



# Types of employment and health in the European Union



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European Foundation for the Improvement of Living and Working Conditions

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# Foreword

There is an ongoing debate in Europe today about the need to reform and deregulate current labour market policies and at the same time to increase quality of work. One objective of a deregulated labour market is to create greater flexibility for companies, which is seen as a key factor in a changing and competitive economy. But increased labour market flexibility is not without consequences for the workers concerned. A number of previous studies carried out by the Foundation have found that the different types of flexible employment tend to have a worse impact on health than more standard types of employment.

In order to continue to monitor the development of working conditions in Europe, the Foundation has now carried out its third European survey on working conditions. The questionnaire addresses issues connected to the physical, organisational and social work environments, as well as the consequences of work on health.

The objective of this report is to find out, on the basis of the third survey, the relationship between different forms of employment status (permanent, non-permanent and self-employed) and health. This report will also compare findings from the second survey of 1995 to identify trends regarding these issues.

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# Introduction

The globalisation of economic activity, in particular the accelerating internationalisation of trade, investments and finance (Ross, 1990), is increasingly acknowledged as a force that is having a profound impact on material and psychosocial conditions and health throughout developing and developed societies (Howson *et al*, 1998; Unwin *et al*, 1998; Yach and Bettcher, 1998). Economic competition, financial turbulence, technological change, massive restructuring of industry and corporate re-engineering, rooted in political decisions taken by corporations and governments — all are leading to upheavals in the world of work, creating new demands for productivity and adaptability in an increasingly deregulated labour market. Although the relation between globalisation trends and employment is not simple, high levels of structural unemployment persist in most regions of the world.

'Flexibility' in the job market has been proposed as a prerequisite for economic competition and also as a solution to unemployment (European Commission, 1995). Although there is little agreement about what is meant by flexibility, the capacity by employers to ensure labour's rapid adaptation to lowering wages, arduous working conditions or displacement by new technology, including job loss, is typically implied by most definitions. Outstanding among the different types of flexibility has been the growth of 'atypical' employment, underemployment or non-permanent employment and the decline of 'standard' full-time permanent jobs. This means new types of employment and new types of work performance as the result of certain types of part-time work, distant work, home work, family industries, work involving travelling and self-employment (WHO, 1995).

In developing countries, the lack of jobs in the formal sector of the economy has led to the growth of a large informal sector, with largely unrecognised and unrecorded small-scale activities, in which many workers are in low-paid employment operating under unregulated and hazardous working conditions. In developed countries, this process is mainly manifested in the rise of new types of employment with reduced job security, such as home-based work, on-call, contract work, temporary work, telework, freelancing, informal work, apprenticeship contracts, self-employment and part-time work. In Europe, the shift from full-time to part-time contracts accelerated during the 1970s and from part-time to temporary contracts from the beginning of the 1980s (Delsen, 1991), while 'flexible' employment (defined as part-time workers, workers with a temporary contract and self-employed) increased by 15% in the period 1985-1995 (De Grip *et al*, 1997).

It is not easy to interpret which new types of employment may be considered 'precarious' (Amable and Benach, 2000). In fact, although precarious employment is perhaps the most widely used sociological category of flexible employment, this concept has not yet been clearly defined in the public health field.

## **Impact of new types of employment on health**

Three types of evidence suggest that new types of flexible employment may have worse health impacts than permanent employment. First, there is overwhelming evidence that unemployment is strongly associated with mortality and morbidity, harmful lifestyles and reduced quality of life (Bartley, 1994; Dooley *et al*, 1996). Since new forms of work organisation and flexible employment are likely to share some of the unfavourable characteristics of unemployment, it seems plausible that they could also produce adverse effects on health (Benach *et al*, 2000). Thus, the experience

of job insecurity has been associated with psychological ill health, while insecure jobs tend to involve high exposure to work hazards of various kinds (Burchell, 1994; Ferrie, 1999; Robinson, 1986). One study, for example, showed that perceived job security was the single most important indicator of a number of psychological symptoms, such as mild depression (Dooley *et al*, 1987). Self-reported health status tended to deteriorate among workers anticipating job change or job loss in a group of middle-aged white-collar civil servants (Ferrie *et al*, 1995). Downsizing, which can lead to increased job insecurity, has been shown to be a risk to the health of employees. Thus, a significant linear relation between the level of downsizing and long periods of sick leave, due to musculo-skeletal disorders and trauma, has been demonstrated (Vahtera *et al*, 1997). In addition, losing a job may lead to a series of negative health events, even after work has been regained.

Secondly, there is evidence that working conditions of non-permanent workers are worse than those of permanent workers. Thus, those workers in flexible employment are exposed to more hazardous or dangerous work environments. Compared to permanent workers, employees with temporary contracts are much more exposed to poor working conditions (such as vibrations, loud noise, hazardous products or repetitive tasks). Analysis by Letourneux (1998) shows that temporary employees work more often in painful or tiring positions when compared to permanent employees (57% and 42% respectively), are more exposed to intense noise (38% and 29% respectively) and perform repetitive tasks more frequently (46% and 36% respectively). In addition, non-permanent workers have greater demands, lower control over the work process and low rewards — all of which have been associated with adverse health outcomes (Bosma *et al*, 1998).

Finally, previous studies have suggested that different types of flexible employment have worse health impacts than more standard types of employment (Platt *et al*, 1999). For example, at EU level, in comparison to full-time permanent workers, employees with temporary contracts were two times more likely to report job dissatisfaction and other health indicators, even after adjusting for various individual and country-level variables (Benavides and Benach, 1999; Benavides *et al*, 2000). In addition, studies at national level have begun to analyse the effects of precarious work on some health outcomes, suggesting that new types of contracts may be linked to ill health. In Spain and France, for example, temporary workers showed much higher levels of occupational accidents as compared to permanent workers (Durán *et al*, 2001; François, 1993).

It is difficult to analyse this relationship because not only are there many forms of flexible employment that might affect health differently, but there also exists a variety of dynamic forms of employment — ranging on a continuum from unemployment through underemployment to satisfactory employment or even overemployment (as in forced overtime). In addition, the frontier between many types of flexible employment and unemployment is becoming blurred. For example, Burchell (1995) has argued that there may be a vicious cycle in which many unemployed individuals are more likely to have been previously in temporary jobs and many of those temporary jobs, in turn, lead to spells of unemployment. In fact, many workers in ‘flexible’ jobs hold similar labour market characteristics as unemployed people and go themselves through periods of unemployment (USDAL, 1994).

There are a number of potential pathways through which new types of employment might damage health. An analytical model of the relationship between types of employment and health is shown in Figure 1. For example, ‘non-permanent employment’, together with its related insecurity and

instability, may be associated with such health problems as job dissatisfaction and health-related absenteeism. This relationship may be modified, however, by several covariates.

