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Work conditions and socioeconomic inequalities in work ability

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Work conditions and socioeconomic inequalities in work ability

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Objectives The objective of this study was to investigate socioeconomic inequalities in work ability among municipal employees and the contribution of work conditions to these inequalities.

Methods The subjects were employees of the City of Helsinki and were all over 40 years of age. Data (N=1827) were collected in the age-group-based medical check-ups by occupational health personnel. Work ability was measured with a work ability index. The association between the work ability index with socioeconomic status was examined by fitting logistic regression models.

Results There was a consistent gradient in work ability, lower socioeconomic groups having poorer work ability. Adjusting for physical stress accounted for a substantial part of the socioeconomic inequalities. Adjusting for possibilities for influence and development at work accounted for some of the difference between white-collar and blue-collar employees, but not for differences between the white-collar subgroups among the women. Mental stress and problems in the social environment were not clearly associated with the inequalities.

Conclusions Socioeconomic inequalities in work ability among municipal employees correspond to the inequalities in ill health found in general populations. Physical stress at work explained a large part of the inequality. Poor possibilities to influence one's work contributed to the excess of lowered work ability among the blue-collar employees, but not to the inequalities between white-collar subgroups of women. Apart from physical workload, work conditions did not explain socioeconomic inequalities between white-collar subgroups of women.

Key terms medical check-ups, municipal employees, occupation, work characteristics, workload, work-related stress.

Socioeconomic inequalities in health among population subgroups are widely known and well documented (1–7). Many studies have shown socially and occupationally low status groups to suffer from higher morbidity and mortality. Such social inequalities are found among the Finnish population as well (7–9). Possible causes of inequalities in health include biological factors, early life, social organization, current living conditions, and health behavior (4, 10–12). The role of work as a determinant of health is obvious and has been confirmed by studies on the association between poor work conditions and ill health (13–16). Studies of work conditions as causes of inequalities in health have often focused on certain diseases or diagnostic groups. The contribution of work conditions to socioeconomic inequalities related to cardiovascular diseases has been studied in detail, and the results suggest that work conditions are a major source of the socioeconomic gradient (17, 18). Further evidence suggests that the contribution of work conditions to inequalities in general health status is considerable (9, 15, 19).

Socioeconomic inequalities in work disability have been studied in several European countries (20–23). These studies have found inequalities in work disability to be consistent with other inequalities in health. Furthermore, in a recent study, the socioeconomic gradient in the incidence of disability pensions was steeper than the corresponding gradient in mortality (20). These

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results suggest that inequalities in the full capability to participate in worklife may be even greater than the inequalities in health and death.

Research on work ability as a global indicator, irrespective of legal definitions of disability or preconditions of disability pension, has been limited due to a lack of universally accepted measures. There is a substantial amount of evidence on work ability as measured by the work ability index developed by Ilmarinen, Tuomi, and their associates in the Finnish Institute of Occupational Health (24–26). The work ability index has been shown to be related to the content of the work [physical, mental or mixed (27)] done by aging employees, manual workers doing primarily physical work having the poorest work ability (24, 25). Previous studies have also identified various work characteristics as associated with changes in work ability. However, possible differences in the effect of particular work characteristics with varying types of occupations have received only limited attention (28). Furthermore, poor work ability among manual employees is not direct evidence of a socioeconomic gradient consistent through all status groups. We lack studies examining socioeconomic inequalities in work ability and the determinants of these inequalities. Therefore, we combined two research traditions in our study on work ability, the first focusing on the influence of hierarchical socioeconomic status and the second dealing with the influence of work conditions.

Table 1. Distribution of age, gender, and socioeconomic status of the men and women invited for a medical check-up and those who actually participated.

Demographic variable	Full-time employees in studied cohorts (N=4767)		Participated in study			
	Men	Women	Men		Women	
	%	%	N	%	N	%
Gender	23	77	429	24	1398	76
Age						
40 years	22	24	57	13	289	21
45 years	22	23	76	18	345	25
50 years	21	23	96	22	345	25
55 years	25	21	142	33	271	19
60 years	10	9	58	14	148	11
Total	100	100	429	100	1398 [a]	100
Socioeconomic status						
White-collar	64	87	253	60	1229	88
Upper white-collar	35	26	148	35	402	29
Intermediate white-collar	17	16	80	19	228	16
Lower white-collar	13	46	25	6	599	43
Blue-collar	36	13	168	40	161	12
Total	100	100	421 [a]	100	1390 [a]	100

[a] Number differs from the total of the age groups because of missing data for some subjects.

