector. One question regarded different sectors on the labor market: manufacturing, health care, service, administration and research/development.

Employer. This variable describes if the respondent was self-employed/employed in the private sector, by the county/city or by the government.

Union. Four different unions and one category for "other or none" were used. The unions were blue collar, white collar, academic union and the employers organization.

Work-related psychosocial factors (the demand-control-support model)

The demand-control-support model was assessed with 19 questions in the form of statements drawn from a modified, and for the purpose of this study, expanded version of Karasek's and Theorell's instrument (Ahlberg, 1999) that in the Swedish version contains nine questions with four alternatives. In this study the original index was supplemented and now contains five questions regarding *work demands* (work hard, too heavy burden, enough time for work tasks – reversed score, conflicting demands, have to keep lots of information in my mind), three questions regarding *skill discretion*, (my work demands a high level of skill, I learn new things, my work demands creativity, repetitive work – reversed score) and four questions regarding *decision latitude* the ability to influence work. Each question could be answered with one of five alternatives; "1=never". "2=rarely", "3=sometimes", "4=most of the time", and "5=always", where the four latter ones specified what exactly was meant by the alternative. For each dimension a mean index was created. Groups were created for low (mean value <2.5), medium (2.5-4.0) and high (>4.0) work demands, skill discretion and decision latitude.

Social support was assessed with seven statements about the relation to colleagues and supervisors (calm and pleasant atmosphere, cohesion, my colleagues help me, It's OK to have a bad day, I get along well with my supervisor, I get along with my subordinates, I get along well with my colleagues). The response scale ranged from 1-4 (disagree totally, disagree partly, agree partly, agree totally). An index was calculated as the mean of the

seven questions and groups were formed with high (4.0), medium (2.6-3.9) and low (0.0-2.5) social support.

Work hour factors

Work hours factors were assessed with 10 different variables.

Employment describes if the respondent was employed fulltime (35h/week or more), part-time employed or self-employed. *Employment status* describes whether the respondent was permanently or temporarily employed. *Work hours* categorize individuals into three groups describing if they had daytime work hours (6.45-17.45), irregular work hours without night work, and irregular work hours with night work or permanent night work. *Work shift length variation* describes if the shifts are mostly of the same length or if they varied in length. *Influence over work hours* was assessed with one question describing how often (five categories) the respondent could decide over his/her own work hours. Three groups were formed with a high (always), medium (often or sometimes), and low (seldom or never) degree of influence.

Overtime was assessed with five different variables describing various aspects of overtime. The first describes only if the respondent used to work *overtime* or not. Three categories were created for the amount of *paid overtime* and *unpaid overtime* (less than 5h, 5-15h and over15h per month). In addition, two variables were calculated from those who worked less than 10h of *total overtime* (paid and unpaid overtime) per month, or over 10h in combination with doing it out of *interest* (worked overtime because work itself is enjoyable) or being *forced* (have to work overtime because there are tasks to finish or because they have been ordered to do so).

Analysis

The main interest was to relate parameters of work hour flexibility to important endpoints of health. For this purpose was used logistic regression analysis. In the first step a series of crude regression analyses were carried out using background variables, psychosocial work indicators and work hour variables. The dependent variables were the intention to remain in the work force until normal retirement; the self-estimated inability to remain in the working force due to high mental strain, short-term sick leave and long-term sick leave.

In a second step the analysis was controlled for background factors (model 2) and in the third and final step (model 3), also controlled for work-related psychosocial factors.

Results

The results from the logistic regression analyses are presented below under subheadings for each of the dependent variables.

Quit working before the normal age of retirement

Table 1 below shows the results of the ´logistic regression analyses for *Quit working before the normal age of retirement*. The crude analyses indicate that not being part of one of the major unions yielded an over- risk, as did having a low degree of social support.

Among the work hour variables, having part-time work (compared to full time work or being self employed), having varied length of the work shifts, low influence over work hours was associated with an over risk of quitting work before normal age of retirement.

There was also an over risk for unpaid overtime however, an *under* risk for paid overtime. Total overtime without interest or with force yielded an over risk.

When controlling for background factors and psychosocial factors, all predictors were still significant although two more groups became significant. Having part-time work hours (compared to full time work hours with work shifts of 7.5-9h) and short work shifts (<7.5h) were associated with an over risk of quitting work before normal retirement.

