

Mortality among women and men relative to unemployment, part time work, overtime work, and extra work: a study based on data from the Swedish twin registry

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Abstract

Objective—To examine mortality before 70 years of age among women and men relative to unemployment, part time work, overtime work, and extra work. Age, marital status, children, smoking and alcohol habits, use of sleeping pills and tranquilisers, stress, shift work, personality factors, and long lasting or serious illness were taken into account as potential confounding factors.

Methods—The study group comprised a subcohort of the Swedish twin registry, people born in 1926–58. Data were based on a postal questionnaire of 1973 and on information from the Swedish Causes of Death Registry. All subjects reporting a main occupation were selected, 9500 women and 11 132 men, and mortality from all causes during 1973–96 was analysed. The subjects were treated as a sample from the general population regardless of the twinning.

Results—Unemployment in 1973 among both women and men showed an association with increased mortality. The adjusted relative risk (RR) (95% confidence interval (95% CI)) was 1.98 (1.16 to 3.38), for women and 1.43 (0.91 to 2.25) for men. For the first 5 years of follow up, a threefold increase in risk was found for men (RR (95% CI) 3.29 (1.33 to 8.17)). The RR declined by time, but remained increased throughout the 24 year study period. In women overtime work of more than 5 hours a week was followed by an increased mortality rate (RR (95% CI) 1.92 (1.13 to 3.25)). A protective effect of moderate overtime work of a maximum 5 hours a week was shown for men (RR (95% CI) 0.58 (0.43 to 0.80)), whereas an increased mortality was indicated for part time work (RR (95% CI) 1.58 (0.91 to 2.77)) and extra work (work outside employment) of more than 5 hours a week (RR (95% CI) 1.29 (0.99 to 1.69)).

Conclusion—Unemployment and some time aspects of work were associated with subsequent mortality, even when controlling for social, behavioural, work, and health related factors. The idea that losing a job may have less importance for women than for men is not supported by this study.

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It is well known that unemployment is associated with health variables—such as increased consumption of health care, mortality, and psychological ill health.^{1–6} Overtime work has been suggested to contribute to increased levels of stress hormones⁷ and to increased mortality from cardiovascular diseases.^{8,9}

Most studies on unemployment are based on men but a few concern women,^{10,11} or are comparisons between the two sexes. Part time work, overtime work, and extra work, are conditions that have only been studied sparsely from the perspective of sex.¹² No studies on unemployment and mortality have included control for potential confounding factors such as family structure, lifestyle habits, and personality factors, within the same study.

In Sweden 79% of the men and 75% of the women between 16–65 years of age were employed or applied for a job¹³ in 1997, compared with 80% men and 57% women in 1974.¹⁴

The Swedish labour market was relatively stable between 1950 and 1990, with unemployment rates of about 2%, never exceeding 4%.¹⁵ Today, structural changes, changes in working time, and changes in working contracts, have divided the labour market into three parts: good, secure, and well paid jobs, an increasing proportion of temporary jobs, and unemployment.¹² In Sweden, as in other European countries, unemployment has increased during the 1990s, in Sweden from about 1.5% to 8%. Including people partially unemployed, the figures were 20% for women and 16% for men in 1995.¹² During the same period, the amount of overtime work increased for those who had employment.¹³

Although most women have joined the labour force during the past 30–40 years, many continue to take a greater responsibility for their children and household than do most men.¹⁶ The proportion of women and men working part time was 38% and 9%, respectively in 1997.¹³ Many women have part time employment to balance the demands from household duties whereas most men have part time work due to health problems.^{12,17} A combination of professional and household work is often to be preferred from a health perspective as long as the total workload does not get excessive, a situation which may induce negative health consequences.¹⁸

The aim of the present study was to examine mortality before 70 years of age among women

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Table 1 Description of the study population and exposure variables

	Women		Men	
	n	%	n	%
People included in the data collection	18516		18020	
Respondents	15874	85.7	14458	80.2
The cohort*	15683		14287	
Deaths 1973–96	862	5.5	1331	9.3
Participants without job titles	6183	39.4	3155	22.1
Participants with job titles	9500	100.0	11132	100.0
Deaths 1973–96	424	4.5	836	7.5
Exposure variables:				
Unemployment:				
Ever unemployed	875	9.2	1309	11.8
Unemployed in 1973	263	2.8	315	2.8
Unemployed earlier but work in 1973	612	6.4	994	8.9
Part time work	2993	31.5	237	2.1
Overtime work:				
≤5 h/week	497	5.2	1457	13.1
>5 h/week	249	2.6	1505	13.5
Extra work:				
≤5 h/week	350	3.7	844	7.6
>5 h/week	362	3.8	1013	9.1

*191 Women and 171 men could not be identified when matching with the Causes of Death Registry.

and men relative to unemployment, part time work, overtime work, and extra work, including an emphasis on the importance of confounding from different social, behavioural, work, and health related factors.

