

Trajectories of psychosocial working conditions and all-cause and cause-specific mortality: a Swedish register-based cohort study¹

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1. *Supplementary Material*

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Table S1. Translated items used for the decision authority, skill discretion and psychological demands in the Job Exposure Matrices

Dimension	Question	Answer alternatives
Job control		
Decision authority	Can you partially decide when tasks should be done?	Never, mostly not, mostly, always
	Do you have the opportunity to decide your own work pace?	Not at all, occasionally, roughly ¼ of the time, half of the time, roughly ¾ of the time, almost all the time
	Can you take short breaks to talk pretty much any time?	Not at all, occasionally, roughly ¼ of the time, half of the time, roughly ¾ of the time, almost all the time
	Are you ever involved in deciding how your work is organized?	Never, mostly not, mostly, always
Skill discretion	Is there any apprenticeship or introductory training required at the workplace (besides education or course) before you can do your job?	No, only a few days, a few weeks, a few months, ½ year, 1 year, 2 years, 3 years, 4 years or more
	Does the work require you to repeat the same work steps many times an hour?	Not at all, occasionally, roughly ¼ of the time, half of the time, roughly ¾ of the time, almost all the time
	Do you spend quite some time during the day trying to understand or solving difficult problems?	Occasionally, roughly ¼ of the time, half of the time, roughly ¾ of the time, almost all the time
	Does the work offer you the possibility to learn something new and to develop in this occupation?	Not at all, a few days per month, one day per week, a few days per week, every day
Job demands		
Psychological demands	Are you sometimes so stressed that you do not have time to talk about or even think about something besides work?	Not at all, occasionally, roughly ¼ of the time, half of the time, roughly ¾ of the time, almost all the time
	Do you sometimes have so much to do that you have to work during lunch, work overtime, or take work home?	Not at all, a few days per month, one day per week, a few days per week, every day
	Does your work require all your attention and concentration?	Not at all, occasionally, roughly ¼ of the time, half of the time, roughly ¾ of the time, almost all the time

Table S2. Diagnostic of trajectory models of job control and job demands by number of groups and sex

Group	Estimated proportion from the trajectory model*	Proportion by posterior probability-based classification*	Average posterior probability	Odds of correct classification
3 groups				
Job control – men (BIC: -22459450.8)				
1	0.31	0.31	0.98	108.1
2	0.40	0.40	0.97	45.6
3	0.29	0.29	0.98	126.6
Job demands – men (BIC: -11389122.4)				
1	0.14	0.14	0.98	267.5
2	0.51	0.51	0.97	31.1
3	0.35	0.35	0.98	76.4
Job control – women (BIC: -21436342.9)				
1	0.38	0.39	0.99	119.6
2	0.41	0.41	0.97	51.0
3	0.21	0.20	0.98	156.2
Job demands – women (BIC: -14851036.6)				
1	0.15	0.15	0.98	427.5
2	0.74	0.74	0.99	48.8
3	0.11	0.11	0.98	353.4
4 groups				
Job control – men (BIC: -20694973.4)				
1	0.09	0.09	0.95	183.6
2	0.29	0.29	0.96	58.7
3	0.34	0.34	0.96	40.4
4	0.28	0.28	0.98	120.6
Job demands – men (BIC: -9667622.8)				
1	0.09	0.09	0.98	437.2
2	0.24	0.24	0.95	56.2
3	0.38	0.38	0.95	28.9
4	0.29	0.29	0.97	74.2
Job control – women (BIC: -19766366.9)				
1	0.11	0.11	0.96	183.2
2	0.33	0.33	0.97	64.1
3	0.38	0.38	0.94	27.8
4	0.18	0.18	0.97	147.3
Job demands – women (BIC: -12350346.5)				
1	0.08	0.08	0.98	570.4
2	0.27	0.27	0.94	42.9
3	0.57	0.57	0.98	29.1
4	0.08	0.08	0.98	500.6
5 groups				
Job control – men (BIC: -19778281.3)				
1	0.03	0.03	0.96	829.6
2	0.19	0.19	0.95	86.8
3	0.23	0.23	0.93	44.2
4	0.28	0.28	0.96	53.5