Table1

Quit work before normal retirement		Model 1 "Crude" logistic regression				Model 2 Control for background factors				Model 3 Model 2 + demand/control/sup.			
Backgrond factors		n	OR	95% CI		n	OR	95% CI		n	OR	95% CI	
Gender	Female	1026											
	male	1003	1,08	0,88 - 1,33									
Age	1 year	2029	1,01	1,00 - 1,02									
Marital status	Married	1204											
	Not married	802	0,82	0,66 - 1,01									
Children < 16	No children	799											
	Have children	1184	0,93	0,75 - 1,15									
Education	Elementary school	634											
	High school	795	1,10	0,85 - 1,41									
	University	575	1,25	0,96 - 1,62									
Sectors	Manufactoring	604											
	Health care	410	0,87	0,64 - 1,18									
	Service	419	0,98	0,73 - 1,32									
	Administration	203	1,03	0,71 - 1,49									
	Research/developm	339	1,24	0,91 - 1,67									
Employer	Private/self	1237											
	County/city	594	1,04	0,83 - 1,30									
	Government	173	0,78	0,52 - 1,16									
Union	Blue Collar	602											
	White Collar	371	1,25	0,92 - 1,70									
	Academic	157	1,11	0,73 - 1,69									
	Employer	49	0,96	0,47 - 1,97									
	Other/none	638	1,31	1,00 - 1,70	*								
Demand/control + support model		n	OR	95% CI		n	OR	95% CI		n	OR	95% CI	
Work demands	Low	405				329							
	Medium	1299	1,02	0,78 - 1,33		1099	0,99	0,73 - 1,34					
	High	316	1,27	0,91 - 1,79		258	1,26	0,86 - 1,85					
Skill discresion	High	495				418							
	Medium	1395	0,89	0,70 - 1,13		1159	0,93	0,71 - 1,22					
	Low	92	0,93	0,55 - 1,57		80	1,31	0,75 - 2,29					
Decision latitude	High	386				306							
	Medium	1223	0,98	0,75 - 1,28		1021	0,99	0,73 - 1,34					
	Low	407	0,80	0,57 - 1,11		355	0,85	0,58 - 1,24					
Social support	High	210				173							
	Medium	1591	1,35	0,93 - 1,94		1325	1,23	0,82 - 1,83					
	Low	150	2,06	1,27 - 3,36	**	137	1,90	1,13 - 3,22	*				
Work hours factors		n	OR	95% CI		n	OR	95% CI		n	OR	95% CI	
Employment	Full time	1304				1110				1079			
	Part time	419	1,31	1,02 - 1,7	*	337	1,59	1,16 - 2,17	**	322	1,55	1,12 - 2,14	**
	Self employed	306	1,04	0,78 - 1,40		244	1,08	0,74 - 1,59		200	1,11	0,73 - 1,68	
Employment statu	Permanent	1681				1410				1363			
	Temporary	238	0,79	0,56 - 1,10		219	0,79	0,55 - 1,14		186	0,81	0,55 - 1,21	
Work hours	Daytime	1259				1065				1025			
	Irregular no night	544	1,00	0,79 - 1,27		451	1,07	0,81 - 1,40		411	1,10	0,83 - 1,47	
	Irregular night	158	0,94	0,63 - 1,39		132	0,99	0,61 - 1,59		130	1,07	0,66 - 1,74	
Workshift length variation	Mostly the same	1092				929				899			
	Varied length	892	1,26	1,02 - 1,55	*	731	1,25	0,99 - 1,58		676	1,21	0,95 - 1,55	
Workshift length	7.5h-9h	872				747				727			
	part-time	674	1,26	0,99 - 1,59		541	1,45	1,07 - 1,95	*	485	1,48	1,08 - 2,02	*
	<7.5h	94	1,55	0,97 - 2,49		77	1,89	1,13 - 3,16	*	77	1,87	1,11 - 3,16	*
	>9h	87	1,32	0,80 - 2,18		77	1,28	0,73 - 2,22		75	1,33	0,76 - 2,34	
Influence over Work hours	always	226				189				160			
	often/sometimes	1043	0,73	0,53 - 1,00	*	872	0,72	0,50 - 1,03		839	0,67	0,45 - 1,00	*
	seldom/never	726	0,67	0,48 - 0,94	*	607	0,66	0,45 - 0,99	*	582	0,62	0,39 - 0,97	*
Overtime	no	499				417				380			
	yes	1458	1,12	0,88 - 1,42		1226	1,08	0,82 - 1,42		1189	1,10	0,82 - 1,47	
Paid overtime per month	<5h	1307				1087				1024			
	5-15h	446	0,76	0,59 - 0,99	*	376	0,77	0,57 - 1,02		368	0,75	0,56 - 1,01	
	>15h	204	0,62	0,43 - 0,91	*	180	0,68	0,45 - 1,02		177	0,65	0,43 - 0,99	*
Unpaid overtime per month	<5h	1508				1265				1204			
	5-15h	209	1,58	1,14 - 2,18	**	176	1,36	0,94 - 1,96		167	1,41	0,96 - 2,05	
	>15h	240	2,02	1,50 - 2,70	***	202	1,81	1,29 - 2,55	***	198	1,77	1,24 - 2,52	**
Total overtime with/without pleasure	<10h	1467				1217				1151			
	>10h no pleasure	362	1,39	1,07 - 1,80	*	308	1,41	1,05 - 1,88	*	302	1,37	1,01 - 1,85	*
	>10h with pleasure	128	1,32	0,88 - 1,98		118	1,12	0,71 - 1,77		116	1,04	0,65 - 1,66	
Total overtime with/without force	<10h	1467				1217				1151			
	>10h no force	226	1,24	0,90 - 1,71		202	1,09	0,76 - 1,57		198	1,01	0,69 - 1,46	
	>10h with force	264	1,50	1,12 - 2,00	**	224	1,56	1,13 - 2,15	**	220	1,54	1,10 - 2,16	*

