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J Epidemiol Community Health. Author manuscript; available in PMC 2014 April 14.

Published in final edited form as:
J Epidemiol Community Health. 2010 January ; 64(1): 57–62. doi:10.1136/jech.2008.075978.

Work stress and health in Western European and post-communist countries: an East–West comparison study

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Abstract

Background—There is evidence that psychosocial factors at work influence the risk of poor health in Western societies, but little is known about the effect of work stress in the former communist countries. The aim of this paper is to compare the association of work stress with self-rated health in Western European and post-communist countries.

Methods—Data from four epidemiological studies were used: the HAPIEE study (Poland, Russia and the Czech Republic), the Hungarian Epidemiological Panel (Hungary), the Heinz Nixdorf Recall study (Germany) and the Whitehall II study (UK). The overall sample consisted of 18 494 male and female workers aged 35–65 years.

Results—High effort-reward imbalance at work was associated with poor self-rated health. The adjusted odds ratios for the highest versus lowest quartile of the effort-reward ratio were 3.8 (95% CI 1.9 to 7.7) in Hungary, 3.6 (95% CI 2.3 to 5.7) in the Czech Republic, 2.5 (95% CI 1.5 to 4.1) in the UK, 2.3 (95% CI 1.6 to 3.5) in Germany, 1.5 (95% CI 1.0 to 2.1) in Poland and 1.4 (95% CI 1.1 to 1.8) in Russia. The differences in odds ratios between countries were statistically significant ($p<0.05$). A similar pattern was observed for the effect of overcommitment on poor health.

Conclusion—The association of effort-reward imbalance at work and of a high degree of work-related overcommitment with poor self-rated health was seen in all countries, but the size of the effects differed considerably. It does not appear that the effects in Eastern Europe are systematically stronger than in the West.

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Competing interests None.

Provenance and Peer review Not commissioned; externally peer reviewed.

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There is consistent evidence from cross-sectional and prospective studies of an association of poor health with the hazards of work stress. However, most of the research is derived from Western European societies.[1 -9] There are only a few studies on the association of work stress with different health outcomes in Central and Eastern European post-communist countries.[10 -19] There are also large differences in morbidity and mortality rates between post-communist and Western European countries. The gap between East and West did not change much after the transition to market economies; mortality rates are still much higher in post-communist countries. Life expectancy for men is still 59 years in Russia, 69 years in Hungary compared with 76 years in the UK.[20]

It has been hypothesised that, in addition to higher levels of unhealthy behaviours (excessive alcohol consumption, smoking, poor nutrition, etc) in post-communist countries, stressful experience related to core social roles (including the work role) could contribute towards explaining some of these differences in health between Western and post-communist societies.[1821 - 24] In many formerly socialist countries, persons of working age are especially vulnerable.[25]

Socioeconomic and labour market differences between Eastern and Western European countries are also pronounced. For example, GDP per capita, total health expenditure per capita and unemployment rates are all less favourable in Eastern Europe compared with Western countries (eg, in Poland the GDP per capita was $11 861, total health expenditure per capita was $805 and unemployment rate was 17.7% while in the UK these indicators were $32 860, $2508 and 4.8% in 2005).[26] Countries with different socioeconomic conditions could have different capabilities in buffering the effect of psychosocial stress which may increase the risk of poor health. It is therefore possible that the psychosocial work stressors may have a stronger effect on health in Eastern Europe compared with the West.[212728]

The focus of this paper is to compare the effect of work stress, measured in terms of effort-reward imbalance, on self-rated health in the working populations of two Western European countries (UK and Germany) and four post-communist Central and Eastern European countries (Czech Republic, Poland, Hungary and Russia). The effort-reward imbalance model is one of the frequently tested concepts in work stress research. Its core assumption is that an imbalance between high effort spent and low rewards received (in terms of salary, esteem, promotion prospects and job security) leads to an increased risk of poor health. In this model, a distinction is made between extrinsic and intrinsic sources of effort.[29] The extrinsic construct shows the relation between the demands at work and the rewards received. The intrinsic component indicates the motivations of working people to perform and achieve. In this latter regard, a risky pattern of coping, “overcommitment”, was identified. Overcommitted people spend excessive efforts at work, striving for control and success, but, by doing so, they run the risk of premature exhaustion and breakdown. Thus, the model assumes that the extrinsic and intrinsic components are independently associated with poor health. An alternative proposition is that there is an interaction between the two components. We have tested both these hypotheses.