5	0.26	0.26	0.98	118.1
Job demands – men (BIC: -8774715.7)				
1	0.08	0.08	0.98	501.5
2	0.24	0.24	0.95	65.6
3	0.33	0.33	0.95	34.7
4	0.25	0.25	0.94	47.5
5	0.10	0.10	0.95	162.7
Job control – women (BIC: -18804651.4)				
1	0.10	0.10	0.97	323.6
2	0.30	0.30	0.97	87.2
3	0.30	0.30	0.95	42.3
4	0.16	0.16	0.94	74.2
5	0.14	0.14	0.98	266.3
Job demands – women (BIC: -11268577.5)				
1	0.06	0.07	0.99	976.4
2	0.20	0.20	0.96	99.7
3	0.36	0.36	0.94	26.1
4	0.32	0.31	0.94	33.3
5	0.06	0.06	0.98	827.6

*There should be sufficient sample size in each identified group (more than 5%) and close correspondence between these two columns

Table S3. ICD codes for somatic disorders, psychiatric disorders, cardiovascular diseases, alcohol-related morbidity, and suicide

	ICD-10	ICD-9	ICD-8
Somatic disorders	All codes in the patient registers excluding F, O, P, Q codes	All codes in the patient registers excluding 29, 30, 31, 63, 64, 65, 66, 67, 74, 75, 76, 77	All codes in the patient registers excluding 29, 30, 31, 63, 64, 65, 66, 67, 74, 75, 76, 77
Psychiatric disorders	F01-F99	29-31	29-31
Cardiovascular diseases	I00-I99	39-45,	39-45
Suicide (attempt)	X60-X84, Y10-Y34	95	95
Alcohol-related morbidity	F10, K70, T51, X65, Y90, Y91, E24.4, G31.2, G62.1, G72.1, I42.6, K29.2, K85.2, K86.0, O35.4, R78.0, Y57.3, Z50.2, Z71.4, Z72.1	291, 303, 357, 425, 535, 571, 790, 977, 980	261, 262, 291, 303, 571, 980

Table S4. Covariates included in model 3 by cause of death

	All-cause	CVD	Suicide	Alcohol-related
Age	x	x	x	x
Birth year	x	x	x	x
Birth country	x	x	x	x
Sex	x	x	x	x
Education	x	x	x	x
Civil status	x	x	x	x
Number of children	x	x	x	x
Childhood SEP	x	x	x	x
Early death of parents	x	x		x
Previous Long-term sick leave	x	x	x	x
History of somatic disorders	x			
History of psychiatric disorders	x		x	
History of CVD		x		
Previous suicide attempt			x	
History of alcohol morbidity				x

SEP, Socioeconomic position; CVD, Cardiovascular diseases

Table S5. Hazard ratios (HRs) with 95% confidence intervals (CIs) of the association between job strain categories and suicide, by age groups

	Age 16-29	Age 30-39	Age 40-49	Age 50-60
	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
Model 1				
Low strain	Ref	Ref	Ref	Ref
Active job	0.60 (0.50-0.72)†	0.66 (0.58-0.76)†	0.69 (0.61-0.78)†	0.64 (0.56-0.72)†
Passive job	1.67 (1.50-1.87)†	1.63 (1.45-1.82)†	1.33 (1.20-1.47)†	1.12 (1.00-1.26)*
High strain	1.10 (0.91-1.34)	1.35 (1.11-1.63)†	1.12 (0.94-1.33)	1.02 (0.85-1.23)
Model 2				
Low strain	Ref	Ref	Ref	Ref
Active job	0.64 (0.53-0.77)†	0.74 (0.65-0.85)†	0.80 (0.71-0.90)†	0.72 (0.63-0.81)†
Passive job	1.59 (1.43-1.78)†	1.44 (1.28-1.61)†	1.18 (1.06-1.31)†	1.00 (0.89-1.12)
High strain	1.11 (0.91-1.35)	1.27 (1.04-1.54)*	1.05 (0.88-1.25)	0.98 (0.82-1.18)
Model 3				
Low strain	Ref	Ref	Ref	Ref
Active job	0.72 (0.59-0.87)†	0.82 (0.71-0.95)†	0.85 (0.75-0.97)*	0.70 (0.61-0.80)†
Passive job	1.43 (1.28-1.60)†	1.31 (1.17-1.48)†	1.12 (1.01-1.25)*	1.00 (0.89-1.13)
High strain	1.06 (0.97-1.29)	1.19 (0.98-1.45)	1.01 (0.85-1.20)	0.98 (0.81-1.17)

