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## Occupational class differences in leisure-time physical inactivity – contribution of past and current physical workload and other working conditions

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**Objective** Our aim was to examine the contribution of past and current physical workload to occupational class differences in leisure-time physical inactivity.

**Methods** Data were taken from the Finnish population-based Health 2000 Survey of employees aged  $\geq 30$  years ( $N=3355$ ). We assessed physical activity during leisure time using a questionnaire and dichotomized responses to inactive versus active. Occupational class was classified into white- and blue-collar worker. Adjustments were made for current work-related factors, other measures of socioeconomic position, clinically diagnosed chronic diseases, other health behaviors, and history of physical workload. We applied sequential logistic regression to the analyses.

**Results** Inactivity during leisure time was more common in blue-collar employees than in their white-collar counterparts [women odds ratio (OR) 1.50, 95% confidence interval (95% CI) 1.12–2.00; men OR 1.66, 95% CI 1.30–2.12]. These occupational differences were not due to working hours, work schedule, or chronic diseases. Among women, current job strain decreased the occupational differences in leisure-time physical inactivity slightly (OR 1.37, 95% CI 0.99–1.04). Education and household income contributed to occupational differences for men (OR 1.45, 95% CI 1.02–2.07), but had no additional effect among women. The occupational differences in leisure-time physical inactivity disappeared after adjusting for smoking and body mass index in women (OR 1.33, 95% CI 0.97–1.83) and men (OR 1.27, 95% CI 0.88–1.82) and were further attenuated after adjusting for history of physical workload among men (OR 1.07, 95% CI 0.67–1.72).

**Conclusion** Having a long history of exposure to physical work (among men) and a high current job strain (among women) contributed to occupational class differences in leisure-time physical inactivity.

**Key terms** Finland; health behavior; population study; socioeconomic position.

Participation in leisure-time physical activity appears to follow a socioeconomic gradient. Low education (in years or qualifications) (1, 2) and occupational class (3, 4), as well as low income (5, 6) are associated with a low level of physical activity during leisure time. Occupational class describes the range of physical and psychosocial working conditions as well as time constraints that can affect an employee's willingness and physical and mental ability to engage in leisure-time physical activities. In particular, the amount of muscle work and the demands this puts on the cardiorespiratory and locomotor systems

of manual workers could influence their motivation to participate in sports and exercise. Recent evidence suggests that high activity at work, particularly high relative aerobic strain (7), or activities including an anaerobic component such as lifting or carrying heavy weights (8) could have negative consequences for the cardiovascular system. However, leisure-time physical activity seems to be beneficial irrespective of occupational workload (8).

Evidence of the associations between physical working conditions and physical activity during leisure time is limited and inconsistent. Several authors (3, 9, 10)

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have found that people in lower-status occupations or physically strenuous jobs (11) are less likely to participate in such activity. Others have reported that people in more physically demanding work tend to engage in exercise more often than those in less physically demanding work (12, 13).

Besides physically strenuous work, mentally straining tasks could also influence leisure-time physical activity. The most widely used job stress model – the two-dimensional job demand and control model or Karasek's job strain model (14) – has yielded conflicting results. Some studies have reported that high job strain (15, 16) is associated with leisure-time physical inactivity whereas other studies have suggested a weak or null association (4, 17, 18). A comparison (19) of cross-sectional studies in Britain, Japan, and Finland found inconsistent associations between job strain and unhealthy behavior (eg, smoking, heavy drinking, physical inactivity, obesity). In addition, long working hours (10, 11) and lack of time (15, 20–22) may also contribute to leisure-time physical inactivity.

Leisure-time physical activity varies between genders (15, 17, 23, 24). Women often have jobs that include less occupational physical activity compared to men (15, 25). Generally in Europe, men are more physically active during leisure time than women (1). In Finland, however, the opposite is true: leisure-time and commuting physical activity are more common among women than men (2, 25, 26). It could be that, compared to men, women do more domestic physical activity, which explains their higher level of leisure-time physical activity. However, domestic physical activities often involve only small upper-body muscle groups and these activities, therefore, might not offer all the assumed health benefits (27, 28).