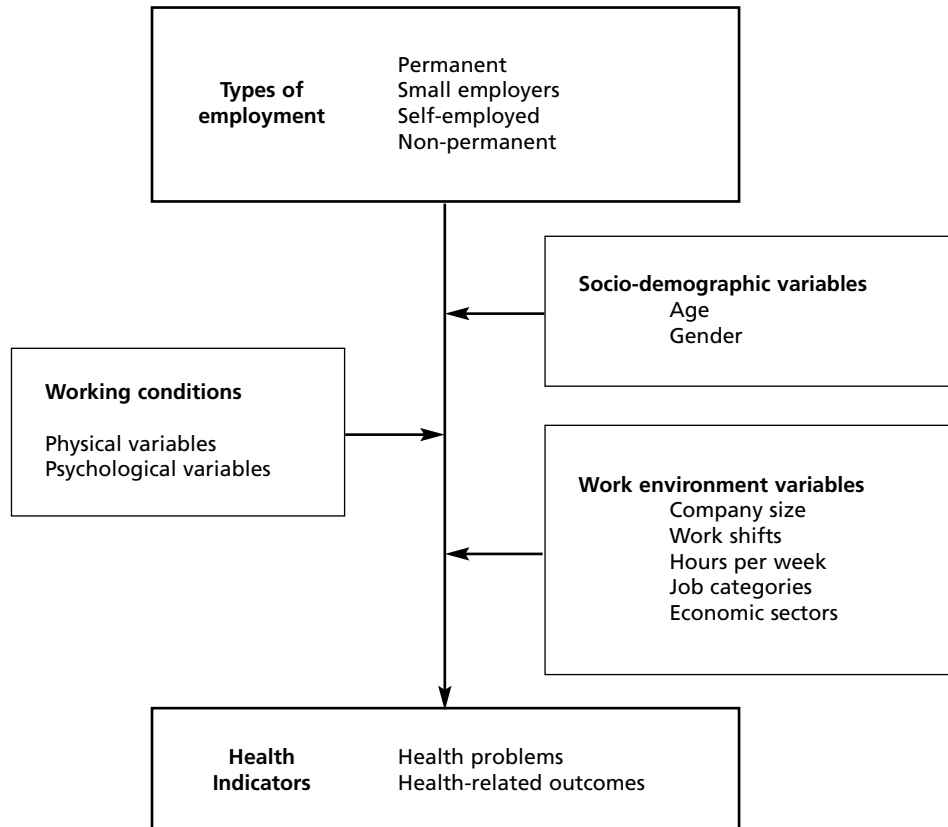
Data from the *Third European survey on working conditions 2000* (Paoli and Merllié, 2001) provides a good source for examining the associations between types of employment and health, as well as for comparing findings with those obtained in the *Second European survey on working conditions 1995* (Paoli and Merllié, 1996). Both surveys have been analysed using similar methods and the same health indicators.

## Hypotheses and objectives of report

Two hypotheses have been investigated in this report, namely:

- that non-permanent employees (temporary and fixed-term employment) report worse health than permanent employees; and
- that there is considerable variation in health among different types of employment and between countries, after taking into account working conditions, work environment and socio-demographic variables (see Figure 1).

**Figure 1 Relationship between types of employment and health**



The three main objectives covered in this report are:

- to assess the overall associations between various types of employment and health indicators, and the role played by potential modifying variables, such as socio-demographic factors, work environment and working conditions;
- to analyse the potential damaging or buffering effects of various social factors at country level; and
- to compare the associations between types of employment and health indicators in the second and third European surveys on working conditions, conducted in 1995 and 2000 respectively.

Cross-sectional design employing individual data was drawn from the *Third European survey on working conditions 2000* (Paoli and Merllié, 2001), conducted in March and April of 2000 — **hereafter referred to as ES2000**. In addition, a multilevel analysis was conducted using contextual data taken from the 15 EU Member States. In ES2000, a representative sample of the total active population (people who were, at the time of the interview, employed or self-employed) was carried out in all 15 EU Member States.

The questionnaire consisted of 68 questions, which covered information on types of contracts, various health indicators and several aspects of working conditions, including the physical environment, psychosocial conditions, design of work stations, working hours, work organisation and social support at work. Details of sampling methods and data collection are provided in Appendix 1.

## Variables

Six health indicators, all of which were dichotomised into two categories, were considered as dependent variables to assess the health of employees. For comparison purposes, the same variables were employed in the analysis of the *Second European survey on working conditions 1995* (Paoli and Merllié, 1996) — **hereafter referred to as ES1995**.

First, three health problems were selected:

Health problems	Categories
■ Fatigue	Yes/No
■ Backache	Yes/No
■ Muscular pains	Yes/No

Secondly, three health-related outcomes were selected:

Health-related outcomes	Categories
■ Stress	Yes/No
■ Job dissatisfaction	Yes/No
■ Health-related absenteeism	Yes/No

The main independent variable investigated was types of employment, which was classified into nine categories according to the same criteria previously defined in the report on ES1995.

### Types of employment (9 categories)

1. Permanent employment, working more than 35 hours per week (full-time)
2. Permanent employment, working between 10 and 35 hours per week (part-time)
3. Self-employed, working more than 35 hours per week (full-time)
4. Self-employed, working between 10 and 35 hours per week (part-time)
5. Small employers, employing between 1 and 9 people
6. Fixed-term employment, working more than 35 hours per week (full-time)
7. Fixed-term employment, working between 10 and 35 hours per week (part-time)
8. Temporary employment, working more than 35 hours per week (full-time)
9. Temporary employment, working between 10 and 35 hours per week (part-time)

The first category (permanent employment, working more than 35 hours per week) was always employed as the reference category.

In addition, due to their small numbers, these nine categories were merged and stratified analyses were conducted employing only four categories, as follows:

### Types of employment (4 categories)

- Permanent employment (include categories 1 and 2)
- Self-employed (include categories 3 and 4)
- Small employers (category 5)
- Non-permanent employment (include categories 6, 7, 8 and 9)

The last type of employment (including both part-time and full-time fixed-term and temporary employment) was defined as 'non-permanent employment'. The first category (permanent employment, including both part-time and full-time) was always taken as the reference category in all analyses.

At the individual level, three groups of covariates were considered — socio-demographic, work environment and working conditions.

First, two socio-demographic variables were selected:

<b>Socio-demographic variables</b>	<b>Categories</b>
■ Age	15-24/25-34/35-44/45-54/55 or over
■ Gender	Male/Female

Secondly, five work environment variables were selected:

<b>Work environment variables</b>	<b>Categories</b>
■ Company size	less than 10 workers/10-499/500 or over
■ Work shifts	Yes/No
■ Hours worked per week	35 or less/more than 35
■ Job categories	10 categories
■ Economic sectors	11 categories

Thirdly, two different types of working conditions variables were selected — physical and psychosocial. All six physical variables were dichotomised as follows:

<b>Physical variables</b>	<b>Categories</b>
■ Vibrations	Yes/No
■ Noise too loud	Yes/No
■ Extreme temperatures	Yes/No
■ Breathing vapours and fumes	Yes/No
■ Repetitive hand or arm movements	Yes/No
■ Short repetitive tasks	Yes/No

Finally, three psychosocial variables were selected:

<b>Psychosocial variables</b>	<b>Categories</b>
■ Control	High/Medium/Low
■ Demand	Low/Medium/High
■ Social support	Yes/No

In the multilevel analysis, information was included on four contextual variables at country level obtained from Eurostat (2000). Four variables were chosen as contextual indicators at country level for each of the 15 EU Member States — unemployment % (annual average rate), temporary contracts (% of temporary contracts out of the total number of contracts), social protection benefits (expenditure on social protection at current prices as a percentage of GDP) and Gross Domestic Product (GDP at market prices per head/Purchasing Power Parity or PPP).