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Methods

Study population

This study used cross-sectional data on working populations collected in four studies in six European countries. These studies are described below.

HAPIEE study (Czech Republic, Poland, Russia)

The HAPIEE (Health, Alcohol and Psychosocial factors In Eastern Europe) study comprises three cohorts in Russia, Poland and the Czech Republic. The study has been described in detail elsewhere.[30] The cohorts consist of random samples of men and women aged 45–69 years at baseline selected from population registers of selected cities. A total of 28 947 individuals completed the questionnaire with an overall response rate of 61%. The study sample was restricted to persons who were still employed and under 65 years of age (n = 12 616). Ethical approval for the study was obtained from the University College London Medical School Committee on the ethics of human research.

Hungarian Epidemiological Panel (Hungary)

The Hungarian Epidemiological Panel (HEP) is the second phase of Hungarostudy 2002, a national prospective survey of the adult Hungarian population.[31] A battery of questionnaires on psychosocial and demographic characteristics was administered during a home interview. The sampling frame was the National Population Register, including men and women. Towns with a population of more then 10 000 as well as a random sample of smaller villages were included. From the first phase (n = 12 643), 8008 individuals gave consent to participate in the second phase. The overall response rate was 72%. We restricted our study sample to the middle-aged working population (35–65 years) who completed the questionnaire on effort-reward imbalance in the second phase conducted in 2005–6 (n = 1449). The study was approved by the ethical committee of Semmelweis University.

Whitehall II study (UK)

The Whitehall II study is a prospective investigation of socioeconomic, psychosocial, behavioural and biomedical health determinants in a cohort of 10 368 male and female British civil servants.[32] Data collection started in 1985–8 (phase 1) and has continued until phase 7 (2002–4). At phase 7 there was a 72% response rate for the overall data collection, but only 3413 were in employment and, of those, 2995 completed the questions on effort-reward imbalance and were under 65 years of age. Furthermore, as questions on educational qualifications were only asked at phase 5, the sample reduced further to 2625. Ethical approval for the Whitehall II study was obtained from the University College London Medical School Committee on the ethics of human research.

The Heinz Nixdorf Recall study (Germany)

The Heinz Nixdorf Recall (HNR) study is a population-based prospective cohort study. Apart from medical examinations to measure coronary atherosclerosis and cardiovascular risk factors, face-to-face interviews were conducted, including questions about socioeconomic conditions, occupation and work stress.[33] The study base was the general

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German population living in three large adjacent cities (Bochum, Essen, Mülheim/Ruhr) of the densely populated Ruhr area in Germany; 4814 men and women aged 45–74 years randomly selected from statutory lists of residence participated in the study (response 56%). Details of recruitment and sample characteristics have been described elsewhere.[34] Baseline examination took place between 2000 and 2003. For this analyses the sample was restricted to the working population (aged <65 years) who completed the questions on effort-reward imbalance (n = 1805). The HNR study was approved by the Institutional Review Committee (Essen) and the German Council for Radiation Safety.

Measurements

We used the self-rated health question as a measure of poor health. The question was answered by a 5-point Likert scale. This question has been shown to predict subsequent deterioration in health and mortality in a number of prospective studies.[35,36] The question was formulated as follows: “Over the last 12 months would you say your health has been …?”. The possible answers were “very good”, “good”, “average”, “poor” and “very poor”. The results were coded from 1 to 5 from “very good” to “very poor” health. In the different countries the questions and the scale of self-rated health were identical, with the exception of a slight change in the wording in the Hungarian and German languages. We dichotomised the self-rated health scale; “poor” and “very poor” health were coded as “poor” health.

