ALL PART OF THE JOB? THE CONTRIBUTION OF THE PSYCHOSOCIAL AND PHYSICAL WORK ENVIRONMENT TO HEALTH INEQUALITIES IN EUROPE AND THE EUROPEAN HEALTH DIVIDE

Marlen Toch, Clare Bambra, Thorsten Lunau, Kjetil A. van der Wel, Margot I. Witvliet, Nico Dragano, and Terje A. Eikemo

This study is the first to examine the contribution of both psychosocial and physical risk factors to occupational inequalities in self-assessed health in Europe. Data from 27 countries were obtained from the 2010 European Working Conditions Survey for men and women aged 16 to 60 (n = 21,803). Multilevel logistic regression analyses (random intercept) were applied, estimating odds ratios of reporting less than good health. Analyses indicate that physical working conditions account for a substantial proportion of occupational inequalities in health in both Central/Eastern and Western Europe. Physical, rather than psychosocial, working conditions seem to have the largest effect on self-assessed health in manual classes. For example, controlling for physical working conditions reduced the inequalities in the prevalence of "less than good health" between the lowest (semi- and unskilled manual workers) and highest (higher controllers) occupational groups in Europe by almost 50 percent (Odds Ratio 1.87, 95% Confidence Interval 1.62–2.16 to 1.42, 1.23–1.65). Physical working conditions contribute substantially to health inequalities across "post-industrial" Europe, with women in manual occupations being particularly vulnerable, especially those living in Central/Eastern Europe. An increased political and academic focus on physical working conditions is needed to explain and potentially reduce occupational inequalities in health.

People with a lower level of education, income, wealth, or occupational class also have a lower life expectancy and experience more health problems throughout

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life compared to those placed higher in the social strata (1–6). This leads to large differences between socioeconomic groups in terms of self-assessed health, mortality, and the number of years that people can expect to live in good health. Several literature reviews (2, 4, 6–8) have shown that these socioeconomic inequalities in health exist in all European countries. The limited empirical research on occupational class and health in Europe (6, 9–12) has also shown that morbidity and premature mortality are unequally distributed in the European workforce, with manual and unskilled professions faring much worse in comparison to professional and higher managerial occupations. Furthermore, it has been reported that (educational) inequalities in mortality in the Eastern parts of Europe are larger than in the West (13, 14) and that individual poor health is more prevalent in Eastern Europe as compared to Western Europe (15). However, results for morbidity inequalities are scarce and inconsistent (10, 16).

Still, very few cross-national studies of socioeconomic inequalities use occupational class as the socioeconomic indicator (often income or education is utilized) and even fewer studies provide evidence with respect to the social determinants underlying differences by occupational class. Health inequalities by occupation have sizable independent and distinct contributions to population health as compared to other indicators of socioeconomic position (17). While most studies of occupational inequalities in health merely explain differences in relation to education or income, few studies focus on the role of working conditions, despite the well-established association between the work environment and health (18).

WORKING CONDITIONS AND HEALTH

Those studies that do consider the contribution of working conditions to occupational inequalities in health do so by focusing exclusively on psychosocial risk factors at work (18). These studies have reported that high-strain jobs (low control and high demands), effort-reward imbalance, and job security are associated with ill health, including musculoskeletal conditions, mental illness, cardiovascular disease, and obesity (18). The most influential single-country evidence with respect to the association between working conditions and occupational inequalities in health is derived from the Whitehall studies of British civil servants. These studies have shown that a higher occupational rank is associated with lower mortality, especially in the case of cardiovascular disease mortality (19, 20). These results have been supported by later studies that link job characteristics to cardiovascular disease risk and other health outcomes (21–25). Findings regarding occupational rank, job characteristics, and health outcomes support the hypothesis that the prevalence of adverse psychosocial working conditions, such as low control or status anxiety, is lower in higher-status positions (26). The psychosocial work environment was also cited as a key factor behind these occupational inequalities.