<b>Country variables</b>	<b>Categories</b>
■ Unemployment (1998)	%
■ Temporary contracts (1998)	%
■ Social protection benefits (1996)	%
■ GDP (1998)	%

All participants were linked to their corresponding country-level variables. A total of 3,847 people were excluded due to the lack of some individual-level data. Therefore, this analysis was conducted in a database with 15,558 people. Details of how the variables were built are given in Appendix 1. All the variables used in this study were summarised by level of analysis as follows:

### Summary of measures

<b>Health indicators</b>	<b>Types of employment</b>		<b>Variables at individual level</b>	<b>Variables at country level</b>
Job dissatisfaction	Permanent	full-time	Age	Unemployment % Temporary contracts Social protection GDP
Health-related absenteeism		part-time	Gender	
Stress	Self-employed	full-time	Company size	
Fatigue		part-time	Work shifts	
Backache	Fixed-term	full-time	Hours worked per week	
Muscular pains		part-time	Vibrations	
	Temporary	full-time	Noise too loud	
		part-time	Extreme temperatures	
	Small employers		Breathing in vapours and fumes	
			Short repetitive tasks	
			Repetitive movements	
			Psychosocial demand	
			Psychosocial control	
			Social support at work	
		Job categories		
		Economic sectors		



### Statistical analysis

The six selected health indicators have been analysed using a number of epidemiological and statistical measures.

A description of the distribution of all variables is presented using absolute figures and percentages. Bivariant analyses, using absolute numbers, percentages and crude odds ratios (OR) with confidence intervals (CI) at 95%, have been carried out to assess the relationship between types of employment and each of the health indicators selected. Two-tailed tests with alpha level of less than 0.05 were used to define statistical significance.

Odds ratios (OR) are a common and useful measure that allow the assessment of the association between an event (such as dissatisfaction) in a group of workers (such as temporary employment) as compared to the occurrence of the same event in another group of workers (such as permanent employment) used as a reference category or baseline. This association may also be expressed as a relative difference of risk. For example, an OR of 2 would simply mean that temporary employment has two times more risk of reporting dissatisfaction as compared to permanent employment. In contrast, an OR of 0.70 would mean that temporary employment would be 30% (1-0.70) less likely to report dissatisfaction in comparison to permanent employment, which is our category of reference.

Confidence intervals (CI) are often employed as a means of assessing the statistical significance level. The confidence limit is the range of values for the effect estimate within which the true effect is thought to lie, with the specified level of confidence (95% in this report). An OR is statistically significant if the unit (1) is not included in the interval. For instance, in the previous example, where OR = 2, if the CI is between 1.5 and 2.5, this would mean that it is not likely that the difference between temporary and permanent employment is due to chance.

Logistic regression models allowed us to determine whether there were significant associations between nine or four types of employment used as independent variables and each of the six health indicators taken as dependent variables. The effects of socio-demographic, work environment and working conditions variables on the relationships between types of employment and health indicators are assessed by taking them into account in the regression models. Details are provided in Appendix 1.

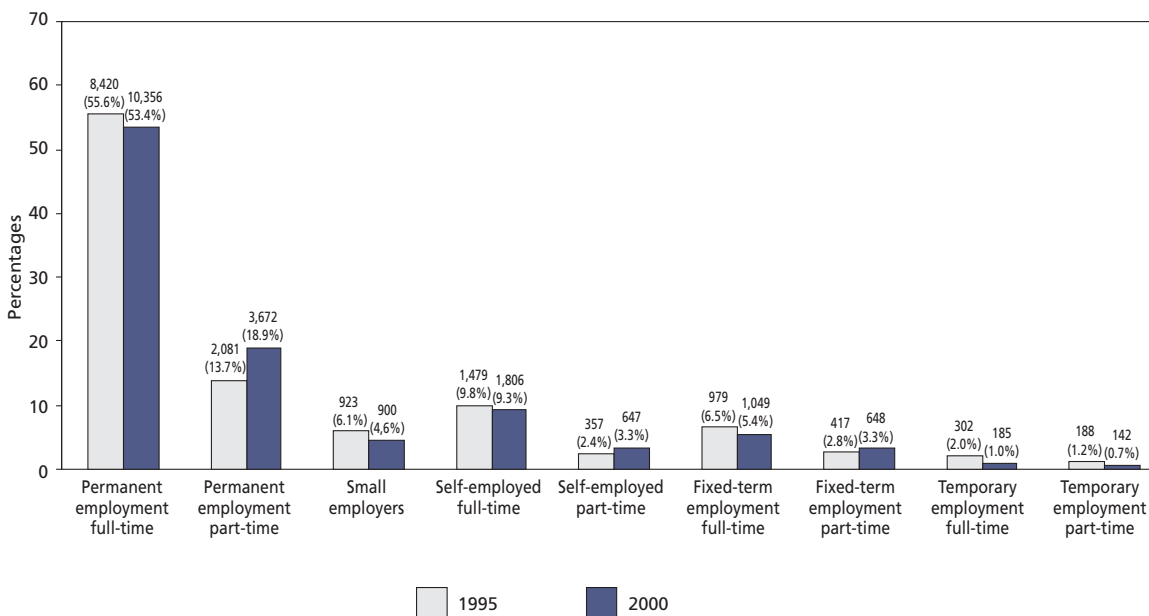
With regard to the multilevel analysis, exploratory analyses were initially used to investigate the relationship between each health indicator and the contextual variables. Multilevel analysis is a technique that allows the integration of individual and group (also called ecological or contextual) variables and explains these relationships and interactions across levels (Diez-Roux, 1998).

Figure 24 (see page 55) shows health indicators in non-permanent employment compared with permanent employment before and after adjustment for individual-level variables (age and gender) and for country-level variables (unemployment, social protection benefits, GDP and temporary contracts).

## Variables

The distribution of types of employment for nine and four categories comparing ES1995 and ES2000 is shown in Figures 2 and 3. For ES2000, those employed with full-time permanent employment represented 53.4% of all jobs, while part-time permanent employment accounted for almost 19% (see Figure 2); small employers were only 4.6%, self-employed (full- and part-time together) were 12.6% and workers with non-permanent employment (fixed-term and temporary employment) represented about 10.4% (see Figure 3). Although the results of both surveys were similar, an increase in part-time permanent employment was observed (13.7% in ES1995 compared to 18.9% in ES2000).

**Figure 2 Distribution by types of employment (9 categories) in ES1995 and ES2000**



The distribution of health indicators comparing ES1995 and ES2000 is presented in Figure 4. In ES2000, almost 15% of the workers interviewed were dissatisfied and 13.4% reported health-related absenteeism in their job in the last year. The prevalence of the other four health indicators ranged from almost 22% for fatigue to almost 32% for backache. In comparing the two surveys, two main points should be noted:

- there was a slight but consistent increase in all health indicators, except for muscular pains where the increment was much stronger (18.6% in ES1995 compared to 30.8% in ES2000); and
- there was a strong decrease in absenteeism (23.3% in ES1995 compared to 13.4% in ES2000).

Nevertheless, as mentioned in Chapter 1 on *Methodology*, dissatisfaction, absenteeism and muscular pains were built differently in the two surveys. In ES2000, for example, results for muscular pains were stratified by shoulder and neck (25.2%), upper limbs (14.4%) and lower limbs (12.7%).