The study cohort is part of the Swedish twin registry, but the subjects were treated as a sample from the general population irrespective of the twinning.¹⁹ It has been shown that twins do not deviate from non-twins for social and behavioural factors such as number of siblings, number of children, education, marital status, place of residence, smoking behaviour, and symptoms of lung or heart problems.¹⁹ Also, for mortality and common causes of death (after the prenatal and neonatal period)²⁰ as well as cancer morbidity,²¹ twins are highly comparable with the general population.

Material and methods

STUDY GROUP

The study cohort comprised in principle all like sexed twins born in Sweden in 1926–58.²² Data are based on a postal questionnaire of 1973, which was answered by 15 683 women and 14 287 men (table 1) and on information from the Causes of Death Registry. All subjects with a defined job title were selected, 9 500 women and 11 132 men. A defined job title means that the subject had specified a main occupation in the questionnaire. Housewives, students, pensioners, people on disablement pension, and people liable for military service were not included. Mortality from all causes during 1973–96 was analyzed.

EXPOSURE FACTORS

The postal questionnaire comprised questions about medical symptoms, use of medication, smoking and drinking habits, personality factors, psychosocial status, and demographic data. A short occupational history was also recorded including the occupational factors that were the focus in this study. The different exposure variables, how they were dichotomised, and their prevalence in the study group are shown in table 1. The three exposure variables of unemployment were constructed from

the questions “Are you now or have you earlier been unemployed?”, “Are you employed at the present time?”. The dichotomisation for overtime work was based on the question “How many hours a week do you work overtime?”. For extra work (other than permanent work) the questions were “Have you now or have you earlier had an extra job? How many hours a week?”.

MORTALITY

The twin registry is matched on a regular basis with central population registries such as the Causes of Death Registry. In this study, mortality has been analyzed regardless of specific causes of death. The 24 year follow up was considered as a continuous period, and also was divided into different time windows, the first 5 years including 1973, the subsequent 10 year period, and the remaining 9 years of observation.

POTENTIAL CONFOUNDING FACTORS

The following potential confounding or mediating factors were taken into account: age, marital status, children, education, smoking and alcohol habits, use of sleeping pills and tranquilisers, stress, shift work, personality factors, and long lasting or serious illness. The variables were dichotomised as follows: the exposed variable precedes the unexposed; unmarried, divorced, and widowed versus married and cohabiting; no children versus one or more children; elementary school versus more than elementary school; former smoker and smoker versus non-smoker; no alcoholic beverages versus 1–250 g alcohol/month; >250 g alcohol/month versus 1–250 g alcohol/month; sleeping pills taken regularly or occasionally versus hardly ever; tranquilisers taken regularly or occasionally versus hardly ever; stressful life versus no stress; shift work versus no shift work; unstable personality >4 points versus stable personality <5 points; extravert personality >4 points versus introvert personality <5 points; ever long lasting or serious illness versus never long lasting or serious illness.

Alcohol consumption was analyzed by g absolute alcohol.²² Stressful life was defined by the question “Do you consider your everyday life to be very stressful?” The personality factors instability and introversion or extraversion were based on nine items each, selected from the neuroticism and extraversion dimensions of the Eysenck personality inventory. These short scales were developed to fit into comprehensive questionnaire investigations.²³ The potential confounder of ill health was described by the question “Have you ever had any long term or serious illness?”.

STATISTICAL ANALYSIS

Relative risks (RRs) and 95% confidence intervals (95% CIs) were computed by Cox's proportional hazards model²⁴ according to the PHREG of the statistical analysis system (SAS 6.12) with calendar years as the underlying dimension. Age at start of follow up was included on a 1 year basis.