However, as Bambra (18) highlighted, there is a noticeable lack of contemporary discussion as to whether physical working conditions still play a meaningful role with respect to the persistence of socioeconomic inequalities in health. Recent policy reports, reviews, and prominent academic books have marginalized the contribution of physical work hazards in favor of psychosocial ones (18). One could speculate that this is because the negative health effects of physical working conditions are associated with the "industrial worker," which again is related to the emergence of modern capitalism and industrialization. The working conditions of the industrial worker were characterized as being repetitive, mechanic, intensive, heavy, and exhaustive (18). However, as a result of technological improvements and the shift in most European countries from a primarily manufacturing economy to a more service-based one, reforms to the length of the working day, and the introduction of health and safety legislations, physical work became less prevalent and remaining physical loads less severe. Public health interest in the physical work environment subsequently decreased and attention was increasingly paid to the psychosocial work environment more prevalent in the service sector (18).

Yet, European employees still face numerous physical hazards at work, including handling chemicals, noise, vibration, or heavy loads (27). For example, across the 27 countries of the European Union, one in six workers are still exposed to hazardous chemicals at work, one-fifth are exposed to vibrations, and one-third are exposed to noise, heavy loads, or repetitive work (18). These exposures are associated with injuries, cancer, hearing loss, and respiratory, musculoskeletal, cardiovascular, reproductive, neurological, skin, or mental disorders (28). This is reinforced in data from the World Health Organization's Global Burden of Disease project, which provides estimates of mortality and morbidity for more than 135 causes of disease and injury. It estimates that 37 percent of all back pain worldwide is attributable to work-related factors, resulting in significant loss of time from work and high economic costs (28). In addition, 16 percent of all hearing loss worldwide is attributable to workplace exposures. Work-related chronic obstructive pulmonary disease is 13 percent, 11 percent of asthma, 9 percent of lung cancer, 2 percent of leukaemia, and 8 percent of injuries, accounting for about 850,000 deaths and 24 million years of healthy life lost each year (28). These global estimates illustrate that there is a need for a renewed interest in the negative health effects of hard physical working conditions.

PHYSICAL WORKING CONDITIONS AND HEALTH INEQUALITIES

Physical working conditions could contribute to health inequalities in two ways, first in terms of the relative exposure to risk as certain sectors of the economy and certain occupations within them are more associated with exposure to workplace hazards. These are disproportionately lower occupational jobs. Second, manual, unskilled, and semi-skilled workers are also more likely to develop ill health after exposure to physical hazards. For example, in the case of lead exposure, poor nutritional conditions such as irregular food intake, high fat intake, and deficiencies in calcium and iron augment the physiological effects of lead uptake (18). The associations between poverty and nutritional deficiencies thus increase the likelihood of disease development among lower-status workers. Examples of the elevated health risks experienced by lower-status workers come in terms of musculoskeletal disease, which has a considerably higher prevalence among blue-collar work as compared to white-collar work (29). This suggests that physical working conditions may remain important in terms of occupational health inequalities. However, this has not yet been examined in any detail or in cross-national research.

CROSS-NATIONAL RESEARCH

There are important variations in the physical working environment across Europe. For example, E.U. data (18) show that chemical hazards are highest in Finland (24%) and lowest in the Netherlands (7%). Noise as an occupational risk is highest in Sweden (36%) and lowest in the Netherlands (18%). Vibration as an occupational risk is highest in Portugal (32%) and lowest in the United Kingdom (14%). Carrying heavy loads as an occupational risk is highest in Greece (42%) and lowest in the Netherlands (23%). Repetitive work as an occupational risk is highest in Germany (42%) and lowest in Luxembourg (23%). These variations may reflect differences in the industrial base of each country. For example, Finland, Greece, and Spain have more people employed in high-risk sectors (agriculture, processing, and construction), while the United Kingdom and the Netherlands have more people at work in the service sector (18).

Regulation of such hazards (exposure limits) also differs by country. These cross-national differences may therefore also reflect differences within the wider welfare state, social protection, and labor market regulation systems, which may influence health outcomes (30–32). It is widely accepted that as a result of extensive work environment legislation, Sweden and Norway have the most regulated work environment (33). There is also evidence that the wider macro-economic climate also affects physical working conditions with, for example, injury rates increasing during periods of severe economic recession or industrial restructuring. For example, Nichols (34) attributes the 25 percent increase in major industrial injuries between 1981 and 1984 in the United Kingdom to labor intensification processes introduced into manufacturing as part of the Thatcher government's industrial reform program. It is therefore of interest to examine to what extent the physical, as well as psychosocial, work environment determines social inequalities in health.