Figure 3 Distribution by types of employment (4 categories) in ES1995 and ES2000

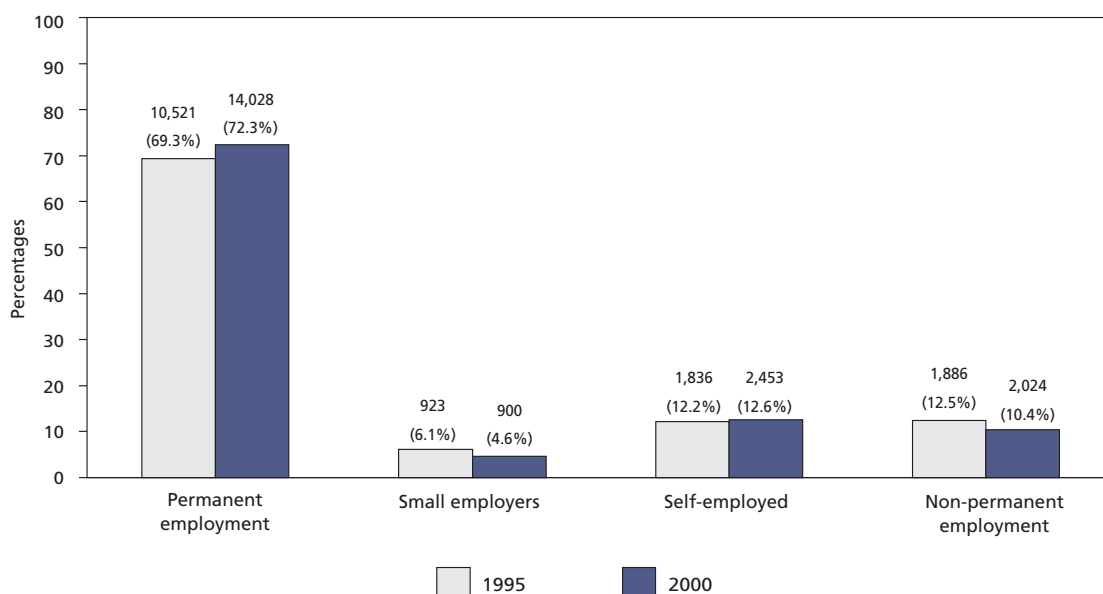
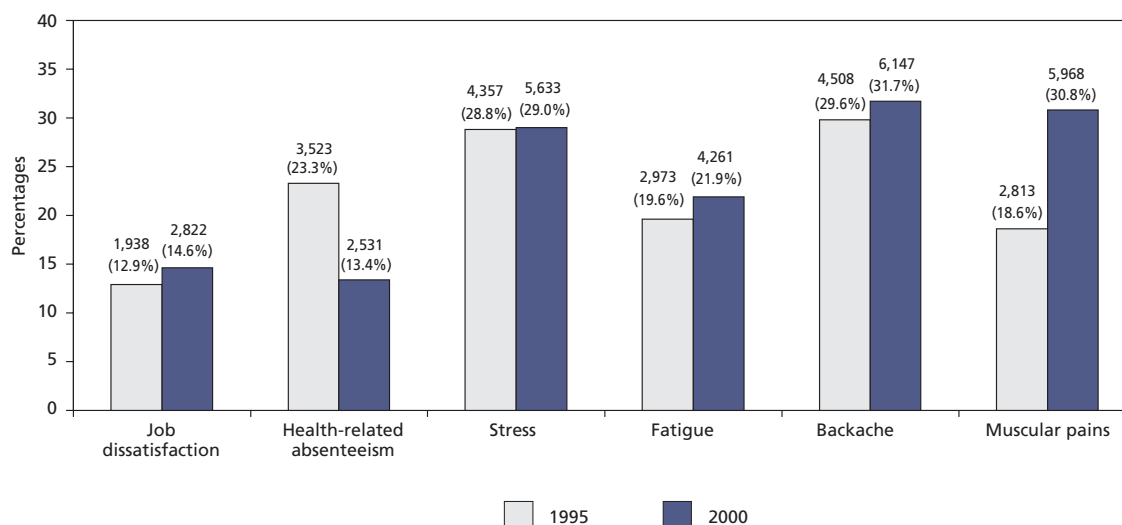


Figure 4 Distribution by health indicators in ES1995 and ES2000

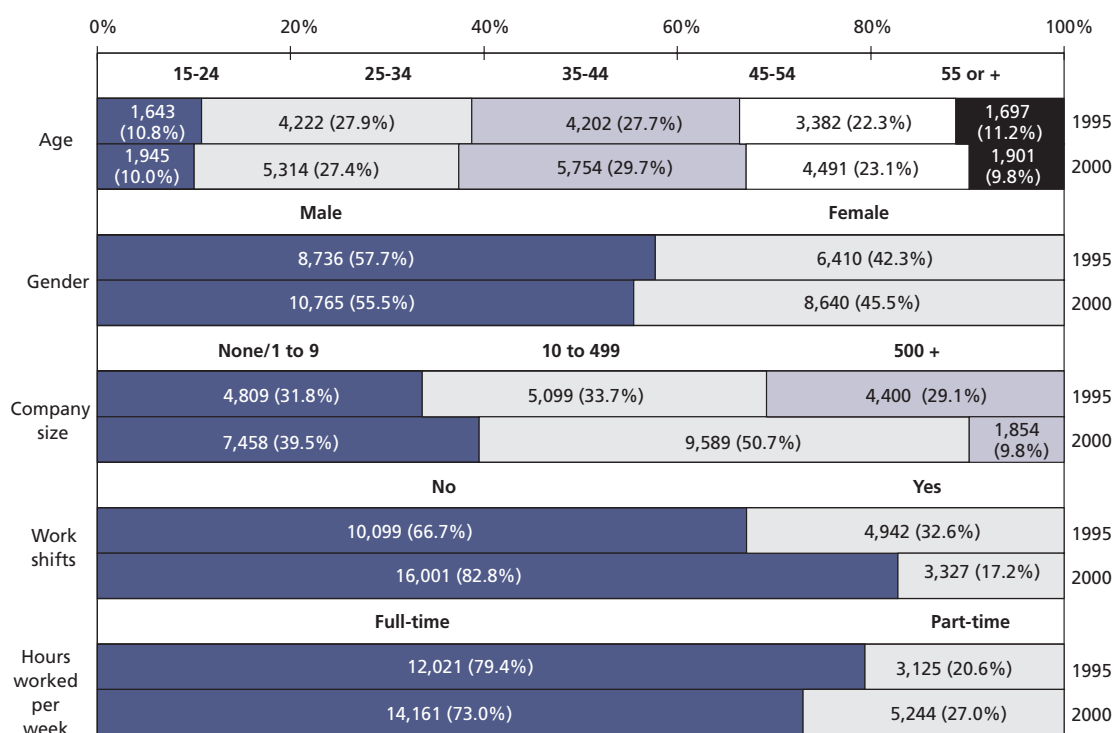


The distribution of variables which may confound the possible relationships between independent and dependent variables is shown in Figures 5 to 7. With regard to socio-demographic variables, in ES2000 37.4% were young workers (less than 35 years of age), almost 10% were workers aged 55 or over, and almost 55.5% represented male workers of the total sampled workforce (see Figure 5). On the other hand, more than 90% of the companies studied had less than 500 workers, about 17% of the workers reported work shifts, and 27% were in part-time employment. The main differences between ES1995 and ES2000 were:

- a strong increase in the number of companies with less than 500 workers (65.5% in ES1995 compared to 90.2% in ES2000);

- an increase in part-time hours worked per week (20.6% compared to 27.0%); and
- a strong reduction in work shifts (32.6% compared to 17.2%), although this variable was built differently in the two surveys.

**Figure 5 Distribution by socio-demographic variables, company size, work shifts and hours worked per week in ES1995 and ES2000**



Data on physical variables is shown in Figure 6. Prevalence of physical variables in ES2000 ranged from 10.9% for extreme temperatures to 59% for repetitive hand or arm movements. Two significant differences were observed between ES1995 and ES2000:

- a strong decrease in the workers exposed to extreme temperatures (31.4% in ES1995 compared to 10.9% in ES2000); and
- a strong increase in repetitive short tasks (36.7% compared to 49.4%). This variable was exactly the same in the two surveys (*see Appendix 1*).