The objective of this study was to investigate socioeconomic inequalities in work ability and the contribution of work conditions to these inequalities among female and male municipal employees over 40 years of age.

Subjects and methods

This study was a part of a broader project on employee health and well-being, the Helsinki Health Study (29–31). The Helsinki Health Study has focused on men and women who are between 40 and 60 years of age and who are employed by the City of Helsinki. The total number of Helsinki employees amounts to about 40 000, 56% being above 40 years of age and 76% being women. There is a wide range of departments operating in diverse fields, such as educational and cultural services, social and health care and transport and industrial work.

Subjects

This study was based on data collected in medical check-ups during the calendar year 2000. The subjects included 40-, 45-, 50-, 55-, and 60-year-old full-time employees of the City of Helsinki. Helsinki employs about 5000 people in these age groups. Each year, employees who reach these ages are invited to a medical check-up in the occupational health services of the city. These check-ups are a part of the routine of the occupational health personnel, and they are performed by qualified occupational health nurses. Employees who have been in recent contact with the occupational health personnel are not always invited to the check-ups.

The data were collected by a questionnaire distributed to the employees invited to the medical check-up. The questionnaire is a routinely used tool in the check-ups, and it was filled out beforehand by the employees and checked by the occupational health nurses. Altogether 4061 employees were invited for a check-up in 2000. Altogether 62% of all the invited employees attended the check-ups, and 72% of those attending the check-ups agreed to participate in the study. This process resulted in a final study sample of 1827 employees, of whom 76% were women. The distribution of the age, gender, and socioeconomic status of the subjects included in the study and of the total cohort (according to the personnel register) are shown in table 1.

Possible selection bias of the study sample was checked against the personnel register of the city. Both the female and the male subsamples were broadly representative of the total staff. Only slight selection effects in relation to socioeconomic status were observable.

Among the men the lower white-collar employees were underrepresented (13% in the personnel register but only 6% in the study sample). Among the women upper white-collar employees were slightly overrepresented (26% in the register but 29% in the study sample). In addition, older men participated somewhat more often than younger men, but there was no consistent age-related selection among the women. An analysis of the response activity in the data sources of the Helsinki Health Study and the dropout of subjects when these datasets were combined with the data from the medical check-ups suggested that the studied sample broadly represented the total staff (31).

Measurement of work ability

Work ability was measured by a work ability index (25, 26). This index is a quantitative measure containing seven items, including self-assessed current work ability compared with the lifetime best, self-assessed work ability in relation to the physical and mental demands of the work, number of days on sick leave during the last year, number of current medically confirmed diseases, impairment due to diseases, own prognosis of work ability 2 years from now, and mental resources. A high score implied good work ability. In previous studies, work ability related to the physical and mental demands of work has been modified by weighing the scores according to work content [physical, mental, or mixed (27)]. The weighing was not used in this study.

Previous studies on the predictive validity of the work ability index have used a cut point of 27 to distinguish poor work ability from "normal" work ability. This cut point resulted in 15% of the employees having a lowered work ability in these studies. However, the distribution of the work ability scores in our study differed in that the studied employees generally had higher scores. A cut point distinguishing a comparable proportion of employees as in previous studies was chosen rather than the same absolute value. Therefore, a work ability score of 32 or lower was regarded as lowered work ability, and scores above 32 signified "normal work ability". The prevalence of lowered work ability was 14% for the study sample.

The inclusion of various items describing work ability and health in the work ability index may complicate the interpretation of any observed association. Therefore all the analyses were repeated with the use of self-assessed current work ability compared with the lifetime best, a single item included in the index, as the dependent variable. The variance of self-assessed current work ability was larger than that of the index and produced greater statistical uncertainty. However, otherwise the results were mainly similar and have not been presented in this report.