Job strain categories based on 4 groups of job control and 4 groups of job demands

Model 1 adjusting for age and sex

Model 2 adjusting for age, sex, birth year, civil status, birth country, number of children, childhood socioeconomic position, previous long-term sick leave, history of psychiatric disorders, and previous suicide attempt

Model 3 adjusting for age, sex, birth year, civil status, birth country, number of children, childhood socioeconomic position, previous long-term sick leave, history of psychiatric disorders, previous suicide attempt, and education

*p<0.05 †p<0.01

Table S6. Hazard ratios (HRs) with 95% confidence intervals (CIs) of the association between job control and job demands in 2009 and all-cause and cause-specific mortality in men

	All-cause	CVD	Suicide	Alcohol-related
Job control	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
Model 1				
High	Ref	Ref	Ref	Ref
Medium-high	1.41 (1.38-1.44)†	1.54 (1.48-1.61)†	1.74 (1.60-1.88)†	1.64 (1.46-1.84)†
Medium-low	1.85 (1.81-1.89)†	2.24 (2.15-2.33)†	2.13 (1.96-2.31)†	2.09 (1.85-2.34)†
Low	1.88 (1.83-1.93)†	2.22 (2.10-2.34)†	2.16 (1.95-2.41)†	2.07 (1.76-2.43)†
Model 2				
High	Ref	Ref	Ref	Ref
Medium-high	1.25 (1.23-1.28)†	1.34 (1.28-1.39)†	1.50 (1.38-1.63)†	1.31 (1.16-1.47)†
Medium-low	1.53 (1.50-1.57)†	1.76 (1.68-1.83)†	1.73 (1.59-1.89)†	1.43 (1.26-1.62)†
Low	1.52 (1.48-1.57)†	1.69 (1.60-1.79)†	1.75 (1.57-1.96)†	1.41 (1.20-1.67)†
Model 3				
High	Ref	Ref	Ref	Ref
Medium-high	1.14 (1.12-1.17)†	1.21 (1.16-1.26)†	1.35 (1.24-1.47)†	1.13 (0.99-1.27)
Medium-low	1.33 (1.30-1.36)†	1.50 (1.44-1.57)†	1.48 (1.35-1.63)†	1.15 (1.01-1.31)
Low	1.32 (1.28-1.36)†	1.45 (1.37-1.54)†	1.49 (1.33-1.68)†	1.14 (0.96-1.35)
Job demands				
Model 1				
Low	Ref	Ref	Ref	Ref
Medium-low	0.74 (0.72-0.75)†	0.71 (0.68-0.73)†	0.68 (0.64-0.73)†	0.66 (0.59-0.73)†
Medium-high	0.65 (0.64-0.67)†	0.60 (0.57-0.62)†	0.56 (0.51-0.60)†	0.53 (0.47-0.60)†
High	0.54 (0.53-0.56)†	0.45 (0.43-0.48)†	0.50 (0.45-0.56)†	0.42 (0.36-0.50)†
Model 2				
Low	Ref	Ref	Ref	Ref
Medium-low	0.82 (0.80-0.83)†	0.80 (0.77-0.83)†	0.75 (0.70-0.80)†	0.80 (0.72-0.89)†
Medium-high	0.75 (0.74-0.77)†	0.72 (0.69-0.74)†	0.65 (0.60-0.70)†	0.69 (0.62-0.78)†
High	0.68 (0.66-0.70)†	0.60 (0.57-0.64)†	0.64 (0.57-0.72)†	0.64 (0.54-0.77)†
Model 3				
Low	Ref	Ref	Ref	Ref
Medium-low	0.87 (0.86-0.89)†	0.87 (0.84-0.90)†	0.81 (0.76-0.86)†	0.88 (0.79-0.97)†