We used a shortened version of the effort-reward imbalance questionnaire, containing questions with the original wording. These questions were included in every study (see Appendix).[7] The “effort” scale comprised 2 (out of 5 in the original instrument) items, the “reward” scale 5 (out of 11) items and the “overcommitment” scale comprised 5 (out of 6) items. In two studies where the original scale was also available (HAPIEE study, HNR study), the Pearson correlation between the original and the shortened scales was between 0.85 and 0.98. Cronbach α values of the shortened scales for effort, reward and overcommitment ranged from 0.58 to 0.76 in the four studies. These numbers suggest that the short versions of all four measures (effort, reward, effort-reward imbalance and overcommitment) are as valid as the original measures.

A ratio of the effort and reward scales was computed (ERI ratio) to indicate the degree of imbalance between the two; this is considered a core estimate of stressful experience at work.[29] The sum of the five 4-point Likert scale items of overcommitment varied from 4 to 20, with higher scores indicating a higher tendency towards excessive striving at work. For the purpose of this comparative study, we divided the ERI ratio into country-specific quartiles. Similarly, the scores of overcommitment were divided into quartiles. The quartiles with highest scores of ERI ratio and overcommitment (quartile 4) indicated the most stressful work conditions. We calculated odds ratios of poor health according to these measures of work stress where the quartile indicating no or low stress served as the reference category.

Age, educational attainment and occupational status were used as covariates. Education levels were split into three categories: primary or less, secondary, and university or college degree. Occupation status was classified into three categories: managerial, self-employed and non-managerial.

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The age range of the whole study sample was 35–65 years. The age ranges in different studies were slightly different: in Hungary it started at 35 years; in Germany, Russia, Poland and the Czech Republic it started at 45 years; and in the UK at 50 years. We tested whether the results differed when we restricted study samples to 45–65 years or 50–65 years. As there were no differences between the results in the full and restricted samples and there was no effect modification by age in the samples, we decided to keep our original study samples.

Statistical methods

The cross-sectional analysis explored the associations between psychosocial factors at work and the prevalence of poor self-rated health in two Western European and four post-communist countries. The Kruskal-Wallis test and ANOVA were used to measure the differences of work stress and poor health among countries depending on the normal distribution of the scales. The χ^2 test was used to analyse the differences in the proportion of poor health and the adverse psychosocial characteristics of work. Multivariate logistic regression analyses were used to determine the main and interaction effects of the components of the effort-reward imbalance model on poor self-rated health. Gender, age, education level and occupation groups were used as covariates in the regression model. Data analysis was conducted with SPSS Version 13 (SPSS Inc, Chicago, USA).

Results

Table 1 shows the number of participants and the prevalence of poor self-rated health in the different age groups, educational level and occupational status and in both genders in each country. Older participants in Russia, Poland and Hungary (>50 years) had significantly poorer health than younger ones. In every country there was an inverse association between educational level and self-rated health. The lowest prevalence of poor health was found in managers, except in Russia where self-employed workers showed the lowest proportion of poor health.

Table 2 shows the mean values, standard deviations and medians of self-rated health and work stress scales. Significant differences in mean values and medians of work stress scales and self-rated health were found between countries ($p<0.001$). The lowest self-rated health mean (which indicated better health) was observed in the UK sample (2.03) and the highest mean was seen in the Russian sample (2.99). The median of the ERI ratio was lowest in Russia and highest in Germany, and the prevalence of ERI >1 (ie, effort higher than reward) was highest among Hungarian workers. Overcommitment was highest in the Czech Republic and lowest in Russia.

The odds ratios of poor health by quartile of effort-reward imbalance and overcommitment estimated for each country separately and adjusted for gender, age, education and employment grade are shown in Table 3. The highest quartiles of ERI ratio and overcommitment indicate the most stressful work conditions (ERI 4, OC 4). For both these measures there were significant linear trends, with higher odds of poor health among those with higher extrinsic (effort-reward imbalance) or intrinsic (overcommitment) levels of stressful experience at work.

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The effects of effort-reward imbalance and overcommitment were significantly smaller in Russia and Poland than in the remaining countries (p for interaction <0.05). Persons in the highest quartile of the effort-reward ratio had more than three times higher odds of poor health than those in the lowest quartile in Hungary and the Czech Republic. In the other two post-communist countries these odds ratios were smaller than 1.5. Similarly, high overcommitment was associated with higher odds ratios of poor health in Hungary, the Czech Republic, Germany and the UK than in Poland and Russia.