To our knowledge, the possible effect of working conditions, over an entire working career, on occupational class differences in leisure-time physical inactivity has not been examined. Our basic aim was to assess the contribution of past and current physical workload to occupational class differences in inactivity among employed Finnish women and men. As a secondary goal, we examined the possible importance of current job strain, work schedule, health behaviors, diagnosed chronic diseases, and measures of socioeconomic position.

## Methods

The Health 2000 Survey (<http://www.terveys2000.fi/indexe.html>) was a cross-sectional epidemiological survey in Finland involving a regionally stratified two-stage cluster sample of adults aged  $\geq 30$  years (29). The study was carried out in 2000–2001 and coordinated by

the National Institute for Health and Welfare [(THL) formerly the National Public Health Institute, Finland (KTL)]. All the participants were interviewed, completed a self-administered questionnaire, and underwent a clinical examination. The response rates were 89% for interviews and 85% for the questionnaires. In this study, we used the interview and questionnaire data for adult employees aged  $\geq 30$  years ( $N=7112$ ). Employees were excluded from the data if they had been unemployed during the previous 12 months ( $N=2625$ ) or were aged  $\geq 65$  ( $N=594$ ), farmers ( $N=239$ ), entrepreneurs ( $N=168$ ) or military personnel ( $N=24$ ). We excluded cases with missing information in the examined variables, resulting in a final dataset of 1795 women and 1560 men.

This study followed THL's ethical regulations on the collection, usage, and reporting of data which correspond to commonly accepted ethical guidelines. The ethics committee of KTL approved the Health 2000 Survey protocol in 1999, as did the Epidemiological and Public Health Ethics Committee of the Helsinki and Uusimaa hospital district in 2000. All participants received an information letter during the interview (and health examination), and provided their written informed consent.

## Measures

Information on leisure-time physical inactivity was collected with a self-administered questionnaire and assessed with the question: "How much do you exercise and strain yourself physically during your leisure time?" Responses were dichotomized as (i) inactive ("reading, watching television, or doing minor activities that do not strain you physically") and (ii) active ("walking, cycling, or moving in other ways  $\geq 4$  hours/week", "vigorous physical activity  $> 3$  hours/week", or "competitive sports"). Several population-based studies have used a question on leisure-time physical inactivity, which has shown strong associations with morbidity and mortality (30, 31).

Information on physical workload history was collected during the interview. The participant was asked to list all occupations in which he or she had worked for  $\geq 1$  year. We collected information on physical working conditions for the most recent occupation and those previous occupations (maximum five) in which the respondent had worked for the longest periods. Few persons (about 1%) had had more than five jobs. We assessed the physical strenuousness of the previous occupations with the question: "How physically demanding was the occupation?" with the following possible responses/tasks: "physically strenuous work", "kneel or squat 1 hour/day", "drive a car, tractor or other work machine  $\geq 4$  hours/day", "manually lift, carry, or push items  $> 5$  kg  $\geq 2$  times/minute for  $\geq 2$  hours/day", "manually lift, carry, or push items  $> 20$  kg  $\geq 10$  times/day", "work with hands above the shoulder level  $\geq 1$  hour/day", "working in a

forward leaning position without support  $\geq 1$  hour/day”, “work demanding great handgrip strength  $\geq 1$  hour/day”, “continuous movements of the hands or wrists”, “work with a vibrating tool  $\geq 2$  hours/day”, and “work that requires standing or walking  $\geq 5$  hours/day”. In addition, the respondents were also asked about the duration (in years) of their jobs that included these tasks. We then calculated a cumulative sum index of the years of exposure to each workload task. In the background analyses, we used a continuous sum index of the individual task and, in the sequential analyses, we simultaneously added all the items into the model.

The participant’s occupation was recorded in the interview according to the occupational classification of Statistics Finland (32). Information on educational level and household income was drawn from the population registers. Occupational class was defined as white-collar (including legislators, senior officials, managers, professionals, technicians, associated professionals, clerks, service and care workers, and retail sales workers) or blue-collar (including craftsmen and related trade workers, plant and machine operators and assemblers, and elementary occupations). Education was divided into three categories: high (university or post-graduate level), middle (tertiary level), and low (secondary/primary level). Household income per consumption unit was used as a continuous variable.