Quit working due to mental strain

Most background factors, psychosocial factors and work hour factors studied were associated with the feeling that work was too mentally straining to remain in the work force until normal age of retirement (Table 2).

Being male was associated with an under risk. Having a university degree, working with health care or research/development, not working in the private sector and being part of a white collar or academic union was associated with an over risk.

Being self-employed and working 5-15h of paid overtime was associated with an under-risk for quitting work.

Over-risks were observed for irregular work hours with or without night work, having varied shift length, working long (>9h) shifts, having low influence over work hours, working more than 5h of unpaid over time, working more than 10h over time without interest or with force.

When controlling for background factors and psychosocial factors only working more than 15h of unpaid overtime, having varied work shift length and having irregular work hours that includes night work were still significant, with an over risk of quitting work due to mental strain.

Table 2

Quit work before normal retirement due to mental strain		Model 1 "Crude" logistic regression				Model 2 Control for background factors				Model 3 Model 2 + demand/control/sup.			
Backgrond factors		n	OR	95% CI		n	OR	95% CI		n	OR	95% CI	
Gender	Female	1019											
	male	983	0,61	0,49 - 0,75	***								
Age	1 year	2002	1,01	1,00	1,02								
Marital status	Married	1186											
	Not married	793	0,99	0,79 - 1,23									
Children < 16	No children	799											
	Have children	1161	1,19	0,95 - 1,49									
Education	Elementary school	612											
	High school	793	1,14	0,86 - 1,50									
	University	573	2,11	1,59 - 2,79	***								
Sectors	Manufactoring	593											
	Health care	410	2,98	2,18 - 4,05	***								
	Service	413	1,19	0,84 - 1,69									
	Administration	202	0,70	0,42 - 1,17									
	Research/developm	339	2,61	1,88 - 3,62	***								
Employer	Private/self	1215											
	County/city	591	2,81	2,23 - 3,55	***								
	Government	173	1,50	1,01 - 2,24	*								
Union	Blue Collar	590											
	White Collar	371	1,64	1,20 - 2,24	**								
	Academic	157	1,89	1,27 - 2,83	**								
	Employer	48	1,05	0,50 - 2,24									
	Other/none	629	1,03	0,77 - 1,38									
Demand/control + support model		n	OR	95% CI		n	OR	95% CI		n	OR	95% CI	
Work demands	Low	396				326							
	Medium	1296	3,16	2,10 - 4,75	***	1098	3,15	1,96 - 5,07	***				
	High	301	9,99	6,39 - 15,6	***	250	9,41	5,58 - 15,8	***				
Skill discresion	High	491				417							
	Medium	1385	0,72	0,56 - 0,91	**	1155	0,83	0,62 - 1,10					
	Low	94	0,57	0,32 - 1,02		82	0,93	0,50 - 1,76					