Finally, we tested the hypothesis that the effect of effort-reward imbalance is modified by the level of overcommitment. However, we did not find significant and consistent interactions between these two variables (not shown).

Discussion

This study found associations between work stress, measured by the effort-reward imbalance model, and poor self-rated health in middle-age male and female working populations in all six countries. When comparing four Central and Eastern European countries with two Western European populations, we did not observe a systematic difference in the magnitude of effect between East and West, despite the fact that the samples from Hungary and the Czech Republic exhibited particularly high levels of effort-reward imbalance and its strong effect on poor health. These effects, however, were weaker in Russia and Poland. Increasing odds for poor health with increasing levels of work stress were seen for both the extrinsic (effort-reward ratio) and the intrinsic (overcommitment) components of the model. These findings are in line with previous results in Western countries and with an earlier report from four post-communist countries.[11 37 -41]

The fact that the Russian and Polish data did not fit with our initial assumption of a stronger association of work stress with health in Central and Eastern European countries compared with Western European countries may have several explanations. First, it is possible— although unlikely— that the job composition differed between countries in a way that fewer jobs were experienced as stressful in Poland and Russia. Second, the thresholds of what constitutes a stressful experience may vary as a function of exposure to material deprivation. As material deprivation is clearly more pronounced in Russia and Poland, psychosocial aspects in general may be evaluated as less pertinent than material adversity.[42] Third, the method of data collection may have played a part. Data were collected at home in the three Central and Eastern European countries and in the offices in the Western countries, whereas Russian participants were invited to the clinic for an interview. It is possible that this context reinforced a tendency towards under-reporting stressful experience. However, none of these explanations seems satisfactory, particularly since previous studies, using different data, also found weak or no associations of work stress with health in Poland and Russia. These observations clearly call for further research.[12 14]

Given the cross-sectional design, the temporal direction of the observed association is not entirely clear. Poor health may affect the tendency towards reporting a higher level of work-related stress, although the latter was measured as a rather complex algorithm (effort-reward ratio) which would not be easily understood by the subjects as a measure of work stress. It is

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also possible that unobserved underlying response style (eg, negative effect) may have affected both measures in a systematic way. Although we cannot exclude such reporting bias, at least three reasons suggest that its impact was limited. First, the association of effort-reward imbalance with self-reported health was previously documented in prospective epidemiological studies.[2443] Second, this association remained significant when adjusted for reporting bias as negative affectivity or personality characteristics (such as perceived control).[1118] Third, the measurement of effort-reward imbalance was shown to be stable over time, evaluated in terms of factorial invariance, thus weakening the argument that this measure may mainly reflect characteristics of the respondent at the time of data collection.[44]

As this study used an abbreviated version of the original instrument, single scales or subscales could not be compared across countries. This limitation prevented us from analysing the role of job insecurity and low control over occupational status, including promotion prospects, in more details. This is unfortunate, since there is a high prevalence of job instability and unemployment and a strong association with adverse health in some Central and Eastern European countries, particularly Hungary.[23] When comparing Eastern with Western Europe, it should be stressed that unemployment at the time of data collection was relatively high in several Western countries including Germany. Further analysis of the Heinz Nixdorf Study found that the risk of poor health was highest in the subgroup of employees who had a low occupational status (and unstable jobs) and who exhibited a high level of psychosocial stress at work.[45]

In this study we found no evidence of an interaction between effort-reward ratio and overcommitment. This result is in line with most recent studies testing this hypothesis.[941] There is an emerging consensus that the two components contribute to the higher risk of poor health independently.

The study samples included in the present analyses were recruited from predominantly urban populations. The results therefore cannot be generalised to the whole working populations in the respective countries. In Poland and Russia in particular, working conditions in rural populations differ considerably from urban areas and are unlikely to be appropriately represented in our studies. In the Whitehall II study the participants were mainly white collar government employees so the results cannot be representative for manual workers, although previous comparative studies support the generalisability of the findings of the Whitehall II study.[324647]

These limitations are balanced by several strengths of the study. Most important, the findings document a consistent association between effort-reward imbalance at work and a high degree of work-related overcommitment with poor self-rated health in four post-communist and two Western European countries. To our knowledge, no previous study has documented this association using a valid theoretical model of psychosocial stress at work and collecting data on the basis of an identical study protocol in all six countries. If confirmed by prospective evidence, these findings underline the importance of improving the quality of work and employment by structural measures with a tangible impact at a European level.