In cross-European analysis of occupational health inequalities, the comparison of Central/Eastern and Western European countries is one of the most interesting, as the regions have very different political histories. The Central/Eastern region had full employment during the communist era, whereas Western Europe has a different history. After the collapse of the communist regimes, neoliberal capitalist measures, such as liberalization of prices and trade and mass privatization, came into place (35), which have left a lasting imprint on the Central/Eastern population. Millions of premature deaths were attributed to massive economic changes in the transition period (36–38). In addition, labor laws have a longer history in Western Europe as compared to Central/Eastern Europe. For example, in Russia, progression in labor legislation was not made until after 1917, whereas Western Europe had introduced labor laws even long before the United States (39). These differences in the history of country characteristics of labor may play a role in the manifestation of occupational class inequalities in self-assessed health within Europe, which furthermore might be enhanced by differences in working conditions.

RESEARCH AIMS

In this study, we will compare the contribution of psychosocial working conditions (low control and high demands) and physical risk factors to occupational inequalities in self-assessed health in Europe within men and women of working age. We pay particular attention to Central/Eastern and Western Europe, to find out if there still is a health divide between these regions and if this divide is manifested in differences in psychosocial and physical working conditions.

DATA AND METHODS

Data on 27 countries (Appendix 1) were obtained from the 2010 European Working Conditions Survey (EWCS). This comparative, freely available, periodical survey is conducted every five years by the European Foundation for the Improvement of Living and Working Conditions, an autonomous E.U. agency. The EWCS contains information on people across Europe, aged 16 to 60 years. The survey is a unique source of comparative information about the working population in the included countries. In each country, a multistage, stratified random sampling method was used. Interviews were carried out face-to-face at respondents' homes. The overall response rate was 44 percent, with considerable variation in the participation rates among countries (ranging from 31% in Spain to 74% in Latvia; see Appendix 1). Further details on the survey design and sampling frame are available elsewhere (40). The subsample for this analysis is restricted to men and women aged 16 to 60 years. We also excluded individuals working fewer than 15 hours a week, those serving in the armed forces, and the self-employed. After excluding individuals with missing data on study variables, a total of 21,083 participants were available for the final analysis. Details of the analytical sample are provided in Table 1.

Table 1

Sample characteristics of the total population of the EWCS

		Men (10,433)		Women (11,370)	
		N = 21,803 No. (%) or mean (SD)			
Age	16–29	2,023	(19.40)	1,962	(17.30)
	30–39	2,874	(27.60)	3,019	(26.60)
	40–49	2,943	(28.20)	3,495	(30.70)
	50–60	2,593	(24.90)	2,894	(25.50)
Education	No/primary education	434	(4.20)	323	(2.80)
	Secondary	6,534	(62.60)	6,257	(55.00)
	Post-secondary	522	(5.00)	692	(6.10)
	Tertiary	2,943	(28.20)	4,098	(36.00)
NACE	Agriculture, hunting, and forestry	266	(2.60)	144	(1.30)
	Fishing	11	(0.10)	2	(0.02)
	Mining and quarrying	115	(1.10)	21	(0.20)
	Manufacturing	2,144	(20.60)	1,417	(12.50)
	Electricity, gas, and water supply	258	(2.50)	91	(0.80)
	Construction	1,359	(13.00)	176	(1.60)
	Wholesale and retail trade	1,408	(13.50)	1,784	(15.70)
	Hotels and restaurants	359	(3.40)	553	(4.90)
	Transport, storage, and communication	1,029	(9.90)	411	(3.60)
	Financial intermediation	331	(3.20)	433	(3.80)

	Real estate activities	880	(8.40)	836	(7.40)
	Public administration and defence	763	(7.30)	835	(7.30)
	Education	518	(5.00)	1,650	(14.50)
	Health and social work	460	(4.40)	2,172	(19.10)
	Other service activities	497	(4.80)	743	(6.50)
	Activities of households	14	(0.10)	84	(0.70)
	Activities of extraterritorial organizations and bodies	21	(0.20)	18	(0.20)
Sector	Private	7,418	(71.10)	6,274	(55.20)
	Public	2,351	(22.50)	4,305	(37.90)
	Other	664	(6.40)	791	(10.00)
Years at current workplace	< 1 years	941	(9.00)	973	(8.60)
	1–4 years	3,206	(30.70)	3,543	(31.20)
	≥ 5 years	6,286	(60.30)	6,854	(60.30)
Weekly working hours		40.9	(8.20)	36.8	(9.00)
Contract	Indefinite	8,812	(84.50)	9,474	(83.30)
	Temporary	1,621	(15.50)	1,896	(16.70)
Company size	Small	2,723	(26.10)	3,453	(30.40)
	Medium	4,827	(46.30)	5,301	(46.60)
	Large	1,858	(17.80)	1,721	(15.10)
	Very large	1,025	(9.80)	895	(7.90)
Vibrations	¼ of the time or less	7,827	(75.00)	10,488	(92.20)
	½ of the time or more	2,606	(25.00)	882	(7.80)

Table 1 (Cont'd.)