Measurement of socioeconomic status

The classification of socioeconomic status was based on a person's occupation, and the employees were grouped as blue-collar or white-collar employees as classified according to the socioeconomic classification of Statistics Finland (32). The female white-collar employees were further divided into three subcategories corresponding to the occupational classification of the personnel register of the City of Helsinki. These were (i) upper white-collar employees, including management and university-level professionals; (ii) intermediate white-collar employees, including foremen and other occupations requiring college-level education or corresponding qualifications; and (iii) lower white-collar employees including occupations requiring vocational training or no specific qualification requirements. Male white-collar employees could not be further divided into subcategories because of the small number of male respondents.

Work characteristics

The questionnaire included a variety of questions on work characteristics. These characteristics included measures of physical and mental stress, the social environment, and cooperation, as well as possibilities for development and influence at work and job satisfaction. These possibilities may also be regarded as reflecting job control, including "job decision latitude" and "skill discretion" (13, 17). The items of each work characteristic measure were dichotomized for the analysis ("stress present" versus "no stress present"). Altogether 1–2% of the values were missing for the work characteristic items, and they were included with those showing no stress. The work characteristics were first categorized into four groups as physical stress, mental stress, poor possibilities, and problems in the social environment and then analyzed. The prevalence of the work characteristics, as well as the Cronbach alpha coefficients for the internal consistency of the corresponding categories, is shown in table 2. The prevalence data are not fully comparable, since the cut points were not similar for all the variables. The Cronbach alpha coefficients were calculated from dichotomized items. The coefficients from the original items were slightly higher.

Statistical methods

The statistical analysis proceeded by fitting six logistic regression models examining the association between lowered work ability and socioeconomic status for the men and women separately. Modeling was done for the women both with and without the white-collar subgroups. This procedure made the comparison of the genders easier.

Table 2. Prevalence of the dichotomized work characteristic variables and the Cronbach alpha coefficients of the work characteristic categories.

Work characteristic	Prevalence		
	Men (%)	Women (%)	Cronbach alpha
Physical stress			0.73
Strenuous muscular work	07	15	
Repetitive movements	38	47	
Difficult work postures	27	37	
Carrying and lifting	19	36	
Mental stress			0.59
Monotonous and uninteresting work	26	14	
Excess responsibility	11	10	
Time pressure	26	27	
Inconsistent tasks and responsibility	34	25	
Fear of failure or mistakes	24	26	
Isolation and loneliness	18	13	
Poor possibilities			0.79
Receiving instruction	32	19	
Influencing the work environment	39	25	
Participating in planning of the work	30	09	
Receiving education	33	22	
Applying one's skills and abilities	22	10	
Learning new things	29	17	
Receiving recognition	47	24	
Contacting associates	10	06	
Perceiving the meaning of the work	26	11	
Problems with the social environment			0.71
Unsatisfactory cooperation between workers and foremen	16	12	
Unsatisfactory management and planning	28	16	
Unsatisfactory information	33	19	
Poor atmosphere	08	05	

The base model consisted of socioeconomic status, adjusted for age only. Four subsequent models were fitted with additional adjustment for each of the four work characteristic categories, one at a time. Finally, the sixth model adjusted simultaneously for all the work characteristics. The statistical significance of the covariates in the models was tested using a log likelihood test (G-scores and degrees of freedom shown). All the calculations were performed with SAS software (SAS Institute, Cary, NC, USA).

Results

The results are shown as odds ratios (OR) and their 95% confidence intervals (95% CI) in table 3. According to the base model, socioeconomic status was strongly associated with lowered work ability when only age was adjusted for. The odds ratio for lowered work ability among the blue-collar employees was 2.35 for the men and 1.85 for the women in a comparison with the white-collar employees (OR=1.00). The gradient of lowered work ability was consistent for the women across all the socioeconomic groups, the odds ratio for lowered work ability being 1.89 for intermediate white-collar employees, 2.61 for lower white-collar employees, and 3.51 for blue-collar employees, as compared with their upper white-collar peers. All these differences were statistically significant.