Medium-high	0.83 (0.82-0.85)†	0.80 (0.77-0.83)†	0.71 (0.66-0.77)†	0.79 (0.70-0.89)†
High	0.80 (0.78-0.83)†	0.73 (0.69-0.78)†	0.76 (0.67-0.86)†	0.82 (0.68-0.98)*

Model 1 adjusting for age

Model 2 adjusting for age, birth year, civil status, birth country, number of children, childhood socioeconomic position, previous long-term sick leave and other outcome-specific covariates

Model 3 adjusting for age, birth year, civil status, birth country, number of children, childhood socioeconomic position, previous long-term sick leave, other outcome-specific covariates, and education *p<0.05 †p<0.01

Table S7. Hazard ratios (HRs) with 95% confidence intervals (CIs) of the association between job control and job demands in 2009 and all-cause and cause-specific mortality in women

	All-cause	CVD	Suicide	Alcohol-related
Job control	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
Model 1				
High	Ref	Ref	Ref	Ref
Medium-high	1.17 (1.14-1.21)†	1.32 (1.22-1.42)†	1.33 (1.15-1.52)†	1.45 (1.16-1.83)†
Medium-low	1.56 (1.51-1.60)†	2.16 (2.00-2.33)†	2.04 (1.78-2.34)†	2.44 (1.95-3.06)†
Low	1.57 (1.51-1.63)†	2.33 (2.12-2.56)†	1.75 (1.48-2.08)†	2.23 (1.68-2.96)†
Model 2				
High	Ref	Ref	Ref	Ref
Medium-high	1.14 (1.11-1.17)†	1.25 (1.15-1.35)†	1.24 (1.08-1.43)†	1.38 (1.09-1.73)†
Medium-low	1.43 (1.39-1.47)†	1.86 (1.72-2.02)†	1.68 (1.46-1.94)†	2.08 (1.65-2.63)†
Low	1.44 (1.39-1.49)†	2.01 (1.83-2.21)†	1.47 (1.23-1.75)†	1.91 (1.43-2.54)†
Model 3				
High	Ref	Ref	Ref	Ref
Medium-high	1.06 (1.03-1.09)†	1.10 (1.01-1.19)†	1.20 (1.04-1.39)*	1.17 (0.93-1.48)
Medium-low	1.20 (1.16-1.24)†	1.39 (1.27-1.51)†	1.53 (1.32-1.79)†	1.44 (1.13-1.85)†
Low	1.16 (1.12-1.21)†	1.42 (1.29-1.57)†	1.32 (1.09-1.59)†	1.23 (0.91-1.66)
Job demands				
Model 1				
Low	Ref	Ref	Ref	Ref
Medium-low	0.78 (0.76-0.81)†	0.67 (0.63-0.72)†	0.96 (0.83-1.12)	0.87 (0.70-1.10)
Medium-high	0.58 (0.56-0.60)†	0.40 (0.37-0.43)†	0.62 (0.52-0.74)†	0.52 (0.41-0.68)†
High	0.48 (0.46-0.51)†	0.28 (0.25-0.32)†	0.63 (0.51-0.79)†	0.31 (0.21-0.45)†
Model 2				
Low	Ref	Ref	Ref	Ref
Medium-low	0.80 (0.78-0.83)†	0.70 (0.66-0.76)†	1.03 (0.89-1.20)	0.93 (0.74-1.16)
Medium-high	0.62 (0.60-0.64)†	0.45 (0.42-0.49)†	0.76 (0.64-0.90)†	0.62 (0.48-0.80)†
High	0.55 (0.52-0.57)†	0.35 (0.30-0.39)†	0.83 (0.66-1.04)	0.40 (0.27-0.60)†
Model 3				
Low	Ref	Ref	Ref	Ref
Medium-low	0.86 (0.83-0.88)†	0.77 (0.72-0.83)†	1.09 (0.93-1.27)	1.06 (0.84-1.34)

Medium-high	0.74 (0.72-0.77)†	0.61 (0.55-0.67)†	0.88 (0.73-1.05)	0.95 (0.71-1.25)
High	0.73 (0.69-0.77)†	0.59 (0.51-0.68)†	1.04 (0.81-1.34)	0.87 (0.56-1.37)