Decision latitude	High	369				298							
	Medium	1217	1,52	1,11 - 2,10	**	1019	1,35	0,93 - 1,97					
	Low	406	2,06	1,43 - 2,96	***	355	2,04	1,32 - 3,14	***				
Social support	High	200				165							
	Medium	1583	5,62	2,85 - 11,1	***	1322	4,32	2,15 - 8,66	***				
	Low	148	16,1	7,67 - 33,9	***	137	14,7	6,78 - 31,8	***				
Work hours factors		n	OR	95% CI		n	OR	95% CI		n	OR	95% CI	
Employment	Full time	1291				1103				1078			
	Part time	417	1,24	0,95 - 1,60		337	0,98	0,70 - 1,36		321	1,01	0,70 - 1,44	
	Self employed	294	0,61	0,43 - 0,87	**	239	0,77	0,48 - 1,21		198	0,79	0,47 - 1,33	
Employment statu	Permanent	1667				1404				1362			
	Temporary	234	0,70	0,48 - 1,01		215	0,79	0,53 - 1,19		185	0,87	0,55 - 1,39	
Work hours	Daytime	1243				1059				1023			
	Irregular no night	539	1,39	1,09 - 1,77	**	448	1,38	1,03 - 1,85	*	410	1,24	0,90 - 1,70	
	Irregular night	156	1,90	1,31 - 2,75	***	131	1,72	1,09 - 2,70	*	129	1,63	1,00 - 2,65	*
Workshift length variation	Mostly the same	1081				924				898			
	Varied length	879	1,72	1,38 - 2,15	***	726	1,71	1,32 - 2,21	***	674	1,58	1,20 - 2,07	***
Workshift length	7.5h-9h	865				742				727			
	part-time	660	1,06	0,82 - 1,36		536	0,94	0,67 - 1,30		482	0,99	0,69 - 1,41	
	<7.5h	94	1,13	0,67 - 1,90		77	1,05	0,59 - 1,87		77	1,02	0,55 - 1,87	
	>9h	84	1,67	1,01 - 2,76	*	75	1,35	0,76 - 2,40		74	1,31	0,71 - 2,42	
Influence over Work hours	always	217				186				157			
	often/sometimes	1036	1,44	0,95 - 2,16		868	1,23	0,78 - 1,94		840	0,91	0,54 - 1,55	
	seldom/never	718	1,99	1,31 - 3,02	***	603	1,47	0,90 - 2,38		581	0,98	0,55 - 1,74	
Overtime	no	489				412				379			
	yes	1449	1,27	0,98 - 1,65		1222	1,38	1,02 - 1,87	*	1188	1,06	0,76 - 1,48	
Paid overtime per month	<5h	1292				1080				1022			
	5-15h	443	0,72	0,55 - 0,96	*	375	0,86	0,62 - 1,17		368	0,72	0,52 - 1,01	
	>15h	203	1,01	0,71 - 1,44		179	1,16	0,77 - 1,75		177	0,82	0,53 - 1,27	
Unpaid overtime per month	<5h	1491				1257				1201			
	5-15h	209	1,93	1,39 - 2,66	***	176	1,62	1,10 - 2,37	*	168	1,49	0,98 - 2,25	
	>15h	238	2,06	1,52 - 2,79	***	201	1,98	1,36 - 2,89	***	198	1,54	1,03 - 2,32	*
Total overtime with/without pleasure	<10h	1451				1210				1149			
	>10h no pleasure	359	1,82	1,41 - 2,37	***	306	1,90	1,40 - 2,59	***	302	1,32	0,95 - 1,83	
	>10h with pleasure	128	0,74	0,45 - 1,22		118	0,72	0,40 - 1,27		116	0,61	0,33 - 1,12	
Total overtime with/without force	<10h	1451				1210				1149			
	>10h no force	226	1,00	0,70 - 1,42		202	1,03	0,69 - 1,56		198	0,84	0,55 - 1,31	
	>10h with force	261	2,01	1,50 - 2,69	***	222	2,05	1,45 - 2,90	***	220	1,37	0,95 - 1,99	

Short-term sick leave

Table 3 shows the results for short-term sick leave (over 24 days/year). Being a male, being young and being an employer were associated with an under risk of short-term sick leave in the crude analyses.