		Men (10,433)		Women (11,370)	
		N = 21,803 No. (%) or mean (SD)			
Tiring positions	¼ of the time or less	6,977	(66.90)	7,717	(67.90)
	½ of the time or more	3,456	(33.10)	3,653	(32.10)
Lifting people	¼ of the time or less	10,119	(97.00)	10,312	(90.70)
	½ of the time or more	314	(3.00)	1,058	(9.30)
Moving heavy loads	¼ of the time or less	7,808	(74.80)	9,889	(87.00)
	½ of the time or more	2,625	(25.20)	1,481	(13.00)
Repetitive movements	¼ of the time or less	4,747	(45.50)	5,136	(45.20)
	½ of the time or more	5,686	(54.50)	6,234	(54.80)
Job demands	Low	5,380	(51.60)	6,415	(56.40)
	High	5,053	(48.40)	4,955	(43.60)
Job control	Low	4,053	(38.90)	4,029	(35.40)
	High	6,380	(61.20)	7,341	(64.60)
Occupational class	I Higher controllers	1,346	(12.90)	1,105	(9.70)
	II Lower controllers	2,223	(21.30)	3,217	(28.30)
	III Routine non-manual employees	1,145	(11.00)	3,909	(34.40)
	IV Manual supervisor	332	(3.20)	79	(0.70)
	V Skilled manual workers	2,164	(20.70)	772	(6.80)
	VI Semi- and unskilled manual workers	3,223	(30.90)	2,288	(20.10)

Health was measured in terms of self-reported general health, constructed from a variable asking "*How is your health in general? Would you say it is . . . very good, good, fair, bad, very bad?*" The variable was dichotomized into "very good or good" versus "not good" health. Sex and age (categories of 16–29, 30–39, 40–49, and 50–60) were included as individual-level demographic variables. We also included variables to measure occupation, using the statistical classification of economic activities in the European Community (NACE). Occupational class was coded according to the Erikson and Goldthorpe (EGP) scheme into: (I) *higher controllers*, consisting of higher-grade professionals, administrators, and officials; managers in large industrial establishments; and large proprietors, (II) *lower controllers*, consisting of lower-grade professionals, administrators, and officials; higher-grade technicians; managers in small industrial establishments; and supervisors of non-manual employees, (III) *routine non-manual employees*, (IV) *manual supervisors*, (V) *skilled manual workers*, and (VI) *semi- and unskilled manual workers* (41). For the comparison of Central/Eastern and Western Europe, the wider EGP scheme could not be applied due to group sizes, and thus a summary measure, comparing classes I–III with IV–VI, was applied. Education was measured according to the international standard classification of education (ISCED-97), using four categories: no/primary, secondary, post-secondary, and tertiary education. To assess physical working conditions, five indicators were used in the analyses, all of which have an established association with health (18): (1) vibrations from hand tools, machinery, etc.; (2) tiring or painful positions; (3) lifting or moving people; (4) carrying or moving heavy loads; and (5) repetitive hand or arm movements. Respondents who reported working more than 50 percent of the time under these conditions are classified as having poor physical working conditions. To measure psychosocial working conditions, we applied the well-established demand-control model (42), using single proxy-scales of high demand and low control. We also included variables to measure the organization of work: public/private/third sectors, temporary or indefinite contract, shift work (yes/no), working at night (how many times a month), working at weekends (how many times a month), and average working hours per week.

Multilevel logistic regression analyses (random intercept) were applied, accounting for the hierarchical structure of the data, in which we estimated the odds ratios (OR) of reporting less than good health within 27 European countries (pooled).