Model 1 adjusting for age

Model 2 adjusting for age, birth year, civil status, birth country, number of children, childhood socioeconomic position, previous long-term sick leave and other outcome-specific covariates

Model 3 adjusting for age, birth year, civil status, birth country, number of children, childhood socioeconomic position, previous long-term sick leave, other outcome-specific covariates, and education *p<0.05 †p<0.01

Table S8. Hazard ratios (HRs) with 95% confidence intervals (CIs) of the association between job strain categories in 2009 and all-cause and cause-specific mortality by sex

	All-cause	CVD	Suicide	Alcohol-related
Men	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
Model 1				
Low strain	Ref	Ref	Ref	Ref
Active job	0.73 (0.71-0.74)†	0.67 (0.64-0.70)†	0.62 (0.57-0.67)†	0.59 (0.52-0.66)†
Passive job	1.39 (1.36-1.41)†	1.53 (1.47-1.58)†	1.38 (1.30-1.48)†	1.32 (1.20-1.46)†
High strain	1.22 (1.19-1.25)†	1.30 (1.23-1.37)†	1.15 (1.04-1.28)†	1.05 (0.90-1.23)
Model 2				
Low strain	Ref	Ref	Ref	Ref
Active job	0.80 (0.79-0.82)†	0.76 (0.73-0.79)†	0.71 (0.65-0.77)†	0.72 (0.64-0.81)†
Passive job	1.26 (1.23-1.28)†	1.34 (1.30-1.39)†	1.27 (1.19-1.36)†	1.10 (0.99-1.22)
High strain	1.15 (1.12-1.19)†	1.20 (1.14-1.27)†	1.10 (0.99-1.23)	0.95 (0.81-1.11)
Model 3				
Low strain	Ref	Ref	Ref	Ref
Active job	0.87 (0.86-0.89)†	0.84 (0.81-0.88)†	0.77 (0.70-0.83)†	0.83 (0.73-0.94)†
Passive job	1.19 (1.16-1.21)†	1.27 (1.22-1.31)†	1.19 (1.11-1.27)†	1.02 (0.92-1.13)
High strain	1.10 (1.07-1.13)†	1.15 (1.09-1.21)†	1.04 (0.94-1.15)	0.89 (0.76-1.05)
Women				
Model 1				
Low strain	Ref	Ref	Ref	Ref
Active job	0.75 (0.73-0.77)†	0.62 (0.58-0.66)†	0.77 (0.68-0.87)†	0.56 (0.46-0.69)†
Passive job	1.24 (1.22-1.27)†	1.52 (1.44-1.61)†	1.57 (1.41-1.74)†	1.47 (1.25-1.73)†
High strain	0.93 (0.88-0.97)†	0.90 (0.80-1.02)	1.04 (0.83-1.29)	1.33 (0.98-1.81)
Model 2				
Low strain	Ref	Ref	Ref	Ref
Active job	0.79 (0.77-0.81)†	0.67 (0.62-0.71)†	0.84 (0.75-0.96)†	0.62 (0.50-0.76)†
Passive job	1.20 (1.17-1.23)†	1.42 (1.34-1.50)†	1.42 (1.28-1.58)†	1.37 (1.16-1.61)†
High strain	0.93 (0.89-0.98)†	0.91 (0.80-1.03)	1.04 (0.84-1.30)	1.36 (1.00-1.85)*
Model 3				
Low strain	Ref	Ref	Ref	Ref
Active job	0.89 (0.87-0.92)†	0.84 (0.78-0.91)†	0.86 (0.75-0.99)*	0.83 (0.66-1.05)

Passive job	1.13 (1.10-1.15)†	1.30 (1.22-1.37)†	1.38 (1.24-1.54)†	1.21 (1.02-1.43)*
High strain	0.94 (0.90-0.99)*	0.93 (0.82-1.05)	1.04 (0.83-1.29)	1.40 (1.03-1.89)*