The distribution by psychosocial variables is shown in Figure 7. Almost one-third of the workforce reported 'low control' (32.5%); 'high demand' was reported by 23.3% and 13.6% of workers reported a lack of social support. The main differences between ES1995 and ES2000 included an increase in 'low control' and 'lack of social support', and a slight decrease in 'high demand'. However, these results might be caused by different constructions of 'demand' and 'control' variables in the two surveys.

Figure 6 Distribution by physical variables in ES1995 and ES2000

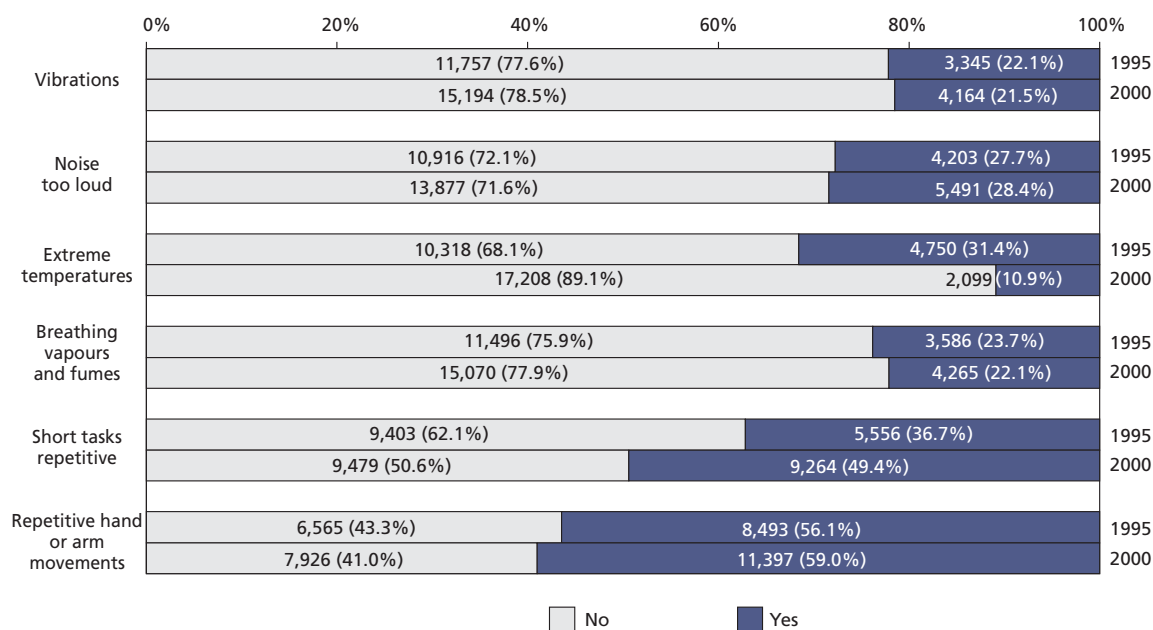
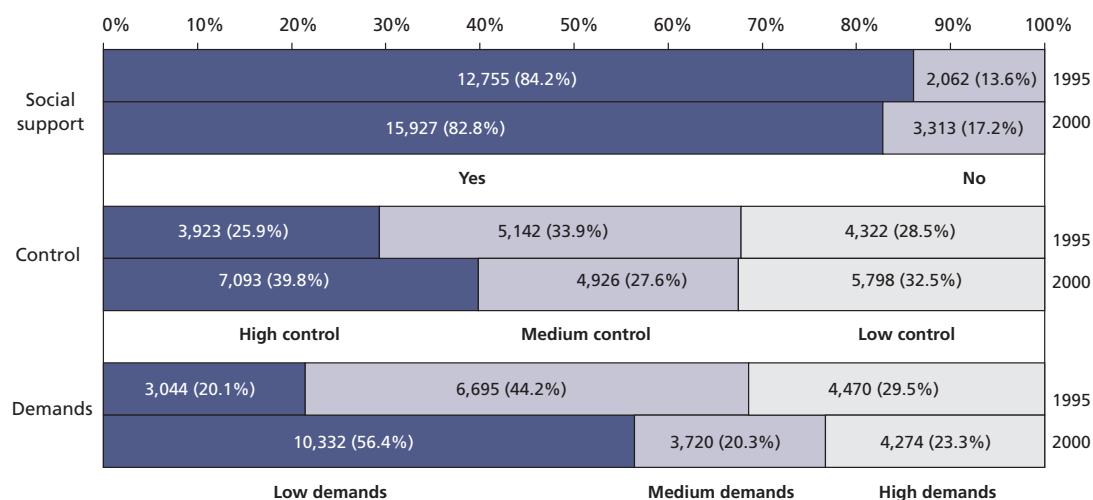
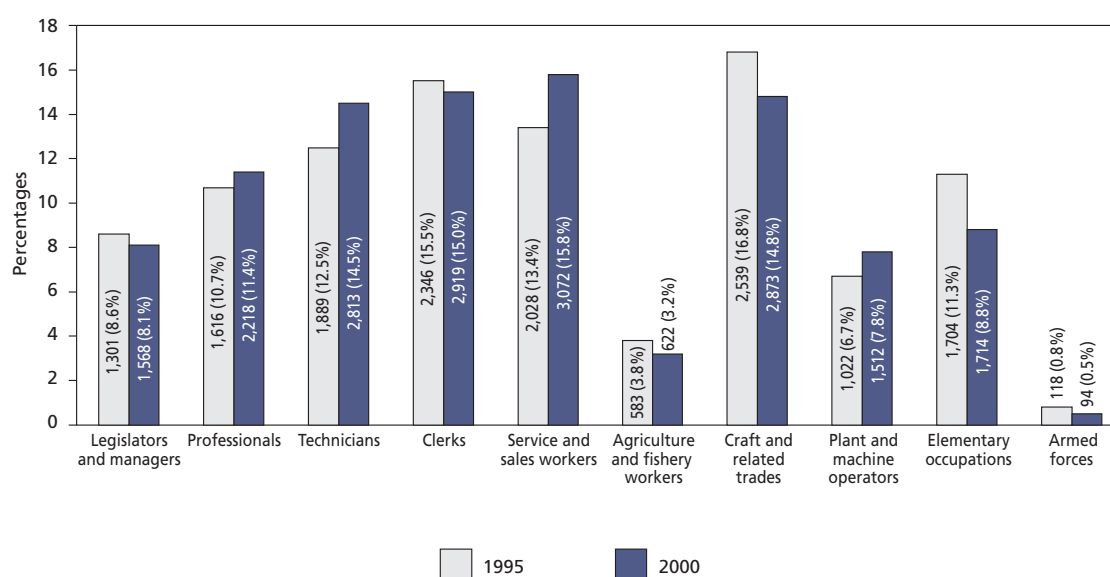