To assess the association between occupational class and health, we first ran a model with occupational class only, adjusted for sex, age, education, public or private sector, years at current workplace, weekly working hours, employment contract, and company size (Model 1). In the second model, we further included physical work environment (Model 2). Next, we separately added psychosocial work environment in two steps: job control (Model 3) and job demands (Model 4). In the final model, all of the working condition variables were combined (Model 5). Separate analyses for men and women were conducted. To analyze region-specific differences between Central/Eastern and Western Europe, additional analyses were conducted for the 11 Central/Eastern and 16 Western European countries, using a summary measure of occupational class.

All calculations were done using STATA 11 (College Station, Texas).

RESULTS

Table 2 presents odds ratios of reporting less than good health by all EGP classes, with higher controllers (EGP Class I) being the reference category, in Europe (pooled). The analysis was performed for: (*a*) the total population and (*b*) men and women separately. The results show that occupational inequalities in health are present, with lower classes having worse health as compared to higher classes (Model 1). The adjustment for physical working conditions (Model 2) reduced this graded relationship. The odds ratio for semi- and unskilled manual workers (EGP Class VI), for example, was reduced from 87 percent higher than the high controllers (OR 1.87, 95% CI 1.62–2.16) in Model 1 to only 42 percent higher (OR 1.42, 95% CI 1.23–1.65) in Model 2. The adjustment for job demand (Model 3) did not seem to make any difference, while an adjustment for job control (Model 4) reduced odds ratios clearly. However, the reduction (OR 1.64, 95% CI 1.42–1.90) was less than for physical working conditions (not statistically significant). Adjusting for all of the physical and psychosocial strains (Model 5) reduced the social inequalities in health remarkably (1.31, 1.13–1.53), although this model was quite similar to Model 2, which was only adjusted for physical working conditions.

Our findings indicate that the health of women in manual classes was generally more affected by physical and psychosocial strain than the health of men in manual classes. For non-manual classes, women seemed to have lower inequalities in health than men. Adjusting for physical working conditions (Model 2) reduced odds ratios for less than good health from 79 percent higher than the high controllers (OR 1.79, 95% CI 1.46–2.19) to only 40 percent higher (OR 1.40, 95% CI 1.14–1.73) for men (a 50% reduction) and from 204 percent as high (OR 2.04, 95% CI 1.66–2.51) to only 52 percent higher (OR 1.52, 95% CI 1.23–1.87) for women in the lowest occupational class (a 75% reduction). High job demands did not reduce occupational class inequalities to a large extent, for neither men nor women. For routine non-manual classes, those inequalities even increased after adjustment. Low job control clearly reduced inequalities in health, albeit to a lesser extent as compared to physical working conditions. The full models, controlling for physical and psychosocial working conditions, reduced the observed occupational inequalities in self-assessed health considerably, though not statistically significant.

Table 3 shows the comparison of odds ratios of reporting less than good health for non-manual (reference category) and manual classes combined, in Central/Eastern and Western Europe. We found that health inequalities are not bigger in

Central/Eastern Europe as compared to the West. Again, manual classes had worse health than non-manual classes. The inclusion of physical working conditions (Model 2) reduced class differences to almost the same extent as found in the full model (Model 5). Among men in Central/Eastern Europe, no significant occupational inequality remained after the inclusion of physical working conditions. Job demands and job control again did not reduce inequalities much, while job control had a bigger effect than job demands. The contribution of working conditions to health inequalities did not vary between Central/Eastern and Western Europe. The analyses for men and women within Central/Eastern Europe showed that women in manual classes seemed to report higher prevalence of poor health as compared to men in manual classes, with odds ratios in the full model of 1.36 (95% CI 1.10–1.69) for women and 1.22 (95% CI 0.92–1.61) for men. For Western Europe, we observed the opposite, with men in manual classes having a higher odds ratio of less than good health as compared to women in manual classes, 1.29 (95% CI 1.09–1.53) and 1.19 (95% CI 1.03–1.38), respectively.

DISCUSSION

This study indicates that physical working conditions account for a substantial proportion of occupational inequalities in health in both Central/Eastern and Western Europe. Physical, rather than psychosocial, working conditions seem to have the largest effect on self-assessed health in manual classes. For example, controlling for physical working conditions reduced the inequalities in the prevalence of "less than good health" between the lowest (semi- and unskilled manual workers) and highest (higher controllers) occupational groups in Europe by almost 50 percent (OR 1.87, 95% CI 1.62–2.16 to 1.42, 1.23–1.65).