Being single, having a high school education, working for the county/city, having low social support and low decision latitude were associated with an increased risk

Significant work hour factors associated with an under risk were: being self employed, having a temporary employment status, varied length of work shifts, working part-time (compared to full-time with 7.5-9h shifts) and working over 10h overtime in combination with over time out of interest. Over-risk for short-term sick leave was observed only for a low influence over work hours.

When controlling for background factors, all work hour predictors lost their significance. However, part-time work (compared to full-time work) became significant with an over risk. This over-risk, was still significant after controlling for psychosocial factors.

Table 3

Short-term sick leave (>24days)		Model 1 "Crude" logistic regression				Model 2 Control for background factors				Model 3 Model 2 + demand/control/sup.			
Backgrond factors		n	OR	95% CI		n	OR	95% CI		n	OR	95% CI	
Gender	Female	1006											
	male	1012	0,68	0,57 - 0,81	***								
Age	1 year	2018	0,97	0,97 - 0,98	***								
Marital status	Married	1190											
	Not married	805	1,36	1,13 - 1,63	***								
Children < 16	No children	795											
	Have children	1179	1,29	0,93 - 1,78									
Education	Elementary school	635											
	High school	793	1,32	1,07 - 1,62	*								
	University	566	1,23	0,98 - 1,55									
Sectors	Manufactoring	608											
	Health care	402	1,11	0,86 - 1,43									
	Service	408	1,03	0,80 - 1,32									
	Administration	200	1,02	0,74 - 1,41									
	Research/developm	336	1,15	0,88 - 1,50									
Employer	Private/self	1231											
	County/city	586	1,25	1,02 - 1,52	*								
	Government	169	1,15	0,83 - 1,59									
Union	Blue Collar	596											
	White Collar	360	0,92	0,71 - 1,20									
	Academic	154	0,77	0,54 - 1,10									
	Employer	51	0,31	0,17 - 0,57	***								
	Other/none	632	0,79	0,63 - 0,99	*								
Demand/control + support model		n	OR	95% CI		n	OR	95% CI		n	OR	95% CI	
Work demands	Low	403				328							
	Medium	1280	1,17	0,94 - 1,47		1086	1,27	0,78 - 2,05					
	High	313	1,26	0,94 - 1,70		254	1,85	1,03 - 3,32	*				
Skill discresion	High	485				409							
	Medium	1379	1,16	0,94 - 1,42		1150	0,97	0,63 - 1,47					
	Low	93	1,45	0,92 - 2,28		79	1,26	0,58 - 2,72					
Decision latitude	High	387				308							
	Medium	1202	1,66	1,32 - 2,10	***	1007	1,79	1,00 - 3,20	*				
	Low	408	2,52	1,89 - 3,36	***	352	2,12	1,12 - 4,00	*				
Social support	High	213				177							
	Medium	1574	1,36	1,02 - 1,81	*	1306	1,10	0,59 - 2,03					
	Low	147	2,10	1,36 - 3,24	***	137	1,79	0,83 - 3,84					
Work hours factors		n	OR	95% CI		n	OR	95% CI		n	OR	95% CI	
Employment	Full time	1297				1098				1068			
	Part time	410	1,09	0,87 - 1,4		332	1,59	1,04 - 2,43	*	317	1,67	1,07 - 2,61	*
	Self employed	311	0,46	0,36 - 0,59	***	244	1,11	0,57 - 2,17		199	1,11	0,53 - 2,32	
Employment statu	Permanent	1659				1391				1346			
	Temporary	239	0,61	0,46 - 0,80	***	219	0,59	0,30 - 1,16		185	0,66	0,32 - 1,36	
Work hours	Daytime	1242				1047				1007			
	Irregular no night	543	0,87	0,71 - 1,06		454	0,88	0,57 - 1,34		411	0,79	0,50 - 1,24	
	Irregular night	157	0,93	0,67 - 1,30		131	1,07	0,56 - 2,02		130	1,04	0,54 - 2,00	
Workshift length variation	Mostly the same	1088				919				888			
	Varied length	877	0,75	0,63 - 0,90	**	726	0,92	0,64 - 1,32		670	0,87	0,59 - 1,29	
Workshift length	7.5h-9h	865				736				718			
	part-time	668	0,69	0,56 - 0,84	***	534	1,40	0,90 - 2,15		477	1,53	0,97 - 2,41	
	<7.5h	97	0,74	0,49 - 1,13		79	0,72	0,30 - 1,77		79	0,75	0,30 - 1,87	
	>9h	89	0,72	0,46 - 1,11		79	1,06	0,43 - 2,62		76	1,15	0,46 - 2,88	
Influence over Work hours	always	227				192				160			
	often/sometimes	1035	1,59	1,19 - 2,12	**	867	0,74	0,39 - 1,39		834	0,66	0,32 - 1,35	
	seldom/never	711	1,70	1,26 - 2,30	***	593	1,40	0,74 - 2,67		571	1,15	0,55 - 2,44	
Overtime	no	494				409				372			
	yes	1443	1,04	0,84 - 1,27		1219	0,82	0,56 - 1,21		1181	0,72	0,48 - 1,09	
Paid overtime per month	<5h	1298				1079				1014			
	5-15h	440	1,12	0,90 - 1,39		374	0,96	0,62 - 1,49		367	0,88	0,56 - 1,38	
	>15h	199	1,22	0,90 - 1,65		175	0,80	0,41 - 1,55		172	0,72	0,37 - 1,42	
Unpaid overtime per month	<5h	1496				1254				1191			
	5-15h	208	0,99	0,74 - 1,33		177	0,79	0,40 - 1,53		168	0,75	0,37 - 1,52	
	>15h	233	0,78	0,59 - 1,03		197	1,55	0,88 - 2,73		194	1,56	0,86 - 2,81	
Total overtime with/without pleasure	<10h	1458				1210				1142			
	>10h no pleasure	353	1,15	0,91 - 1,45		302	1,22	0,76 - 1,94		297	1,11	0,69 - 1,80	
	>10h with pleasure	126	0,67	0,46 - 0,96	*	116	0,37	0,11 - 1,20		114	0,39	0,12 - 1,27	
Total overtime with/without force	<10h	1458				1210				1142			
	>10h no force	228	0,91	0,69 - 1,21		203	0,91	0,49 - 1,68		199	0,90	0,48 - 1,69	
	>10h with force	251	1,07	0,81 - 1,40		215	1,06	0,60 - 1,87		212	0,96	0,53 - 1,72	