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Acknowledgments

The HAPIEE study thanks local collaborators and interviewers in the Czech Republic, Poland and Russia. The Hungarian Epidemiological Panel (HEP) thanks all members of the HEP study team, the network of district nurses and the Median Institute for the home interviews, the National Population Register for the selection of the sample. The Whitehall II study thanks all participating civil service departments and their welfare, personnel and establishment officers; the Occupational Health and Safety Agency; the Council of Civil Service Unions; all participating civil servants in the Whitehall II study; and all members of the Whitehall II study team. The Heinz Nixdorf Recall study thanks the Heinz Nixdorf Foundation (Chairman: Dr jur G Schmidt) for generous support of the Heinz Nixdorf Study. We are indebted to the investigative group and the study personnel, in particular E M Beck, Dr S Moebus, Professor Dr A Stang, U Roggenbuck and U Slomiani.

Funding The HAPIEE study has been funded by grants from the Wellcome Trust (reference numbers 064947/Z/01/Z and 081081/Z/06/Z), the US National Institute on Aging (1R01 AG23522-01) and the MacArthur Foundation. The HEP study was supported by the National Research Fund (OTKA) projects (73754/2008) and the Scientific Committee of Health Sciences (ETT 100/2006). The Whitehall II study has been supported by grants from the Medical Research Council; Economic and Social Research Council; British Heart Foundation; Health and Safety Executive; Department of Health; National Heart Lung and Blood Institute (HL36310), US, NIH: National Institute on Aging (AG13196), US, NIH; Agency for Health Care Policy Research (HS06516); and the John D and Catherine T MacArthur Foundation Research Networks on Successful Midlife Development and Socio-economic Status and Health. The Heinz Nixdorf Recall Study was supported by the German Ministry of Education and Science. Assessment of psychosocial factors and neighbourhood level information is funded by the German Research Council (DFG; Project SI 236/8-1 and SI 236/9-1).

Appendix

Items of the effort-reward imbalance scale

Effort

I have constant time pressure due to a heavy work load.

I have many interruptions and disturbances while performing my job.

Reward

My job promotion prospects are poor.

I have experienced or I expect to experience an undesirable change in my work situation.

My employment security is poor.

Considering all my efforts and achievements, I receive the respect and prestige I deserve at work.

Considering all my efforts and achievements, my job promotion prospects are adequate.

Overcommitment

As soon as I get up in the morning I start thinking about work problems.

When I get home, I can easily relax and “switch off” work.

People close to me say I sacrifice too much for my job.

Work rarely lets me go; it is still on my mind when I go to bed.

If I postpone something that I was supposed to do today I’ll have trouble sleeping at night.

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What is already known on this subject

There is evidence linking psychosocial work stress with poor health in Western societies but little is known about the effect of work stress in the former communist countries. To our knowledge, this is the first study which directly compares the effect of work stress in Western European and post-communist countries.

What this study adds

Effort-reward imbalance at work and overcommitment were associated with poor health in all the six samples. Although there were differences in the magnitude of the effects between countries, there does not seem to be a systematic difference between Eastern and Western European countries. Improvement in the quality of employment may have a major impact on the health of working people in both Eastern and Western Europe.