Table 3. Association between socioeconomic status (SES) and lowered work ability as adjusted for work characteristics. (model 1 = age + SES (base), model 2 = age + SES + physical stress, model 3 = age + SES + mental stress, model 4 = age + SES + poor possibilities, model 5 = age + SES + social environment, fully adjusted model = age + SES + physical + mental + possibilities + social environment; OR = odds ratio, 95% CI = 95% confidence interval)

Socioeconomic status	Model 1		Model 2		Model 3		Model 4		Model 5		Fully adjusted model	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Women – 4 classes [a]												
Upper white-collar	1.00	.	1.00	.	1.00	.	1.00	.	1.00	.	1.00	.
Intermediate white-collar	1.89	1.05–3.42	1.40	0.76–2.59	2.66	1.42–4.96	1.97	1.08–3.62	2.05	1.12–3.74	1.93	1.00–3.74
Lower white-collar	2.61	1.67–4.09	1.60	0.98–2.60	3.82	2.33–6.28	2.40	1.50–3.85	2.88	1.81–4.57	2.14	1.23–3.71
Blue-collar	3.51	2.03–6.09	1.94	1.06–3.54	4.49	2.45–8.23	2.63	1.46–4.74	3.94	2.24–6.93	2.11	1.06–4.21
Women – 2 classes [b]												
White-collar	1.00	.	1.00	.	1.00	.	1.00	.	1.00	.	1.00	.
Blue-collar	1.85	1.20–2.84	1.34	0.85–2.13	1.72	1.09–2.72	1.38	0.87–2.19	1.92	1.24–2.97	1.11	0.67–1.84
Men – 2 classes [c]												
White-collar	1.00	.	1.00	.	1.00	.	1.00	.	1.00	.	1.00	.
Blue-collar	2.35	1.34–4.13	1.32	0.68–2.57	2.13	1.15–3.94	1.78	0.90–3.53	2.28	1.26–4.13	0.95	0.42–2.19

[a] G-score: 99.3 for model 1; 145.3 for model 2; 166.0 for model 3; 152.4 for model 4; 131.3 for model 5; 230.3 for fully adjusted model; degrees of freedom: 7 for model 1; 11 for model 2; 13 for model 3; 16 for model 4; 11 for model 5; 30 for fully adjusted model.
[b] G-score: 78.4 for model 1; 139.1 for model 2; 131.7 for model 3; 136.8 for model 4; 107.2 for model 5; 219.7 for fully adjusted model; degrees of freedom: 5 for model 1; 9 for model 2; 11 for model 3; 14 for model 4; 9 for model 5; 28 for fully adjusted model.
[c] G-score: 21.4 for model 1; 45.6 for model 2; 40.7 for model 3; 30.9 for model 4; 31.3 for model 5; 83 for fully adjusted model; degrees of freedom: 5 for model 1; 9 for model 2; 11 for model 3; 14 for model 4; 9 for model 5; 28 for fully adjusted model.

The changes in the odds ratios of the blue-collar employees as compared with the white-collar employees, with adjustment for work characteristics, were in the same direction among the men and the women. Adjusting for physical stress markedly lowered the odds ratios, more so among the men than among the women. Only slight decreases in the odds ratios were found with adjustment for mental stress. Adjusting for poor possibilities for development and influence also decreased the odds ratios of both the men and the women markedly. Adjusting for problems in the social environment had no effects on the difference between the blue-collar and white-collar workers.

For the women, the changes in the odds ratios of the intermediate and lower white-collar employees and the blue-collar employees as compared with the upper white-collar employees, with adjustment for work characteristics, were slightly different from the effects on the differences between blue-collar and all white-collar employees. Adjusting for physical stress decreased the odds ratios for all the socioeconomic groups, whereas adjusting for mental stress increased the differences. Adjusting for poor possibilities for development and influence did not alter the odds ratios of the intermediate and lower white-collar employees, although there was a decrease in the odds ratio of the blue-collar employees. Adjusting for problems in the social environment had a negligible effect on the differences between the socioeconomic groups.

The model adjusting for all the work characteristic variables accounted for the largest portion of the differences between the white-collar and blue-collar employees among both genders. Among the women, however, the excess lowered work ability found for the blue-collar employees was only reduced to the level of the lower white-collar employees, and marked inequalities between the subgroups of white-collar employees and between the blue-collar and upper white-collar employees remained. Furthermore, the model adjusting only for physical stress accounted for a larger portion of the found inequalities than did the model adjusting for all the work characteristic variables when the other socioeconomic groups were compared with the upper white-collar employees among the women.