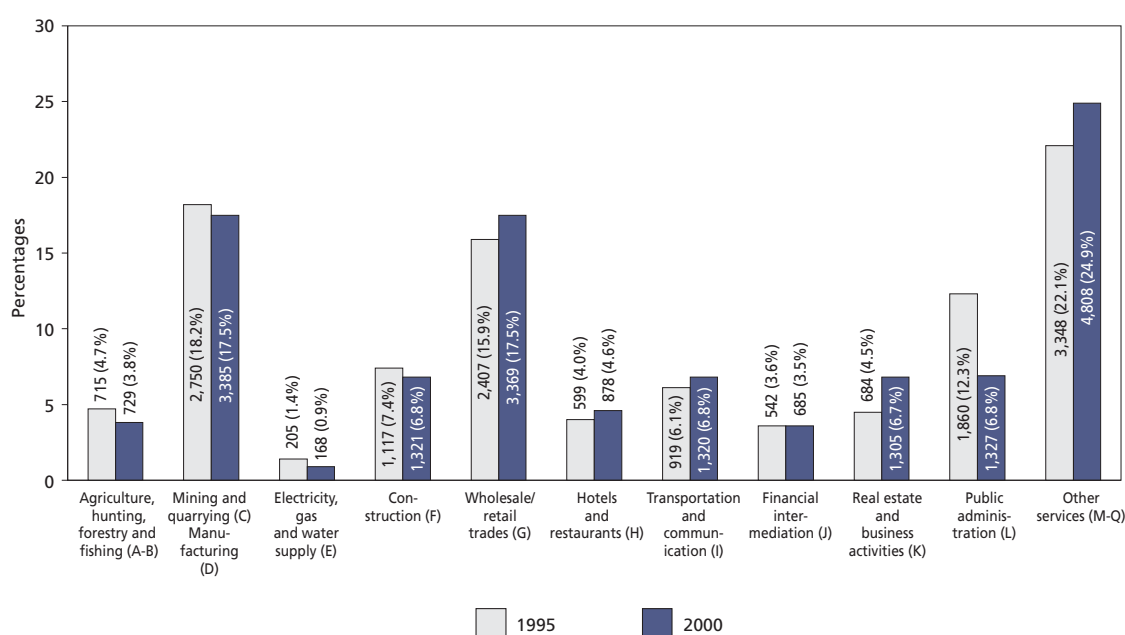
Figure 7 Distribution by psychosocial variables in ES1995 and ES2000



Regarding the variable of job categories used in the stratified analysis, Figure 8 shows that in ES2000 (much as in ES1995) craft and related trades workers, clerks, service and sales workers, and technicians accounted for the highest percentages of the workforce (60.1% in ES2000 compared to 58.2% in ES1995). Elementary occupations, plant and machine operators, and agriculture and fishery workers accounted for 19.8%, while legislators and managers, and professionals were 19.5%. The main difference between the two surveys was a reduction in the percentage of elementary occupations (11.3% in ES1995 compared to 8.8% in ES2000).

**Figure 8 Distribution by job categories in ES1995 and ES2000**

Regarding the variable of economic sectors, Figure 9 shows that in ES2000 other services (24.9%), wholesale and retail trades/repairs (17.5%), and public administration (6.8%) accounted for almost half of the total distribution by economic sector. Mining, quarrying and manufacturing were 17.5%, while the rest of the economic sectors showed much lower percentages. The most significant change between the two surveys was a reduction in the number of workers in public administration (12.3% in ES1995 compared to 6.8% in ES2000).

**Figure 9 Distribution by economic sectors in ES1995 and ES2000**

## Health indicators

**Please note that all figures referred to in this section are contained in Appendix 2.**

The distribution of health indicators by types of employment is shown in Table 1. The associations (crude ORs and 95% CI) between types of employment (nine and four categories) and health indicators are shown in Figures 10 and 11 respectively (*see Appendix 2*). Age-adjusted association between types of employment and health, comparing ES1995 and ES2000 for four types of employment by gender, are shown in Figures 12 and 13 (*see Appendix 2*).

Overall, the distribution of each health indicator by nine categories of employment shows some interesting results (*see Table 1*). Firstly, for all types of employment except self-employed, full-time workers usually reported worse health compared to part-time workers. Secondly, two other patterns were observed: (a) small employers and self-employed showed high levels in almost all health indicators (an exception is low job dissatisfaction among small employers), but levels of absenteeism were very low; and (b) non-permanent workers, especially those with temporary employment, were highly dissatisfied, but their level of stress was low. Patterns in ES2000 were consistent with those reported in ES1995.

**Table 1 Distribution of health indicators (frequencies and percentages) by types of employment in ES2000**

Health indicators	Job dissatisfaction		Health-related absenteeism		Stress		Fatigue		Backache		Muscular pains	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<b>Types of employment</b>												
<b>Permanent employment</b>	1,888	13.6	2,028	14.8	4,099	29.2	2,785	19.9	4,348	31.0	4,245	30.3
full-time	1,446	14.1	1,559	15.4	3,132	30.2	2,131	20.6	3,274	31.6	3,217	31.1
part-time	442	12.1	469	13.1	967	26.3	654	17.8	1,074	29.2	1,028	28.0
<b>Small employers</b>	74	8.3	75	8.7	303	33.7	243	27.0	290	32.2	273	30.3
<b>Self-employed</b>	452	18.5	183	7.7	746	30.4	798	32.5	884	36.0	833	34.0
full-time	310	17.3	141	8.0	755	30.7	563	31.2	648	25.9	605	33.5
part-time	142	22.0	42	6.7	191	29.5	235	36.3	236	36.5	228	35.2
<b>Non-permanent employment</b>	409	20.3	245	12.3	481	23.8	429	21.2	620	30.6	618	30.5
Fixed-term, full-time	221	21.2	140	13.7	269	25.6	262	25.0	347	33.1	352	33.6
Fixed-term, part-time	111	17.3	64	10.0	157	24.2	107	16.5	189	29.2	177	22.3
Temporary, full-time	41	22.4	30	16.3	32	17.3	40	21.6	53	28.6	55	29.7
Temporary, part-time	36	25.4	11	8.0	23	16.2	20	14.1	31	21.8	34	23.9
<b>Total</b>	<b>2,823</b>	<b>14.6</b>	<b>2,531</b>	<b>13.4</b>	<b>5,629</b>	<b>29.0</b>	<b>4,255</b>	<b>21.9</b>	<b>6,142</b>	<b>31.7</b>	<b>5,969</b>	<b>30.8</b>

### Job dissatisfaction

Similar to the findings reported in ES1995, the results of ES2000 (*see Table 1*) show that small employers and permanent employment had the lowest percentages of job dissatisfaction (8.3% and 13.6% respectively), while non-permanent employment and self-employed showed high percentages (20.3% and 18.5% respectively). Temporary employment had the highest percentages of all (between 22.4 and 25.4%).

The probability of being dissatisfied among temporary part-time workers was higher (OR = 2.08; 95% CI 1.42-3.04) than among full-time permanent employment. In contrast, this probability was 16% lower among small employers (OR = 0.84; 95% CI between 0.75 and 0.94) than for full-time

permanent employment (see Figure 10). The other categories of employment were significantly more dissatisfied than full-time and part-time permanent workers. These differences were statistically significant since the unit was not included within the confidence intervals.

The comparison between ES1995 and ES2000 showed a reduction in dissatisfaction among self-employed and non-permanent employment (see Figure 11), while small employers were less dissatisfied (OR = 0.95 in ES1995 compared to OR = 0.58 in ES2000). By and large, age-adjusted results by gender showed similar trends (see Figures 12 and 13). However, while in ES1995 men in non-permanent employment and women who were self-employed were more dissatisfied, those differences decreased in ES2000.

### Health-related absenteeism

With regard to health-related absenteeism, in ES2000 full-time temporary employment (16.3%) and full-time permanent employment (15.4%) showed the highest levels (see Table 1). In contrast, part-time and full-time self-employed (6.7% and 8.0% respectively) and part-time temporary employment (8.0%) showed the lowest percentages. These findings were similar to those reported in ES1995.

When eight types of employment were compared to full-time permanent employment (see Figure 10), only full-time fixed and temporary employment showed similar levels of health-related absenteeism. Small employers, part-time and full-time self-employed, part-time fixed-term employment and part-time temporary employment all showed a lower probability of reporting absenteeism, with ORs ranging from 0.39 to 0.61. For example, part-time self-employed had a 61% less probability to report absenteeism as compared to full-time permanent employment (OR = 0.39 and 95% CI ranging from 0.29 to 0.54). Examining four types of employment, the results show that self-employed, small employers and non-permanent employment had less absenteeism compared to permanent employment (see Figure 11). After adjusting for age, results were similar for both men (except in the case of non-permanent employment) and women (see Figures 12 and 13 respectively).