Long-term sick leave

The results from analyses of long-term sick leave (currently on sick leave for more than 3 months) are presented in table 4. The crude regression analyses show that being a male was associated with an under risk. Over-risks were observed for higher age, having children, working in the health care sector or service sector, being employed in the county/city, having high work demands, low decision latitude and low social support.

Varied work shift length, working overtime and working overtime more than 10h without being forced was associated with an under risk of long-term sick leave. An over risk was observed for having a low influence over work hours.

When controlling for background factors and psychosocial factors, the under risk for varied length of work shifts and working overtime without force were still significant. In addition, having a temporary employment status was associated with an increased risk of long-term sick leave.

Table 4

Long-term sick leave (>3months)		Model 1 "Crude" logistic regression				Model 2 Control for background factors				Model 3 Model 2 + demand/control/sup.			
Backgrond factors		n	OR	95% CI		n	OR	95% CI		n	OR	95% CI	
Gender	Female	1125											
	male	1092	0,31	0,20 - 0,50	***								
Age	1 year	2217	1,04	1,03 - 1,06	***								
Marital status	Married	1316											
	Not married	871	0,93	0,61 - 1,41									
Children < 16	No children	837											
	Have children	1326	2,12	1,32 - 3,41	**								
Education	Elementary school	738											
	High school	846	0,77	0,47 - 1,25									
	University	601	0,92	0,55 - 1,53									
Sectors	Manufactoring	660											
	Health care	442	2,62	1,39 - 4,92	**								
	Service	459	2,12	1,11 - 4,06	*								
	Administration	216	1,75	0,76 - 4,02									
	Research/development	359	2,00	1,00 - 4,01									
Employer	Private/self	1346											
	County/city	640	1,93	1,26 - 2,98	*								
	Government	187	1,26	0,59 - 2,72									
Union	Blue Collar	663											
	White Collar	384	0,69	0,37 - 1,27									
	Academic	163	0,76	0,33 - 1,74									
	Employer	54	0,01	0,00 - ###									
	Other/none	693	0,66	0,40 - 1,10									
Demand/control + support model		n	OR	95% CI		n	OR	95% CI		n	OR	95% CI	
Work demands	Low	443				347							
	Medium	1368	1,31	0,69 - 2,48		1130	4,45	0,57 - 34,8					
	High	365	3,57	1,82 - 7,02	***	274	6,10	0,69 - 53,6					
Skill discresion	High	527				431							
	Medium	1486	0,87	0,53 - 1,41		1198	1,03	0,39 - 2,69					
	Low	104	1,06	0,39 - 2,84		83	0,00	0,00 - ###					
Decision latitude	High	421				328							
	Medium	1305	2,23	1,05 - 4,71	*	1055	5,18	0,65 - 41,3					
	Low	448	3,70	1,68 - 8,16	***	366	5,86	0,65 - 53,0					
Social support	High	231				187							
	Medium	1689	1,43	0,61 - 3,34		1365	2,52	0,32 - 19,6					
	Low	174	5,71	2,27 - 14,4	***	141	4,91	0,52 - 46,6					
Work hours factors		n	OR	95% CI		n	OR	95% CI		n	OR	95% CI	
Employment	Full time												
	Part time												
	Self employed												
Employment status	Permanent	1792				1455				1432			