A summary variable of current physically strenuous work included information on “lifting”, “carrying”, “poor working postures”, “working with hands above the shoulder level”, “working on your knees or squatting”, “strenuous work with hands”, and “repetitive hand motions”. Each exposure was assessed on a scale from 1 (low exposure) to 4 (high exposure). For the analyses, we used a continuous cumulative sum index of all the previous exposure items.

Data on current job strain (14) were collected via the self-administered questionnaire and data on current physically strenuous work, working hours, and work arrangements were collected in the interview. Current job control and demands were combined according to Karasek’s job strain model into a continuous variable. In addition, we analyzed job control and demands separately. Working hours (hours per week) and work schedule on a scale from 1 (regular day job) to 8 (other work) were used as continuous variables.

The physicians collected information on cardiovascular, musculoskeletal, and respiratory diseases in the clinical examination according to detailed written instructions and uniform diagnostic criteria.

Information on smoking was collected in the interview while the questionnaire gathered data on alcohol consumption. A trained nurse measured each respondent’s body weight and height during the health examination. Smoking was divided into four categories:

non-smoker, former smoker, occasional smoker, and daily smoker. Body mass index ( $\text{kg}/\text{m}^2$ ) was used as a continuous variable.

### Statistical analyses

The sampling design and non-responses were taken into account in the survey procedures and by post-stratification weighting. We conducted the statistical analyses separately for women and men using STATA 9.2 software (StataCorp LP, College Station, TX, USA).

We calculated the prevalences (%) and 95% confidence intervals (95% CI) of leisure-time physical activity, diagnosed chronic diseases, education, and smoking status for each occupational class. We also calculated the mean and standard deviation (SD) of history of physical workload, current working conditions, body mass index and household income per consumption unit for each occupational class. The contribution of these factors to occupational class differences in leisure-time physical inactivity was examined with logistic regression analysis. The individual contribution was modeled first, and then sequential modeling was applied. We controlled for age (as a categorical variable) in all analyses. The results are given as odds ratios (OR) for leisure-time physical inactivity and 95% CI.

## Results

Leisure-time physical inactivity was more common among blue- than white-collar women and men (table 1). Blue-collar workers were currently working under more physically strenuous working conditions than their white-collar counterparts and had had more exposure to various physical workload factors during their work history (table 2). Blue-collar women had less control over their jobs and experienced higher job strain than white-collar women. Blue-collar men had diagnosed musculoskeletal diseases more often than white-collar workers of both genders. Blue-collar workers in general were less educated, had lower household income, and were more likely to be daily smokers than their white-collar counterparts. No differences by occupational class were found in current working hours, job demands, and body mass index.

Blue-collar workers were more likely to be physically inactive during leisure time (women OR 1.50 and men OR 1.66) than their white-collar counterparts. The independent contribution of each examined variable on occupational class differences in leisure-time physical inactivity appears in table 3.

In sequential analyses (tables 4 and 5), controlling for current physically strenuous work (model 2) only slightly decreased the occupational class differences in

**Table 1.** Prevalence (%) and 95% confidence intervals (95% CI) of leisure-time physical activity, diagnosed chronic diseases, education and smoking in white- and blue-collar women and men, Finnish Health 2000 Survey.

	Women				Men			
	White-collar (N=1515)		Blue-collar (N=273)		White-collar (N=850)		Blue-collar (N=707)	
	Prevalence (%)	95% CI	Prevalence (%)	95% CI	Prevalence (%)	95% CI	Prevalence (%)	95% CI
Leisure-time physical activity								
Active (walking or cycling 4 hours/week or vigorous physical activity 3 hours/week)	79	77–81	71	66–77	78	75–81	68	65–71
Inactive (no physical activity)	21	19–24	29	24–34	22	19–25	32	24–29
Diagnosed chronic diseases <sup>a</sup>								
Cardiovascular disease	14	12–16	17	13–23	16	14–19	17	14–19
Respiratory disease	13	11–15	10	7–15	10	7–12	7	5–10
Musculoskeletal disease	29	26–31	39	34–45	26	22–29	36	32–39
Education								
High	22	20–24	2	1–4	36	33–40	0	–
Medium	27	25–30	3	1–6	28	25–31	4	2–6
Low	51	48–54	95	92–97	35	32–39	96	93–97
Smoking status								
Non-smoker	58	55–61	44	37–50	46	43–49	27	24–30
Former smoker	15	13–17	22	17–27	24	22–27	26	23–29
Occasional smoker	5	5–7	3	1–5	8	6–10	4	3–6
Daily smoker	21	18–23	32	27–37	22	19–24	43	39–47