Table 2 Mortality relative to unemployment and different time aspects of work for the first 5 years and the total follow up period (rate ratio (RR) (95% CI) for women

Variables	24 Year follow up*				5 Year follow up*			
	Age adjusted		Full model‡		Age adjusted		Full model‡	
	RR (95% CI)	n†	RR (95% CI)	n†	RR (95% CI)	n†	RR (95% CI)	n†
Ever unemployed	1.72 (1.26 to 2.36)	411 (45)	1.62 (1.11 to 2.35)	279 (33)	2.07 (0.71 to 6.08)	29 (4)	2.23 (0.62 to 7.97)	20 (3)
Unemployed 1973	2.25 (1.43 to 3.53)	386 (20)	1.98 (1.16 to 3.38)	261 (15)	1.54 (0.21 to 11.43)	26 (1)	2.60 (0.33 to 20.55)	18 (1)
Unemployed earlier, work 1973	1.45 (0.96 to 2.18)	391 (25)	1.42 (0.87 to 2.32)	264 (18)	2.29 (0.67 to 7.79)	28 (3)	2.09 (0.46 to 9.45)	19 (2)
Part time work	0.81 (0.65 to 1.01)	354 (142)	0.95 (0.72 to 1.26)	244 (100)	0.47 (0.20 to 1.15)	26 (7)	0.40 (0.12 to 1.33)	17 (4)
Overtime work ≤5 h/week	0.85 (0.52 to 1.38)	348 (17)	0.78 (0.44 to 1.40)	240 (12)	—	26 (0)	—	17 (0)
Overtime work >5 h/week	1.69 (1.06 to 2.69)	348 (19)	1.92 (1.13 to 3.25)	240 (15)	—	26 (0)	—	17 (0)
Extra work ≤5 h/week	1.18 (0.71 to 1.95)	350 (16)	1.05 (0.59 to 1.89)	240 (12)	0.89 (0.12 to 6.58)	26 (1)	1.19 (0.16 to 9.08)	17 (1)
Extra work >5 h/week	1.70 (1.09 to 2.65)	350 (21)	1.30 (0.74 to 2.29)	240 (13)	—	26 (0)	—	17 (0)

* Age adjusted model is based on 7899–9248 subjects; the full model is based on 5425–6329 subjects depending on the number of missing values.

†Number of cases (number of exposed cases).

‡Adjusted for age, marital status, smoking, alcohol consumption, use of tranquilisers, extraversion, and long lasting or serious illness.

— No exposed cases.

Firstly, the exposure factors were studied with adjustment for age only. Secondly, all potential confounding factors were analyzed together relative to mortality, and the factors yielding an RR>1.30, or a lower confidence limit >1.00 for either the entire study period or for the first 5 year period were retained in a final regression model for each exposure factor. Also, factors with a point estimate below unity and an upper confidence interval <1.00 were retained.

The factors showing an independent association with mortality according to the criteria described were, for women: age, marital status, smoking and alcohol habits, use of tranquilisers, extraversion as a personality factor, and long lasting or serious illness. For men, the corresponding factors were: age, marital status, smoking and alcohol habits, use of sleeping pills, instability as a personality factor, and long lasting or serious illness.

The subjects were treated as a sample from the general population regardless of the

twinning.¹⁹ For one of the main results, the full model was also analysed on subgroups where the twins in a pair were randomly distributed on two independent samples. This procedure was repeated six times, with the objective of assessing the difference between using only one in a pair or using both as independent people.

Results

Mortalities relative to unemployment and other time aspects of work are presented separately for women and men (tables 2 and 3), to condense the sex specific outcome. On the other hand, the later results are presented by type of exposure factor.

UNEMPLOYMENT

For the 24 year follow up, a more than doubled mortality was found for women who were unemployed in 1973 and a 40% increase in risk was found for those who reported that they had been unemployed earlier but worked in 1973. Ever unemployed yielded a 70% increase in

Table 3 Mortality relative to unemployment and different time aspects of work for the first 5 years and the total follow up period (rate ratio (RR) (95% CI) for men)