This study has several strengths, such as the large geographic coverage and unique information about occupations and working conditions. Further, to our knowledge, this is the first study to show a larger contribution of physical as compared to psychosocial risk factors at work to explain the association between occupational class and health. Still, there are some limitations. One notable issue regarding the EWCS data is the average response rate of 44 percent (Appendix 1), ranging from 31 percent in Spain to 74 percent in Latvia. This is a common problem to interview surveys, which may have biased our estimates of health inequalities if non-response is systematically related to occupational class positions. We cannot exclude this possibility. It is also important to assess whether the proportion of non-response is different in the East as compared to the West. This difference was 13 percentage points, with more non-response in the West. Still, we think it unlikely that non-response has greater effects in the East as compared to the West. In a previous study that used the European Social Survey with similar non-response patterns between Central/Eastern and Western Europe, Eikemo and colleagues (10) did not find greater health inequalities by occupational class in Central/Eastern Europe as compared to the West. Health

Table 2

Odds ratios (OR) and 95% confidence intervals (CI) of less than good self-assessed health by occupational class in 27 European countries, for the total population and men and women separately

	Model 1		Model 2 (Model 1 + physical working conditions)	
Occupational class	OR	95% CI	OR	95% CI
Total (N = 21,803)				
I Higher controllers	1		1	
II Lower controllers	1.05	(0.92–1.20)	1.00	(0.88–1.15)
III Routine non-manual employees	1.30	(1.13–1.50)	1.23	(1.07–1.43)
IV Manual supervisors	1.55	(1.19–2.02)	1.20	(0.91–1.57)
V Skilled manual workers	1.67	(1.43–1.96)	1.26	(1.07–1.48)
VI Semi- and unskilled manual workers	1.87	(1.62–2.16)	1.42	(1.23–1.65)
Men (N = 10,433)				
I Higher controllers	1		1	
II Lower controllers	1.06	(0.87–1.29)	1.03	(0.84–1.25)
III Routine non-manual employees	1.47	(1.16–1.86)	1.37	(1.08–1.73)
IV Manual supervisors	1.51	(1.10–2.08)	1.21	(0.88–1.68)
V Skilled manual workers	1.67	(1.35–2.06)	1.31	(1.05–1.63)
VI Semi- and unskilled manual workers	1.79	(1.46–2.19)	1.40	(1.14–1.73)
Women (N = 11,370)				
I Higher controllers	1		1	
II Lower controllers	1.06	(0.88–1.27)	1	(0.83–1.21)
III Routine non-manual employees	1.29	(1.06–1.56)	1.22	(1.01–1.48)
IV Manual supervisors	1.69	(0.98–2.92)	1.25	(0.72–2.18)
V Skilled manual workers	1.76	(1.37–2.26)	1.25	(0.96–1.62)
VI Semi- and unskilled manual workers	2.04	(1.66–2.51)	1.52	(1.23–1.87)

Note: All models additionally adjusted for sex, age, education, public or private sector, NACE, years at current workplace, weekly working hours, employment contract, and company size.

Model 3 (Model 1 + job demands)		Model 4 (Model 1 + job control)		Model 5 (Model 1 + physical working conditions + job demand + job control	
OR	95% CI	OR	95% CI	OR	95% CI
1		1		1	
1.05	(0.92–1.20)	0.99	(0.87–1.13)	0.96	(0.84–1.11)
1.34	(1.16–1.55)	1.19	(1.03–1.37)	1.17	(1.01–1.35)
1.46	(1.12–1.91)	1.46	(1.11–1.90)	1.14	(0.87–1.50)
1.64	(1.40–1.92)	1.48	(1.26–1.74)	1.17	(0.99–1.38)
1.86	(1.61–2.15)	1.64	(1.42–1.90)	1.31	(1.13–1.53)
1		1		1	
1.07	(0.88–1.30)	1.02	(0.84–1.24)	1	(0.82–1.22)
1.49	(1.18–1.89)	1.35	(1.07–1.71)	1.29	(1.02–1.64)
1.47	(1.07–2.03)	1.44	(1.05–1.99)	1.17	(0.85–1.63)
1.67	(1.35–2.07)	1.52	(1.23–1.89)	1.24	(0.99–1.55)
1.79	(1.46–2.20)	1.60	(1.30–1.98)	1.31	(1.06–1.62)
1		1		1	
1.06	(0.88–1.28)	0.99	(0.82–1.19)	0.96	(0.79–1.16)
1.33	(1.10–1.61)	1.17	(0.96–1.41)	1.15	(0.95–1.41)
1.51	(0.88–2.61)	1.58	(0.91–2.74)	1.15	(0.65–2.01)
1.68	(1.30–2.16)	1.51	(1.17–1.95)	1.12	(0.86–1.46)
2.03	(1.65–2.50)	1.77	(1.44–2.18)	1.39	(1.12–1.72)