<sup>a</sup> Prevalence of those respondents diagnosed as having cardiovascular, respiratory, or musculoskeletal disease.

**Table 2.** The history of physical workload (years), current physical strenuous work, job strain, working hours, work schedule, body mass index, household income per consumption unit, among white- and blue-collar women and men, Finnish Health 2000 Survey.

	Women						Men					
	White-collar			Blue-collar			White-collar			Blue-collar		
	Mean	SD	95% CI	Mean	SD	95% CI	Mean	SD	95% CI	Mean	SD	95% CI
History of physical workload (in years)												
Physically strenuous work	5	9.1	4–5	11	11.9	9–13	4	8.2	3–5	13	13.0	11–15
Kneel or squat 1 hour/day	4	8.0	3–4	9	10.7	7–11	4	7.5	3–4	11	12.0	10–13
Drive a car, tractor or other work machine ≥4 hours/day	2	6.0	2–3	6	9.5	5–7	3	7.2	2–4	10	11.7	9–11
Manually move items >5 kg at ≥2 minutes ≥4 hours/day	4	8.0	3–4	9	11.1	8–11	4	7.7	3–4	12	12.5	10–13
Manually move items >20 kg ≥10 times/day	4	7.9	3–4	8	10.8	6–10	4	8.0	3–4	12	12.8	11–13
Work with hands above the shoulder level ≥1 hour/day	4	8.2	4–5	9	10.7	8–11	4	7.8	3–4	11	12.6	10–13
Working in a forward leaning position without support ≥1 hour/day	5	8.8	4–6	11	11.5	9–12	4	7.8	3–4	12	12.2	11–14
Work demanding great hand-grip strength ≥1 hour/day	3	7.5	3–4	8	10.8	7–10	4	8.0	3–4	12	13.2	11–14
Continuous movements of the hands or wrists	6	9.7	6–7	13	11.8	11–15	5	8.8	4–6	13	12.7	12–15
Work with a vibrating tool ≥2 hours/day	2	6.2	2–3	6	9.6	5–8	3	6.9	2–3	9	11.2	8–10
Work that requires standing or walking ≥5 hours/day	7	10.1	6–8	14	11.5	12–16	6	9.1	5–7	14	12.2	13–16
Current physically strenuous work												
Job demands	12	4.2	11.9–12.4	16	4.4	15.5–16.7	11	3.9	10.3–10.8	17	4.9	16.6–17.4
Job control	1.4	1.6	1.3–1.5	1.6	1.5	1.4–1.8	1.4	1.5	1.3–1.5	1.4	1.5	1.3–1.5
Job strain	5.7	1.9	5.6–5.8	4.1	2.1	3.9–4.4	6.2	1.6	6.1–6.3	5.3	2.2	5.1–5.4
Working hours (hours/week)	7.1	2.7	7.0–7.2	5.7	2.7	5.4–6.0	7.6	2.4	7.4–7.7	6.6	2.7	6.4–6.8
Work schedule	36.9	7.2	36.5–37.2	36.2	7.4	35.2–37.1	40.5	8.1	40.0–41.1	40.3	6.2	39.8–40.7
Body mass index	2.2	2.2	2.1–2.3	2.5	2.3	2.2–2.8	2.1	2.4	1.9–2.3	2.6	2.4	2.4–2.8
Household income per consumption unit (in €)	25.8	4.8	25.6–26.1	26.4	4.7	25.8–26.9	26.7	3.9	26.5–27.0	27.0	3.9	26.7–27.3
Household income per consumption unit (in €)	15694	13590	15010–16377	12759	5680	12067–13451	19380	26480	17609–21145	12680	5140	12260–13099