Variables	24 Year follow up*				5 Year follow up*			
	Age adjusted		Full model‡		Age adjusted		Full model‡	
	RR (95% CI)	n†	RR (95% CI)	n†	RR (95% CI)	n†	RR (95% CI)	n†
Ever unemployed	1.55 (1.25 to 1.91)	817 (102)	1.34 (1.03 to 1.73)	547 (70)	2.21 (1.27 to 3.85)	84 (16)	1.52 (0.75 to 3.09)	58 (10)
Unemployed in 1973	1.96 (1.39 to 2.76)	749 (34)	1.43 (0.91 to 2.25)	498 (21)	4.83 (2.40 to 9.70)	77 (9)	3.29 (1.33 to 8.17)	54 (6)
Unemployed earlier, work in 1973	1.39 (1.08 to 1.78)	783 (68)	1.29 (0.95 to 1.74)	526 (49)	1.26 (0.57 to 2.78)	75 (7)	0.86 (0.31 to 2.43)	52 (4)
Part time work	1.49 (0.92 to 2.41)	698 (17)	1.58 (0.91 to 2.77)	477 (13)	2.76 (0.86 to 8.92)	58 (3)	3.15 (0.94 to 10.59)	41 (3)
Overtime work ≤5 h/week	0.63 (0.49 to 0.81)	692 (72)	0.58 (0.43 to 0.80)	472 (45)	0.84 (0.37 to 1.88)	61 (7)	0.71 (0.25 to 2.06)	42 (4)
Overtime work >5 h/week	1.08 (0.89 to 1.31)	692 (135)	1.15 (0.92 to 1.44)	472 (103)	1.87 (1.05 to 3.34)	61 (17)	2.00 (1.02 to 3.95)	42 (13)
Extra work ≤5 h/week	0.87 (0.66 to 1.16)	683 (52)	0.91 (0.65 to 1.27)	472 (39)	1.38 (0.58 to 3.24)	58 (6)	1.94 (0.79 to 4.72)	41 (6)
Extra work >5 h/week	1.37 (1.10 to 1.71)	683 (93)	1.29 (0.99 to 1.69)	472 (65)	2.33 (1.22 to 4.44)	58 (12)	2.57 (1.20 to 5.52)	41 (9)

*Age adjusted model is based on 9681–10975 subjects; the full model is based on 6716–7512 subjects depending on the number of missing values.

†Number of cases (number of exposed cases).

‡Adjusted for age, marital status, smoking, alcohol consumption, use of sleeping pills, instability, and long lasting or serious illness.

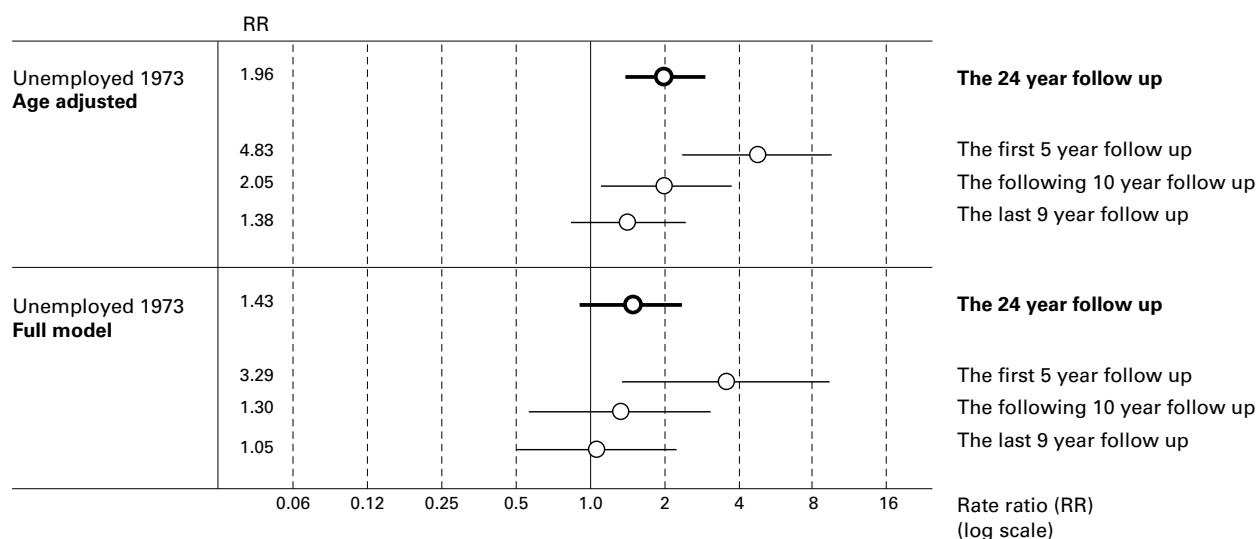


Figure 1 Mortality RR (95% CI), among men, unemployed in 1973, by time of follow up.