Table 3

Odds ratios (OR) and 95% confidence intervals (CI) of less than good self-assessed health by occupational class in 11 Central/Eastern and 16 Western European countries, for the total population and men and women separately

	Model 1		Model 2 (Model 1 + physical working conditions)	
Occupational class	OR	95% CI	OR	95% CI
Central/Eastern Europe				
Total (N = 7,232)				
I Non-manual	1		1	
II Manual	1.44	(1.24–1.68)	1.25	(1.08–1.46)
Men (N = 3,164)				
I Non-manual	1		1	
II Manual	1.33	(1.04–1.70)	1.14	(0.88–1.47)
Women (N = 4,068)				
I Non-manual	1		1	
II Manual	1.50	(1.24–1.81)	1.30	(1.07–1.58)
Western Europe				
Total (N = 14,571)				
I Non-manual	1		1	
II Manual	1.49	(1.34–1.67)	1.30	(1.16–1.45)
Men (N = 7,269)				
I Non-manual	1		1	
II Manual	1.70	(1.44–2.01)	1.40	(1.17–1.66)
Women (N = 7,302)				
I Non-manual	1		1	
II Manual	1.37	(1.19–1.59)	1.26	(1.08–1.47)

Note: All models are additionally adjusted for sex, age, education, public or private sector, NACE, years at current workplace, weekly working hours, employment contract, and company size.

Model 3 (Model 1 + job demands)		Model 4 (Model 1 + job control)		Model 5 (Model 1 + physical working conditions) + job demand + job control	
OR	95% CI	OR	95% CI	OR	95% CI
1		1		1	
1.45	(1.25–1.68)	1.35	(1.16–1.58)	1.21	(1.03–1.41)
1		1		1	
1.33	(1.04–1.71)	1.29	(1.00–1.66)	1.13	(0.88–1.47)
1		1		1	
1.50	(1.24–1.81)	1.38	(1.14–1.68)	1.24	(1.02–1.51)
1		1		1	
1.50	(1.34–1.68)	1.39	(1.24–1.55)	1.25	(1.12–1.41)
1		1		1	
1.69	(1.43–2.00)	1.56	(1.31–1.85)	1.33	(1.11–1.59)
1		1		1	
1.40	(1.21–1.63)	1.30	(1.12–1.51)	1.24	(1.06–1.44)

was measured from people's self-reports and was not assessed by a general practitioner. However, though self-reports might be biased (e.g., by cultural differences or socially desirable answers), they are known to correlate highly with mortality and are a well-respected indicator in comparative observational models (43). Only one specific aspect of psychosocial working conditions was measured while others, such as effort-reward imbalance, job insecurity, and long working hours, were not included. Further, health-related behaviors such as unhealthy diet, sedentary behavior, heavy alcohol consumption, and smoking, which are core determinants of ill health, were not measured. The associations between occupational class and health are possibly mediated through those health behaviors (20, 44), and not having this information might introduce bias to our results. However, a Finnish study revealed that the associations of working conditions with health behaviors were weak and inconsistent (23). Finally, although statistical power was not comparatively low in this study, and the size of the semi- and unskilled manual worker class (EGP Class VI) was substantial (31% in men, 20% in women), confidence intervals were in most cases too wide to establish statistically significant differences and odds ratio reductions. However, considering the large reduction of the odds ratios associated with manual EGP Class VI with the introduction of physical working conditions, we argue that our findings are substantially significant, if not statistically.

Hazardous physical working conditions were more common among men and women classified as low-skilled or unskilled manual than in the other occupational classes. Furthermore, the independent contribution of physical working conditions on health inequalities, as compared to psychosocial working conditions, was larger among women than among men, which is especially true for Central/Eastern Europe. This gender difference in Central/Eastern Europe might be due to several different mechanisms (45): first, women traditionally have shown high labor market participation; however, they are more present in lower non-manual occupations, but also in industry and manufacturing, where the latter is clearly linked to strenuous physical working conditions. Second, combining work and family was always inherent in the Central/Eastern European labor market, though women's role as mother always had a conservative character. This means that in addition to full-time work, women took full-time care of the family, which imposed a double burden on them. Further, there is a lack of gender (equality) policies in the labor market. Therefore, especially among female workers in lower occupational classes, interventions aimed at improving physical working conditions seem necessary.