inactivity among men (OR 1.62) and women (OR 1.44). Controlling for job strain (model 3) among women and men (OR 1.37 and 1.54, respectively) and body mass index and smoking (model 7) among women and men (OR 1.33 and 1.27, respectively) somewhat decreased these differences in leisure-time physical inactivity. In addition, controlling for education and household income (model 6) decreased the occupational class differences in inactivity among men (OR 1.45). Working hours and work schedule, and diagnosed chronic diseases among both genders as well as education and household income among women had no additional effect.

When adding the history of physical workload after making the above-mentioned adjustments (model 8), the occupational class differences decreased substantially among men (OR 1.07) but did not have an additional effect among women. The OR for occupational differences were, however, statistically insignificant in both genders.

## Discussion

Blue-collar workers men and women were more inactive during leisure time than their white-collar counterparts. A history of physical work strongly contributed to these differences among men. Unhealthy behavior, mainly smoking, was shown to cluster together with physical inactivity among both genders. Moreover, job strain due mainly to low job control contributed to occupational class differences in inactivity among women. Among men, current physically strenuous work, working hours and work schedule, and diagnosed chronic diseases slightly decreased the occupational class differences. A history of physical workload, current physically strenuous work, diagnosed chronic diseases, education, and household income did not contribute to occupational class differences in leisure-time physical inactivity in women.

**Table 3.** The independent contribution <sup>a</sup> of exposure to various physical workload factors during work history, current work-related factors, diagnosed chronic diseases, measures of socioeconomic position, health behaviors, and other factors related to occupational class differences in leisure-time physical inactivity among women and men, Finnish Health 2000 Survey. (+ indicates added to the factor within the model)

	Women			Men		
	White-collar (N=1515)	Blue-collar (N=273)		White-collar (N=850)	Blue-collar (N=707)	
	OR	OR	95% CI	OR	OR	95% CI
Model 1: age	1.00	1.50	1.12–2.00	1.00	1.66	1.31–2.12
History of physical workload						
+ physically strenuous work	1.00	1.51	0.97–2.35	1.00	1.59	1.15–2.17
+ kneel or squat 1 hour/day	1.00	1.50	0.97–2.31	1.00	1.50	1.08–2.08
+ drive a car, tractor or other work machine ≥4 hours/day	1.00	1.46	0.95–2.25	1.00	1.57	1.15–2.15
+ manually move items >5 kg ≥2 times/minute for ≥4 hours/day	1.00	1.45	0.94–2.25	1.00	1.55	1.14–2.12
+ manually move items >20 kg ≥10 times/day	1.00	1.47	0.96–2.27	1.00	1.61	1.17–2.21
+ work with hands above the shoulder level ≥1 hour/day	1.00	1.43	0.93–2.21	1.00	1.52	1.10–2.10
+ working in a forward leaning position without support ≥1 hour/day	1.00	1.45	0.94–2.24	1.00	1.46	1.05–2.04
+ work demanding great handgrip strength ≥1 hour/day	1.00	1.50	0.97–2.31	1.00	1.52	1.10–2.10
+ continuous movements of the hands or wrists	1.00	1.47	0.95–2.26	1.00	1.53	1.11–2.12
+ work with a vibrating tool ≥2 hours/day	1.00	1.46	0.94–2.25	1.00	1.53	1.11–2.11
+ work that requires standing or walking ≥5 hours/day	1.00	1.49	0.97–2.30	1.00	1.55	1.12–2.13
Current work-related factors						
+ current physically strenuous work	1.00	1.44	1.07–1.93	1.00	1.62	1.20–2.19
+ job strain	1.00	1.44	1.08–1.93	1.00	1.62	1.26–2.09
+ working hours	1.00	1.52	1.14–2.04	1.00	1.67	1.30–2.15
+ work schedule	1.00	1.50	1.12–2.00	1.00	1.67	1.30–2.13
Diagnosed chronic diseases						
+ cardiovascular disease	1.00	1.47	1.10–1.98	1.00	1.67	1.31–2.14
+ respiratory disease	1.00	1.48	1.10–1.98	1.00	1.68	1.31–2.14
+ musculoskeletal disease	1.00	1.47	1.10–1.97	1.00	1.65	1.29–2.11
Other measures of socioeconomic position						
+ education	1.00	1.46	1.07–1.99	1.00	1.67	1.23–2.26
+ household income	1.00	1.44	1.08–1.93	1.00	1.49	1.17–1.91
Other health behaviors and related factors						
+ body mass index	1.00	1.46	1.08–1.97	1.00	1.64	1.28–2.10
+ smoking	1.00	1.38	1.03–1.84	1.00	1.35	1.05–1.72