	Temporary	279	1,37	0,79 - 2,39		240	0,57	0,12 - 2,72		208	2,63	1,27 - 5,45	**
Work hours	Daytime	1348				1101				1076			
	Irregular no night	600	1,40	0,89 - 2,21		477	1,51	0,60 - 3,83		441	1,23	0,67 - 2,25	
	Irregular night	168	1,25	0,58 - 2,67		136	1,31	0,25 - 6,93		137	0,76	0,28 - 2,07	
Workshift length variation	Mostly the same	1186				964				956			
	Varied length	959	0,62	0,40 - 0,96	*	764	0,49	0,19 - 1,22		710	0,53	0,31 - 0,93	*
Workshift length	7.5h-9h												
	part-time												
	<7.5h												
	>9h												
Influence over Work hours	always	250				205				169			
	often/sometimes	1110	1,36	0,57 - 3,27		901	0,53	0,13 - 2,23		882	1,08	0,30 - 3,84	
	seldom/never	796	2,84	1,21 - 6,70	*	631	0,89	0,22 - 3,68		622	1,23	0,34 - 4,46	
Overtime	no	554				440				408			
	yes	1552	0,55	0,36 - 0,86	**	1268	0,70	0,27 - 1,80		1253	0,59	0,34 - 1,04	
Paid overtime per month	<5h	1414				1135				1083			
	5-15h	470	0,76	0,43 - 1,32		386	0,72	0,20 - 2,56		388	0,80	0,41 - 1,54	
	>15h	222	0,91	0,44 - 1,85		187	0,57	0,07 - 4,49		190	0,78	0,33 - 1,89	
Unpaid overtime per month	<5h	1639				1321				1283			
	5-15h	219	0,49	0,20 - 1,22		181	0,00	0,00 - ###		175	0,37	0,12 - 1,13	
	>15h	248	0,70	0,33 - 1,46		206	1,85	0,59 - 5,78		203	0,71	0,28 - 1,77	
Total overtime with/without pleasure	<10h	1590				1271				1225			
	>10h no pleasure	385	0,87	0,49 - 1,53		318	2,02	0,73 - 5,61		318	0,79	0,40 - 1,57	
	>10h with pleasure	131	0,33	0,08 - 1,37		119	0,00	0,00 - ###		118	0,25	0,03 - 1,93	
Total overtime with/without force	<10h	1590				1271				1225			
	>10h no force	234	0,19	0,05 - 0,76	*	207	0,00	0,00 - ###		204	0,11	0,02 - 0,86	*
	>10h with force	282	1,20	0,68 - 2,13		230	2,99	1,03 - 8,68	*	232	1,15	0,56 - 2,34	

Discussion

The main impression of the results is that work hours seem to be important for all the variables analyzed in this study, but to a varied degree. However, before the results are further discussed a short remark on the statistical analyses has to be made.

When comparing the three models of regression analyses for the dependent variables it is important to keep in mind that there are two main explanations for the loss of significance when control variables are entered into the analyses.

First, control variables may share some of the variance with the independent variables and therefore the independent variables loose significance. If this would be the main explanation for loss of significance then the odds ratios for the independent variables should also be substantially affected. Second, the more variables that are entered in to the analyses the lower is the statistical power. This is partly due to loss of subjects but also because of loss of degrees of freedom due to more independent variables in the analyses. This means that a correct interpretation of the results has to take into account the changes in odds ratios across the different models as well as the number of independent variables and loss of subjects.