Table 4 Assessment of the confounding effect from each of the factors considered in the final model (unemployment in 1973 relative to mortality)

	Women RR (95% CI)†	Men RR (95% CI)†
Full model	1.98 (1.16 to 3.38)	1.43 (0.91 to 2.25)
Factor excluded from the full model:*		
Marital status	1.98 (1.16 to 3.37)	1.57 (1.00 to 2.45)
Smoking habits	2.09 (1.23 to 3.56)	1.52 (0.97 to 2.38)
Alcohol consumption	1.88 (1.17 to 3.00)	1.49 (1.01 to 2.18)
Tranquilisers	2.05 (1.22 to 3.43)	
Sleeping pills		1.53 (1.01 to 2.33)
Extraversion	2.00 (1.17 to 3.40)	
Instability		1.51 (0.97 to 2.37)
Long lasting illness	2.03 (1.19 to 3.46)	1.47 (0.94 to 2.29)

*New models with one confounding factor excluded, one at a time, from the full model.

†RR=rate ratio.

risk. After adjustment for confounding, unemployment in 1973 still showed a clear association with mortality, and the results for unemployment earlier or ever were largely unaffected. Results for the first 5 years of follow up, were hampered for women, by the low mortality. Also for men an increased mortality was found for the 24 year period, and the outcome was further strengthened by the analyses of the first 5 year follow up where there was an almost fivefold increase in risk for being unemployed in 1973. The associations decreased when controlling for confounding. The strength of the association between unemployment in 1973 and mortality for men, relative to the different time windows, is illustrated in the figure.

The confounding effect from the different factors was further studied for unemployment in 1973 (table 4). For women smoking habit was most important; and for men, marital status was the factor with the largest impact on the relation. The specific effect of ill health was further studied by excluding subjects reporting long lasting or serious illness. For women an even stronger association was found for unemployment in 1973, with an RR (95% CI) of 2.60 (1.40 to 4.83), whereas the results for men were unaffected, 1.48 (0.83 to 2.65).

PART TIME WORK

For women, part time work seemed to reduce the mortality when only age was controlled for.

This protective effect disappeared when also adjusting for confounding from other factors. An opposite situation was found for men where part time work increased the mortality. After adjusting for possible confounding factors the risk estimate was still increased, and the association was strengthened by the outcome for the first 5 year follow up, although based on smaller numbers.

OVERTIME WORK

A protective effect from overtime work up to a maximum 5 hours a week was found for men. This finding also remained after adjustment for confounding. The same tendency was found for women.

For overtime work of more than 5 hours a week an association with mortality was found for women, which remained after consideration of potential confounding factors. For men such a relation was found only for the first 5 years of follow up.

EXTRA WORK

The mortality for men with extra work up to a maximum 5 hours a week was increased only for the first 5 years of follow up. For women no association was found.

Extra work of more than 5 hours a week for men was associated with an increased mortality, which was more evident for the first 5 years of follow up. For women, an association was also found, but there were indications that the outcome was influenced by confounding from the factors considered in the full model.

Discussion

In the present study the opportunity offered by the Swedish twin registry²² was used to study long term mortality among women and men relative to unemployment, part time work, overtime work, and extra work. A major advantage of the study was the ability to take into consideration the potential impact of many social, behavioural, work, and health related factors on these relations.

Unemployment showed the strongest association with subsequent mortality, and the risk

estimates were consistent with previous studies.^{4 6 11} A comparable relation between unemployment in 1973 and the subsequent 24 year mortality was found for men and women. It has been suggested that the work role is less important for women than for men and that losing a job has less importance for women.⁵ The present results do not support this view, which may be due to different definitions of work and unemployment. If anything, the increased mortality after unemployment was more evident among women in our study.

In discussions of the association between unemployment and health, confounding has often been brought out as a problem in the interpretation.^{4 11 25} Here, not only social factors—such as marital status and children—but also education, smoking and alcohol habits, use of sleeping pills and tranquilisers, stress, shift work, personality factors, and long lasting or serious illness, have been taken into account. The evaluation of the confounding effect from each of the factors considered (table 4), showed a comparatively weak effect for all factors. For women, smoking showed the largest effects; whereas for men, marital status had the largest impact on the risk estimate. It should be pointed out, however, that some of these factors might, to some extent, have been a consequence of unemployment; and if so, the unadjusted RR should be a more valid measure of the relation between unemployment and mortality. The personality factors (instability and introversion or extraversion) were derived from personality dimensions of the Eysenck personality inventory, dimensions claimed to be relatively stable characteristics of the person.²⁶

After adjustment for long lasting or serious illness, the results may still be influenced by selective illness. The question used may have a low sensitivity and probably fails to capture all types of illness. This could imply an overestimation of the effect due to unemployment.