<sup>a</sup> Logistic regression, age-adjusted odds ratios (OR) and 95% confidence intervals (95% CI) for leisure-time physical inactivity. The reference category is white-collar workers.

**Table 4.** Occupational class differences in leisure-time physical inactivity in women: the contribution<sup>a</sup> of exposure to various physical workload factors during work after taking into account current work-related factors, diagnosed chronic diseases, other measures of socioeconomic positions, other health behaviours and related factors, Health 2000 –study in Finland. (+ indicates item was added to the factor within the model)

	Women		
	White-collar	Blue-collar	
	OR	OR	95% CI
Model 1 (Age + occupation)	1.00	1.50	1.12–2.00
Model 2 (Model 1 + current physically strenuous work)	1.00	1.44	1.07–1.93
Model 3 (Model 2 + job strain)	1.00	1.37	0.99–1.04
Model 4 (Model 3 + working hours + work schedule)	1.00	1.37	1.03–1.84
Model 5 (Model 4 + cardiovascular disease + respiratory disease + musculoskeletal disease)	1.00	1.37	1.03–1.86
Model 6 (Model 5 + education + household income)	1.00	1.37	1.01–1.87
Model 7 (Model 6 + body mass index + smoking)	1.00	1.33	0.97–1.83
Model 8 (Model 7 + history of physical workload <sup>b</sup> )	1.00	1.33	0.85–2.09

<sup>a</sup> Logistic regression, age-adjusted odds ratios (OR) and 95% confidence intervals (95% CI) for leisure-time physical inactivity. The reference category is white-collar women.

<sup>b</sup> Includes all the history of physical workload items: physically heavy work, kneel or squat, drive a car, tractor or other work machine, manually move items >5 kg, manually move items >20 kg, work with hands above the shoulder plane, working in a forward leaning position without support, work demanding great handgrip strength, continuous movements of the hands or wrists, work with a vibrating tool, and work that requires standing or walking.

**Table 5.** Occupational class differences in leisure-time physical inactivity in men: the contribution<sup>a</sup> of exposure to various physical workload factors during work history after taking into account current work-related factors, diagnosed chronic diseases, other measures of socioeconomic positions, other health behaviors and related factors in Finnish Health 2000 Survey. (+ indicates item was added to the factor within the model)

	Men		
	White-collar	Blue-collar	
	OR	OR	95% CI
Model 1 (Age + occupation)	1.00	1.66	1.30–2.12
Model 2 (Model 1 + current physically strenuous work)	1.00	1.62	1.20–2.19
Model 3 (Model 2 + job strain)	1.00	1.54	1.12–2.11
Model 4 (Model 3 + working hours + work schedule)	1.00	1.54	1.12–2.12
Model 5 (Model 4 + cardiovascular disease + respiratory disease + musculoskeletal disease)	1.00	1.56	1.14–2.14
Model 6 (Model 5 + education + household income)	1.00	1.45	1.02–2.07
Model 7 (Model 6 + body mass index + smoking)	1.00	1.27	0.88–1.82
Model 8 (Model 7 + history of physical workload <sup>b</sup> )	1.00	1.07	0.67–1.72

<sup>a</sup> Logistic regression, age-adjusted odds ratios (OR) and 95% confidence intervals (95% CI) for leisure-time physical inactivity. The reference category is white-collar men.