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Table 1

Demographic characteristics of the study samples

	Czech Republic		Russia		Poland		Hungary		Germany		UK	
	N = 3920	% poor health	N = 4515	% poor health	N = 4181	% poor health	N = 1449	% poor health	N = 1805	% poor health	N = 2624	% poor heal h
Age (years)												
<49	1277	4.9	1309	11.5	1424	4	972	3.9	612	11.1	ND	ND
≥50	2643	6.1	3206	14.2	2757	7.5	477	9	1193	13.1	2624	4.7
p Value (χ^2 test)		0.08		0.02		<0.001		<0.001		0.2		ND
Education												
Primary	235	11.5	208	13.5	179	10.6	186	12.4	93	28	197	8.6
Secondary	2958	5.8	2749	14.9	2230	6.5	966	5.3	1217	12.8	1080	5
University	727	3.2	1558	10.7	1772	5.6	297	2.4	495	8.5	1347	3.9
p Value (χ^2 test)		<0.001		<0.001		0.02		<0.001		<0.001		0.01
Occupation												
Non-manager	2483	6.4	3274	14.4	2475	6.6	1145	6	1222	14.6	175	6.3
Manager	1061	4.1	1161	10.8	1240	4.8	164	2.4	332	8.4	2449	4.6
Self-employed	376	5.1	80	8.8	466	9.0	140	5.7	251	6.8	ND	ND
p Value (χ^2 test)		0.03		0.003		0.004		0.17		<0.001		0.31
Sex												
Male	2017	6.4	2296	8.6	2241	6.2	634	5.4	1065	9.6	2002	4.3
Female	1903	4.9	2219	18.3	1940	6.4	815	5.8	740	16.5	622	6.1
p Value (χ^2 test)		0.04		<0.001		0.82		0.74		<0.001		0.06

ND, no data.

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Table 2

Descriptive statistics of the scales

	Self-rated health			Effort-reward ratio				Overcommitment		
	Mean	**SD**	**Median**	**Mean**	**SD**	**Median**	**Proportion >1 (%)**	**Mean**	**SD**	**Median**
Czech Republic	2.48	0.69	2	0.58	0.52	0.40	11.6	12.10	2.50	12
Russia	2.99	0.54	3	0.37	0.26	0.24	3.1	10.22	3.52	10
Poland	2.47	0.72	2	0.64	0.58	0.44	16.5	11.33	2.81	11
Hungary	2.49	0.71	2	0.67	0.53	0.52	19	11.29	3.24	11
Germany	2.49	0.89	2	0.61	0.31	0.60	8.7	10.82	3.52	11
UK	2.03	0.82	2	0.46	0.26	0.31	3.2	11.18	2.80	11

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Table 3

Odds ratios (OR) and 95% CI or risk of poor health by work characteristics

	Czech Republic	Russia	Poland	Hungary	Germany	UK
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Effort-reward imbalance						
ERI 1 (lowest quartile)	1	1	1	1	1	1
ERI 2	1.58 (0.97 to 2.58)	1 (0.77 to 1.3)	0.98 (0.66 to 1.44)	1.52 (0.7 to 3.27)	1.44 (0.92 to 2.25)	0.93 (0.51 to 1.68)
ERI 3	1.84 (1.14 to 2.98)	1.06 (0.80 to 1.38)	1.19 (0.80 to 1.73)	1.48 (0.67 to 3.28)	1.33 (0.86 to 2.05)	1.03 (0.57 to 1.88)
ERI 4 (highest quartile)	3.64 (2.33 to 5.68)	1.39 (1.08 to 1.8)	1.48 (1.02 to 2.14)	3.84 (1.93 to 7.67)	2.33 (1.55 to 3.49)	2.48 (1.49 to 4.12)
p for trend	<0.001	0.01	0.024	<0.001	<0.001	<0.001
Overcommitment						
OC 1 (lowest quartile)	1	1	1	1	1	1
OC 2	0.72 (0.41 to 1.24)	1.14 (0.89 to 1.46)	0.83 (0.58 to 1.2)	0.93 (0.41 to 2.1)	1.19 (0.75 to 1.87)	1.01 (0.53 to 1.94)
OC 3	1.55 (1.04 to 2.32)	1.14 (0.85 to 1.52)	1.26 (0.85 to 1.86)	1.56 (0.78 to 3.1)	1.72 (1.15 to 2.59)	1.52 (0.86 to 2.67)
OC 4 (highest quartile)	2.93 (2.00 to 4.28)	1.75 (1.35 to 2.26)	1.37 (0.94 to 2.01)	2.38 (1.16 to 4.86)	2.34 (1.57 to 3.5)	2.84 (1.63 to 4.94)
p for trend	<0.001	<0.001	0.01	0.01	<0.001	<0.001

Adjusted for sex, age, educational level and employment grade.