### Stress

Similar to the findings reported in ES1995, in ES2000 small employers and self-employed showed the highest percentages of stress (33.7% and 30.4% respectively), as shown in Table 1. In contrast, part-time and full-time temporary employment had the lowest percentages (16.2% and 17.3% respectively).

Figure 10 shows a barely statistically significant positive association between stress and small employers, which had 17% more risk of reporting stress (OR = 1.17 and 95% CI ranging from 1.01 to 1.35) compared to full-time permanent employment. On the other hand, the lowest probabilities were found among non-permanent workers, and especially temporary employment, with ORs ranging from 0.45 to 0.80. For four types of employment, in ES2000 small employers reported a significant 23% higher probability of reporting stress, while self-employed showed a similar probability and non-permanent employment a significant 34% lower probability (see Figure 11). These findings were similar to those reported in ES1995. After adjusting for age, results were almost similar for both genders (see Figures 12 and 13).



### Fatigue

Table 1 shows that the highest percentages of fatigue were shown by self-employed (32.5%) and small employers (27.0%); full-time fixed-term employment and full-time temporary employment also showed high percentages (25.0% and 21.6% respectively). In contrast, except in the case of self-employed, part-time employment showed the lowest percentages of all — 14.1% for temporary employment, 16.5% for fixed-term employment and 17.8% for permanent employment.

Small employers, self-employed and full-time fixed-term employment showed significant high levels of fatigue compared to full-time permanent employment (see Figure 10). For example, part-time self-employed were 2.2 times more likely to report fatigue (OR = 2.20; 95% CI ranging from 1.86 to 2.60). Comparison of the two surveys showed an increase in the risk of fatigue in self-employed (OR = 1.64 in ES1995 compared to OR = 1.95 in ES2000) and a reduction in non-permanent employment (OR = 1.25 in ES1995 compared to OR = 1.09 in ES2000) (see Figure 11). By and large, age-adjusted results by gender showed similar results (see Figures 12 and 13), with the exception of small employers. For men, there was a decrease of fatigue (OR = 1.64 in ES1995 compared to OR = 1.32 in ES2000), while for women the risk of fatigue increased (OR = 1.55 in ES1995 compared to OR = 1.98 in ES2000).

### Backache

Part-time self-employed (36.5%), full-time fixed-term (33.1%), permanent (31.6%) and small employers (32.2%) reported higher levels of backache (see Table 1). In contrast, part-time temporary employment (21.8%) had low levels of this health indicator.

Figure 10 shows that, as compared to full-time permanent employment, positive significant associations were found among part-time self-employed (OR = 1.24) and full-time self-employed (OR = 1.21), while part-time temporary employment and part-time permanent employment reported a statistically significant lower risk of backache (OR = 0.60 and OR = 0.89 respectively).

The comparison between the two surveys showed similar results (see Figure 11). By and large, age-adjusted results by gender showed similar patterns (see Figures 12 and 13). However, an exception was found in the case of small employers. While for men there was a slight decrease of backache (OR = 1.15 in ES1995 compared to OR = 0.96 in ES2000), for women the risk of backache seemed to increase (OR = 1.06 in ES1995 compared to OR = 1.32 in ES2000).

### Muscular pains

For muscular pains, Table 1 shows how self-employed (34.0%) and full-time fixed-term employment show the highest percentages of all (33.6%). In contrast, part-time fixed-term (22.3%) and temporary employment (23.9%) show the lowest percentages.

The self-employed had more risk of reporting muscular pains when compared to full-time permanent employment (see Figure 10). For example, part-time self-employed were 21% more likely to report muscular pains (OR = 1.21; 95% CI ranging from 1.02 to 1.43). In contrast, part-time temporary employment had 30% lower risk (OR = 0.70; 95% CI ranging from 0.47 to 1.03).

The comparison between ES1995 and ES2000 shows a decrease in the risk of reporting muscular pains in all types of employment (see Figure 11). Similarly, age-adjusted results by gender show a

decrease of risk in both men and women (see Figures 12 and 13). However, as already mentioned, it is important to note that this variable was built differently in both surveys.

### Covariates

The assessment of whether there was a significant association between each of the covariates and each health indicator can be seen in Tables 2 and 3. Most variables show some positive associations with health. Age was mainly associated with stress, gender with muscular pains and dissatisfaction, company size with absenteeism and stress, and work shifts with health. In contrast, hours per week was negatively associated with health (see Table 2).

**Table 2 Association (crude OR and 95% CI) between socio-demographic and work environment variables and health indicators in ES2000**

Health indicators	Job dissatisfaction	Health-related absenteeism	Stress	Fatigue	Backache	Muscular pains
Covariates (baseline)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
<b>Age (15-24)</b>	1	1	1	1	1	1
25-34	1.05 (0.90-1.21)	0.99 (0.85-1.17)	1.85 (1.63-2.11)	1.25 (1.09-1.42)	1.17 (1.04-1.31)	1.14 (1.10-1.28)
35-44	0.91 (0.78-1.05)	1.15 (0.98-1.34)	2.09 (1.84-2.37)	1.32 (1.16-1.51)	1.28 (1.14-1.43)	1.33 (1.18-1.49)
45-54	0.91 (0.79-1.06)	1.05 (0.89-1.23)	1.96 (1.72-2.23)	1.30 (1.13-1.49)	1.25 (1.11-1.41)	1.46 (1.30-1.65)
55 and over	1.01 (0.85-1.21)	0.98 (0.81-1.18)	1.41 (1.20-1.64)	1.37 (1.17-1.61)	1.27 (1.11-1.46)	1.37 (1.19-1.58)
<b>Gender (Men)</b>	1	1	1	1	1	1
Women	0.88 (0.81-0.95)	0.89 (0.82-0.97)	1.04 (0.98-1.11)	0.93 (0.87-0.99)	0.99 (0.93-1.05)	1.20 (1.13-1.27)
<b>Company size (none/1 to 9)</b>	1	1	1	1	1	1
10 to 499	0.96 (0.88-1.05)	1.51 (1.38-1.66)	1.19 (1.12-1.28)	0.77 (0.72-0.83)	0.98 (0.92-1.05)	1.02 (0.95-1.09)
500 and over	1.00 (0.87-1.16)	1.67 (1.44-1.93)	1.45 (1.39-1.61)	0.92 (0.82-1.04)	0.99 (0.88-1.09)	1.02 (0.92-1.14)
<b>Hours per week (full-time)</b>	1	1	1	1	1	1
Part-time	0.97 (0.88-1.06)	0.81 (0.73-0.89)	0.85 (0.79-0.91)	0.88 (0.82-0.96)	0.92 (0.86-0.98)	0.89 (0.83-0.95)
<b>Work shifts (No)</b>	1	1	1	1	1	1
Yes	1.52 (1.38-1.68)	1.66 (1.50-1.83)	1.40 (1.30-1.52)	1.50 (1.37-1.63)	1.48 (1.37-1.60)	1.29 (1.20-1.40)

OR = odds ratio; 95% CI = confidence interval

**Note:** All odds ratios (OR) are compared to the specific reference category (i.e. 1). For example, in the case of work shifts, an OR of 1.50 for fatigue simply means that workers under this risk factor have 50% more risk to report fatigue compared to non-exposed workers, which are the reference category.

Similar to the results of ES1995, other working conditions variables showed a significant risk increase in all health indicators (see Table 3).