Martikainen and Valkonen¹¹ showed that the relation between unemployment and mortality was stronger in times with low unemployment and that the association decreased with increasing rates of unemployment. This could be explained by health related selection, with an overrepresentation of illness preceding or following unemployment,^{2 3} or that harmful effects—for example, psychosocial stress or stigmatisation—may be more pronounced in times with few unemployed people.¹¹ The present study refers to a period with a low and relatively constant unemployment rate.

Economic problems may lead to restrictions of lifestyle with little opportunity for recreation and recovery. Extra work may be a marker of economic stress which may contribute to illness,²⁷ and could explain the somewhat increased mortality in this study among both women and men who reported extra work of more than 5 hours a week.

Not only for extra work, but also for overtime work of more than 5 hours a week, there was an association with increased mortality among women. The outcome may be explained by the fact that women take much of the responsibil-

ity and unpaid work at home, and if combined with more than full time work, the total workload may pass a threshold with adverse health effects. Men had a reduced mortality relative to moderate overtime work, 5 hours a week or less, which may reflect a devotion to work or a stimulating work environment entailing positive health effects. However, this could also be a reflection of a healthy worker selection.

The results showed a discrepancy between men and women for part time work. As expected,¹² part time work was a risk indicator for men, possibly because it is a marker of impaired health, an impairment that was not controlled for by the answers to the question on long lasting or serious illness. Among women, part time work was not linked with an increased mortality. On the contrary, there was to a certain extent a reduced mortality, which might signify that full time work, 40 hours a week, is not the optimal work time for most women, given the traditional workload at home.¹⁸

The assessment of the different exposure variables refers to one point in time, 1973. The changes in exposure for the study subjects over the decades were not possible to measure. A fraction of those classified as unexposed has been exposed during the follow up, and among those classified as exposed there should be a wide range of duration of exposure. We think that the validity of the exposure classification is highest for the time closest to the data collection. Among women, the number of cases during the first 5 year period was very small. Among men, the precision was also decreased for that time window, but several of the point estimates were more pronounced for the first 5 year period. This suggests that the results for the 24 year period may be diluted by misclassification of the exposures (apart from a time dependent reduction of the RR).

The identification of dead subjects should have a very high sensitivity and specificity, so there should not be any bias in the mortality data. However, higher death rates were found among those who did not answer the questionnaire, and it may be that the non-respondents (17%) comprise an excess number of exposed (unemployed) subjects. The effects of the drop out are not possible to assess. We think that a potential selection bias has reduced rather than produced the associations found—for example, the increased mortality in unemployed subjects.

An improved precision when using both twins in a pair instead of only one was found in the sensitivity study where the twins were randomly distributed on two independent samples. The differences between the point estimates of the RRs from the six repeated analyses showed for men who were unemployed in 1973, a range of RR (95% CI) from 1.06 (0.49 to 2.27) to 1.76 (0.92 to 3.38) and a mean RR corresponding to the result based on the whole cohort, of 1.43. A consistent association between unemployment and mortality was also suggested by the results from conditional logistic regression analysis of death discordant twin pairs.

The cohort comprises subjects who had specified a main occupation, which means that the associations are not influenced by mortality among groups outside the workforce. The prevalence of unemployed subjects in the cohort corresponds with population statistics of that time,¹⁴ and the same applies to the occurrence of overtime work. This strengthens the assumption that the study subjects are representative of the general population. The proportion of women reporting overtime work in 1973 (8%) differs markedly from figures of today (23%), mainly due to the expanded and intensified work patterns among women.

In this study, no attention was paid to specific causes of death. This issue should be interesting to pursue particularly relative to unemployment, as such knowledge could be of importance in preventive work. Another area that should be further explored is the partitioning of time between work and private life, including a sex perspective, with the aim to improve health and wellbeing among men and women.

Conclusions

Unemployment, but also lengthy working hours, were associated with increased mortality for both women and men. This association remained when social, behavioural, work, and health related factors were taken into consideration. Despite the fact that the data reflect the situation in 1973 these results are especially relevant today, because of the situation on the labour market. Unemployment may vary greatly over decades, and across different occupational groups. At the same time a considerable proportion of women and men perform much overtime work as well as unpaid work at home. From a public health perspective it seems important to share and balance the total workload.

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