The role of various working conditions as explanations for health inequalities is not yet fully understood, although this article has now provided empirical support for Bambra's thesis of the importance of physical working conditions to health inequalities in Europe (18). Previous single-country studies also suggest that physical working conditions and job control explain a large part of the inequalities in self-assessed health (24, 46–48). Schrijvers and van de Mheen (49) found that a substantial part of the association between occupational class and a less-than-good perceived general health in the working population could be attributed to a differential distribution of hazardous physical working conditions and low job control across occupational classes. The authors suggest that interventions aimed at improving these working conditions might result in a reduction of socioeconomic inequalities in health in the working population. Similarly, using a French cohort, Niedhammer and Chastang (48) found that the strongest impacts on occupational inequalities in self-assessed health were found for decision latitude; ergonomic, physical, and chemical exposures; and work schedules, suggesting that concerted prevention of occupational risk factors would be useful not only to improve health at work, but also to reduce social inequalities in health. This evidence is supported by Aittomäki and Lahelma (46), who concluded that physical workload is likely to contribute considerably to inequalities in health in a Finnish study. Other evidence of the importance of physical factors in terms of health inequalities comes from a Finnish study (50) that found that physical workload explained up to 95 percent of inequalities by occupational class in physical functioning. A study of maternal physical working conditions in Sweden found that these contribute to socioeconomic inequalities in birth outcomes (51), including preterm births and low birth weight (30%).

CONCLUSION

Our findings suggest that the contribution of physical working conditions to occupational differences in health continues to be important in Europe. However, further research examining the contribution of people's physical working conditions to occupational differentials in health within and between countries is needed. Our main finding is that physical working conditions seem to matter for health inequalities, and that they appear to be more important than psychosocial conditions for manual classes. An increased political and academic focus on physical working conditions is needed to explain and potentially reduce occupational inequalities in health. Improving physical working conditions may perhaps be an important element in reducing occupational inequalities in health, suggesting that if we improve physical working conditions, then we may potentially reduce occupational inequalities within Europe.

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APPENDIX 1

Cooperation rate, contact rate, refusal rate, and response rate (in %) in all countries studied

	Cooperation rate	Contact rate	Refusal rate	Response rate
5th EWCS	59.6	76.3	29.9	44.2
Central/Eastern Europe				
Bulgaria	76.5	87.6	20.3	66.1
Croatia	66.2	66.5	22.2	43.4
Czech Republic	61.5	78.0	29.3	46.8
Estonia	67.0	84.4	27.3	55.5
Hungary	57.0	83.6	35.1	46.6
Latvia	85.5	86.2	12.5	73.5
Lithuania	59.3	92.3	37.1	54.1
Poland	56.7	77.9	33.4	43.8
Romania	66.8	88.8	29.2	58.7
Slovakia	82.4	70.3	12.2	57.2
Slovenia	50.6	84.1	40.8	41.8
Western Europe				
Austria	39.7	83.9	48.8	32.1
Belgium	50.3	70.4	33.8	34.2
Denmark	71.4	84.3	23.4	58.4
Finland	62.5	77.3	28.1	46.8
France	65.5	54.7	17.8	33.8
Germany	60.7	96.2	36.1	55.7
Greece	58.3	76.0	28.4	39.8
Ireland	67.1	78.6	24.5	49.9
Italy	42.6	82.2	45.9	34.1
Luxembourg	56.1	73.2	31.6	40.4
Netherlands	45.0	86.7	45.7	37.4
Norway	49.5	66.2	32.5	31.8
Portugal	52.7	84.0	39.3	43.7
Spain	42.7	74.0	42.0	31.3
Sweden	52.5	69.1	31.5	34.8
United Kingdom	66.0	59.1	19.2	37.2

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Direct reprint requests to:

Terje Andreas Eikemo
Professor of Sociology
Norwegian University of Science and Technology
Department of Sociology and Political Science
7491 Trondheim
Norway

Terje.eikemo@svt.ntnu.no