Discussion

Determinants of socioeconomic inequalities in work ability among employees of the City of Helsinki, aged 40–60 years, were investigated in this study. Despite the fact that age and socioeconomic status had somewhat influenced participation in the study, the data, in general, were representative of the occupational status groups of the employees. Some health-related selection may have occurred, however, since employees with recent contacts with the occupational health unit were not necessarily invited to the periodic health examinations from which data were gathered in this study. Thus selection of those with possible poor health out of the cohort may have occurred. Whether such a selection would decrease or increase work ability inequalities between socioeconomic groups is not evident. However, it is reasonable to assume that such selection is unrelated to socioeconomic status. Since disadvantaged socioeconomic groups are more likely to have poor health, the selection would rather narrow than widen the differences. Therefore, socioeconomic inequalities in work ability were more likely to be underestimated than overestimated by the dropout of subjects from this study. The "healthy worker effect" also needs to be considered. Employees with poor health are subject to exit from work. Selection due to work ability can be expected to be even larger. Consequently cross-sectional data of employed people always represent those who have survived at work. Selection reduces differences in the prevalence of poor health, and thus the inequalities are in fact greater than those found in cross-sectional studies.

We found a consistent socioeconomic gradient of lowered work ability. This result is in accordance with the results of previous studies on both health status and disability (14, 15, 20, 21). Lowered work ability was more prevalent among the blue-collar employees than among the white-collar employees of both genders. For the women the inequalities were consistent throughout all the socioeconomic groups, including the subgroups of white-collar employees. Thus our study adds to the evidence on socioeconomic inequalities in work ability among both men and women.

Physical stress had the strongest effect on socioeconomic inequalities in relation to work ability. The effect was particularly strong for the differences between the male white-collar and blue-collar employees. For the women, physical stress contributed to the inequalities in work ability also between the white-collar subgroups. This finding could be expected since, in established socioeconomic classifications, white-collar employees include a variety of predominantly female-occupied lower status jobs in social and health care. Heavy physical workload is known to be common in such occupations as home care (27, 29).

Mental stress was not clearly associated with socioeconomic inequalities in relation to lowered work ability. There were some signs of a possible contribution of mental stress to differences between white-collar and blue-collar employees, but mental stress was unassociated with the differences between the white-collar subgroups of women. These results are probably partly

related to the fact that the mental stress variables were adjusted for simultaneously, although the internal consistency of the mental stress category was not particularly high. Indeed monotonous work was clearly the most prevalent among the blue-collar employees, whereas excess responsibility was more common among the upper white-collar employees. However, an examination of the correlation patterns between the mental stress variables did not clearly indicate that monotonous work and excess responsibility would be distinct factors underlying other mental stress variables. Problems in the social work environment were not related to the socioeconomic inequalities.

Poor possibilities for development and influence at work were associated with differences in lowered work ability between the white-collar and blue-collar employees of both genders. The association of poor possibilities for development and influence with differences in lowered work ability between the subgroups of white-collar employees among the women was, however, negligible. This is an unexpected result, since dissimilar opportunities to influence one's work could be assumed to be an important distinction between the white-collar subgroups. However, comparison of the white-collar subgroups was possible for the women only, and the effect of job control on work ability may well be partially gender specific. Some studies suggest that socioeconomic inequalities in women's health are, to a less degree, accounted for by occupation-related factors than by inequalities in men's health (33–35). Furthermore all work characteristics related to the category of poor possibilities for development and influence at work had a clearly higher prevalence among the men than the women.

The differences in work ability between the white-collar subgroups proved hard to explain. There are known pathways of association between socioeconomic status and health that are not associated with work as such, including health behavior, living conditions, and possible selection effects related to education. Yet additional work-related factors need to be considered. In our study, potentially harmful work conditions were considered to be equally harmful to all the employees and thus would result in a lowering of work ability when present. This point of view does not take into account the possibility of differing ways of relating to work and work conditions. Whereas health can be defined and measured without reference to such personal ways of thinking, attitudes are an inseparable part of work ability.

In conclusion, this study adds evidence for the explanations for socioeconomic inequalities in work ability, an effort which has been rare in previous studies. While work conditions influenced the found socioeconomic inequalities in work ability, the full explanatory pattern turned out to be complex and calls for further analyses.

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