<sup>b</sup> Includes all the history of physical workload items: physically heavy work, kneel or squat, drive a car, tractor or other work machine, manually move items >5 kg, manually move items >20 kg, work with hands above the shoulder plane, working in a forward leaning position without support, work demanding great handgrip strength, continuous movements of the hands or wrists, work with a vibrating tool, and work that requires standing or walking.

Our results are in line with those of a previous study showing that manual workers are more likely to have a physically inactive lifestyle (11), but conflict with other studies where low-educated men, whose jobs included physical activity, tended to be more physically active during leisure time (12, 13). It is notable that in our study, current physically strenuous work somewhat increased these occupational class differences among men. On the other hand, having a history of heavy physical workload contributed substantially to these differences, even after adjusting

for several current work-related factors. Our findings differ from those of a study on public sector employees (17) where current physically strenuous work contributed to leisure-time physical inactivity among women. Some have interpreted these findings to be an indication of a lack of motivation to engage in sports-related activities after a physically strenuous work day (33–35) and a greater likelihood to spend recreational time engaging in activities that require no physical exertion, such as watching television. On the other hand, some of those with a history of physical work

may have moved into less-demanding occupations, and thereafter adopted a more active lifestyle during leisure time.

The other main mediator between occupational class and leisure-time physical inactivity was “other health behaviors” (mainly smoking) among both genders. This suggests that occupational class-specific cultural factors (such as traditions, values, and attitudes) could determine some of the occupational differences in such inactivity. Physical activity during leisure time may not be something blue-collar workers value much or that is generally associated with blue-collar culture, with the exception of spectator sports. Our results are in line with those studies that show a clustering of unhealthy behaviors (36, 37).

Other, more specific barriers may discourage leisure-time physical activity among blue-collar workers. Engaging in physical activity may not be possible due to shift work or long working hours (10), inconvenient access to facilities, low income or poor health (20, 38). Our results partly contradict these suggestions, since diagnosed chronic diseases and working overtime (among both men and women) and low household income (among women only) showed no contribution to occupational differences in leisure-time physical activity. Among men, however, low household income made a minor contribution.

To some extent, job strain mediated the association between occupation and leisure-time physical inactivity among women. Our finding is in agreement with those studies (4, 15, 18) where low job control either independently or together with job demands was associated with a physically inactive lifestyle. Our study, however, indicated that current job demands did not mediate the association between occupation and inactivity. This finding is in line with those of another study (17) of employees of the City of Helsinki, where job demands were not associated with physical inactivity during leisure time.

### Study limitations and strengths

Information on physical activity and working conditions were self-reported and, as such, prone to recall bias. Our physical activity measure, however, strongly associates with several health measures, such as morbidity and mortality (30, 31, 39). The physical activity measures used in different studies vary, making comparisons difficult. The results may be influenced by the fact that older participants have had different work tasks and longer exposure to these working conditions than younger ones. In additional analyses, however, we found no interaction between age and working history. A particular strength of the study was that we were able to examine individual

exposure to several working conditions throughout the individual's entire working career. We were also able to use information on chronic diseases diagnosed by a physician in a clinical examination. The use of post-stratification weights in the statistical analyses minimized the potential errors due to non-response (40), which was more common among young men, at both extremes of the socioeconomic continuum, and those living in urban areas. We also had an excellent response rate (nearly 90%) and a study design that enables generalization of the results to the Finnish adult population.

### Concluding remarks

Having a long exposure to physical work, among men, and a high job strain, among women, contributed to occupational class differences in inactivity during leisure time. Different mechanisms may influence how working conditions affect such inactivity between genders. In our study, blue-collar men were more likely to work in metal and wood crafting, construction, and related jobs. Having a long exposure history to such physically strenuous working conditions may cause male workers to be physically inactive during leisure time so as to recover from the demands of physical work. Blue-collar women were more likely to work in cleaning, cooking, laundering, and related jobs. These jobs are not only physically strenuous but may offer few opportunities to change their repetitive tasks and limited potential for career advancement. This may diminish blue-collar women's motivation for physical activity during leisure time. Among both genders, this could lead blue-collar workers to participate less in healthy behaviors and more in unhealthy ones such as smoking.

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