Among the predictors, part-time work was associated with an increased risk of *short-term* sick leave and a risk of quitting work before normal age of retirement. In addition, short work shift (<7.5h) when working full-time work hours increased the risk for quitting work before normal retirement. Part-time work would perhaps at first thought be associated with a better prognosis for survival in the work force. However, it is probably the case that shorter work days and/or work hours to some extent is a coping strategy for less healthier individuals and/or individuals with a high total workload (in and outside work). One of the reasons for having part-time work is often a health problem or social obligations at home. Thus, this group would be more likely to quit work early in life if they have the opportunity to, and also to have more sickness absence while still in the work force.

Temporary employment status was associated with an over risk for long-term sick leave but, an *under* risk for short-term sick leave. In the latter case, significance was lost after controlling for background factors, although, odds ratios were hardly affected. A plausible explanation is that the loss of significance had more to do with loss of statistical power than the variance shared with the control variables. Interestingly, there is a substantial increase in the risk of having long-term sick leave (from 0.57 to 2.63) after introduction of psychosocial factors for the group that has a temporary employment status. Apparently, there is a synergistic interaction with other psychosocial factors at work. Having a permanent position increases the risk for long-term sick leave the most when other psychosocial factors are taken into account.

Irregular work hours with night work and work hours with varied shift length were associated with *quitting work due to mental strain*. This indicates that irregular working hours contributed to mental strain. Varied shift length was associated with an *under* risk of long-term sick leave. The result contrasts to the increased risk of irregular work-hours discussed above. However, other aspects of irregular work-hours did not show an under risk.

Low influence over work-hours was associated with a higher risk for long-term & short-term sick leave and to quit work due to mental strain in the crude analyses. However, the predictors lost their significance when controlled for psychosocial factors. In these cases there are also a decrease in odds ratios, which indicates that the control variables account for part of the variance. This was not very surprising because influence over work hours is closely related to work demands and decision latitude. High demands decrease influence and high decision latitude is also often related to work hours as well as to the work situation.

Low influence over work hours also indicated an *under risk* for quitting work before normal age of retirement. The reason for this under risk is not clear. A possible explanation is that quitting work before normal retirement also is influenced by economic factors. It is plausible that individuals who have the economic possibility to quit work early in life also have more influence over work hours.

Overtime work seems to be mainly associated with an *under risk* for sick leave (both long-term and short-term), especially in combination with interest or in the absence of force. However, when controlling for background and psychosocial factors only the combination overtime without force was significant as a predictor and only for long-term sick leave.

When examining the odds ratios for overtime work in the analyses above, loss of statistical power seems to be the most plausible explanation for the predictors to lose their significance. Odds ratios are hardly affected by the control variables but there is a loss of subjects in the analyses when more control variables are entered.

A similar pattern was also shown for variables describing if one would work until normal retirement (both due to mentally straining work and for any reason). However, in these cases, overtime was associated with an over risk in combination with the absence of interest or in combination with force. However, when controlling for background factors and psychosocial factors significance is lost for the variable describing if one would quit before normal retirement due to mental strain. The main reason for loss of significance seem to be that the control variables accounted for the variance, because odds ratios were substantially decreased when psychosocial factors were entered in to the analyses. Apparently, overtime in combination with force or pleasure are to some extent explained by the demand-control-support model.

In the prediction of who will quit work before normal retirement (sp. for any reason) the combination of overtime without interest or with force was,

however, still significant after controlling for psychosocial factors. Apparently, overtime in combination with force or the absence of pleasure has a more robust effect on this outcome.

There also seems to be differential effects of the amount of overtime and whether the overtime is paid for or not. Unpaid overtime seems to increase the risk for quitting work before normal retirement but paid overtime seem to decrease the risk. When controlling for background and psychosocial factors the under risk for paid overtime loose significance in predicting who's quitting work due to mental strain. But again, the explanations seem to have more to do with loss of statistical power than the control variables per se.

Overtime seem to be a complex variable and different kinds of overtime seem to have differential effects. Paid overtime with pleasure and the absence of being forced to work overtime seem to be mainly beneficial. Unpaid overtime, especially in combination with force or the absence of pleasure seem have more negative effects.

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