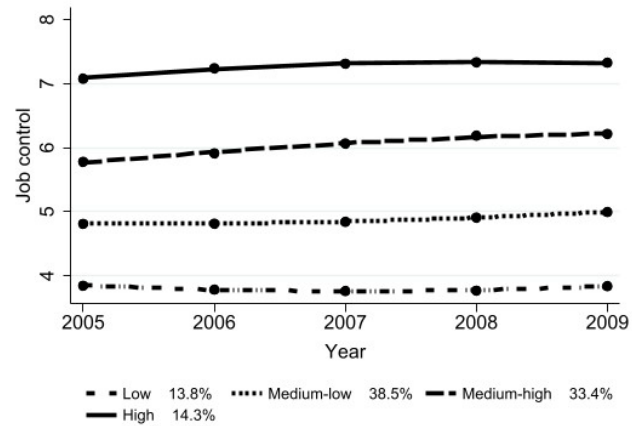
Model 1 adjusting for age

Model 2 adjusting for age, birth year, civil status, birth country, number of children, childhood socioeconomic position, previous long-term sick leave and other outcome-specific covariates

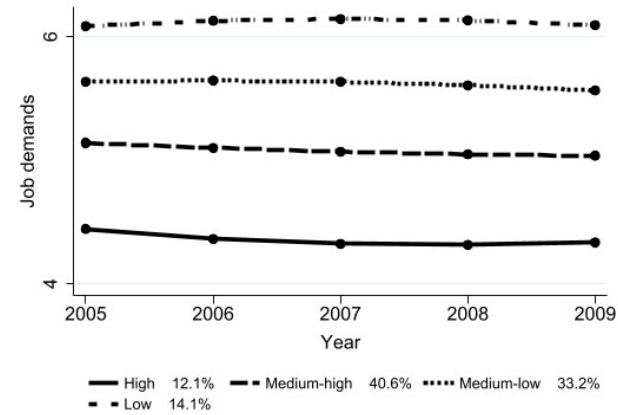
Model 3 adjusting for age, birth year, civil status, birth country, number of children, childhood socioeconomic position, previous long-term sick leave, other outcome-specific covariates, and education

*p<0.05 †p<0.01

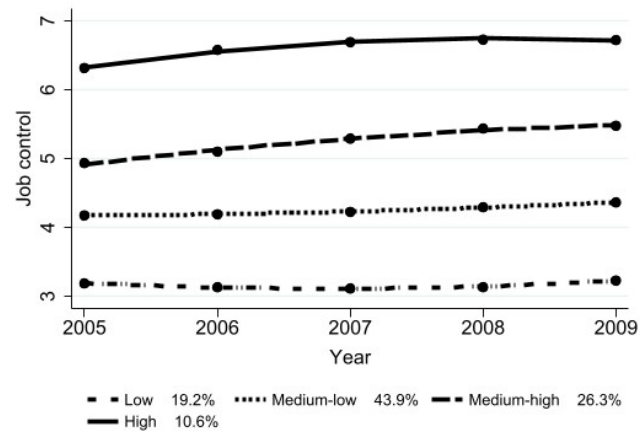
Job control – Men



Job demands – Men



Job control – Women



Job demands – Women

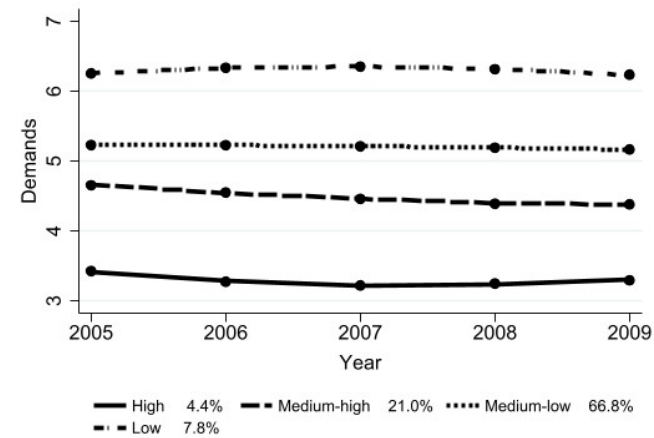


Figure S1. Trajectories of job control and job demands (2005-2009) in the Swedish working population aged below 30 in 2005 by sex
A higher score of job control means a higher level of job control; A higher score of job demands means a lower level of job demands