### Job categories

The distribution for each health indicator by job category in ES2000 shows some consistent patterns (see Table 4) and the results obtained are similar when compared to those of ES1995. Health indicators showed a worsening situation among agriculture and fishery workers (27.3% for dissatisfaction, 42.1% for fatigue, 54.5% for backache and 46.6% for muscular pains) and craft and related trades workers (18.3% for health-related absenteeism, 25.7% for fatigue, 43.2% for backache and 40.2% for muscular pains). In contrast, legislators and managers, and professionals reported low levels in most health indicators. Two exceptions, however, were stress (34.8%) and

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fatigue (25.4%) for legislators and managers, and stress (39.8%) for professionals. Due to the very small number of persons, results for the armed forces were negligible.

**Table 3 Association (crude OR and 95% CI) between working conditions variables and health indicators in ES2000**

Health indicators	Job dissatisfaction	Health-related absenteeism	Stress	Fatigue	Backache	Muscular pains
<b>Covariates (baseline)</b>	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
<b>Vibrations (No)</b>	1	1	1	1	1	1
Yes	1.80 (1.65-1.97)	1.97 (1.80-2.16)	1.01 (0.94-1.09)	1.88 (1.74-2.03)	2.50 (2.33-2.69)	2.26 (2.12-2.43)
<b>Noise too loud (No)</b>	1	1	1	1	1	1
Yes	1.87 (1.72-2.03)	2.30 (2.11-2.51)	1.36 (1.27-1.46)	1.95 (1.81-2.09)	2.37 (2.22-2.53)	2.21 (2.07-2.36)
<b>Extreme temperatures (No)</b>	1	1	1	1	1	1
Yes	2.63 (2.37-2.92)	2.31 (2.06-2.58)	1.73 (1.58-1.90)	2.81 (2.56-3.09)	3.04 (2.78-3.33)	2.80 (2.56-3.07)
<b>Breathing vapours (No)</b>	1	1	1	1	1	1
Yes	2.29 (2.10-2.50)	2.16 (1.98-2.37)	1.50 (1.40-1.62)	2.39 (2.21-2.57)	2.91 (2.72-3.13)	2.75 (2.56-2.95)
<b>Short repetitive tasks (No)</b>	1	1	1	1	1	1
Yes	1.69 (1.56-1.84)	1.57 (1.44-1.71)	1.25 (1.18-1.33)	1.67 (1.55-1.79)	1.92 (1.80-2.04)	2.03 (1.91-2.17)
<b>Repetitive movements (No)</b>	1	1	1	1	1	1
Yes	1.72 (1.58-1.87)	1.93 (1.76-2.11)	1.31 (1.23-1.40)	1.77 (1.65-1.90)	3.00 (2.81-3.02)	3.67 (3.42-3.94)
<b>Social support (Yes)</b>	1	1	1	1	1	1
No	1.94 (1.77-2.13)	0.81 (0.72-0.91)	1.03 (0.95-1.12)	1.58 (1.46-1.73)	1.15 (1.06-1.24)	1.03 (0.95-1.12)
<b>Control (High control)</b>	1	1	1	1	1	1
Medium control	2.13 (1.89-2.41)	1.41 (1.26-1.58)	1.09 (1.01-1.18)	1.44 (1.32-1.58)	1.42 (1.31-1.54)	1.27 (1.18-1.38)
Low control	4.41 (3.95-4.91)	1.62 (1.46-1.80)	1.00 (0.93-1.08)	1.69 (1.56-1.84)	1.66 (1.54-1.79)	1.42 (1.31-1.53)
<b>Demand (Low demand)</b>	1	1	1	1	1	1
Medium demand	1.74 (1.56-1.96)	1.94 (1.72-2.17)	1.89 (1.74-2.06)	1.90 (1.73-2.08)	2.48 (2.28-2.69)	2.51 (2.31-2.73)
High demand	4.02 (3.66-4.42)	3.60 (3.25-3.98)	3.10 (2.87-3.34)	3.43 (3.16-3.73)	5.44 (5.04-5.89)	5.22 (4.83-5.64)

OR = odds ratio; 95% CI = confidence interval

**Table 4 Distribution of health indicators (frequencies and percentages) by job category in ES2000**

Health indicators	Job dissatisfaction		Health-related absenteeism		Stress		Fatigue		Backache		Muscular pains	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Legislators and managers	152	9.7	121	7.8	545	34.8	399	25.4	332	21.2	355	22.6
Professionals	216	9.8	220	10.1	883	39.8	493	22.2	484	21.8	515	23.2
Technicians	276	9.9	328	12.0	954	33.9	505	18.0	790	28.1	779	27.7
Clerks	365	12.6	289	10.1	800	27.4	455	15.6	684	23.4	724	24.8
Service and sales workers	462	15.1	401	13.4	834	27.1	646	21.0	958	31.2	923	30.0
Agriculture and fishery workers	169	27.3	84	13.8	166	26.7	262	42.1	339	54.5	290	46.6
Craft and related trades workers	514	18.1	512	18.3	661	23.0	739	25.7	1,242	43.2	1,155	40.2
Plant and machine operators	298	19.8	282	19.2	408	27.0	345	22.8	623	41.2	569	37.6
Elementary occupations	354	20.8	285	17.0	343	20.0	392	22.9	669	39.0	635	37.0
Armed forces	17	18.3	9	9.8	35	37.2	19	20.2	21	22.3	24	25.5

The associations between types of employment and each health indicator have been analysed for each of the job categories (see Figures 14 to 16). With regard to non-permanent versus permanent employment, several consistent patterns across job categories — specifically for job dissatisfaction, absenteeism and stress — were found (see Figure 14). Elementary occupations with non-permanent

employment were 2.65 times more likely to report dissatisfaction than elementary occupations with permanent employment. Positive associations for dissatisfaction were also statistically significant for service and sales workers (OR = 1.67). On the other hand, positive associations were observed for agriculture and fishery workers in most health indicators, and for professionals in the case of fatigue, backache and muscular pains. Conversely, probability to report absenteeism was lower among non-permanent employment compared to permanent employment in most categories. Statistically significant negative associations were found in the case of clerks (OR = 0.47; 95% CI 0.28 to 0.77) and service and sales workers (OR = 0.70; 95% CI 0.50 to 0.99). These results were consistent with those found in ES1995. Thus, in both surveys, non-permanent employment was more likely to report higher job dissatisfaction and lower stress.

The comparison between self-employed and permanent employment showed a consistent pattern across job categories for health-related absenteeism (see *Figure 15*). Thus, the self-employed had more risk of absenteeism than permanent employment among most job categories, although results were only significant for legislators and managers (OR = 0.37). In contrast, a positive association was observed for clerks (OR = 2.85). On the other hand, for health indicators such as fatigue, backache and muscular pains, it was observed that risks of the majority of job categories were higher than one, although some results were not statistically significant. It is also interesting to note that the self-employed working as legislators and managers, and agriculture and fishery workers reported the highest differences for job dissatisfaction (OR = 3.35 and OR = 2.94 respectively), fatigue (OR = 2.83 and OR = 2.57 respectively), backache (OR = 1.69 and OR = 1.69 respectively) and in the case of stress only for agriculture and fishery workers (OR = 2.73). Overall, these results were very similar with those found in ES1995, especially for legislators and managers, and for health-related absenteeism.

Similar to the findings reported in ES1995, the comparison between small employers and permanent employment showed a lack of a consistent pattern across job categories, except for absenteeism, and less clearly for job dissatisfaction (see *Figure 16*). Small employers were less likely to report absenteeism than permanent employment in the majority of the job categories, except for plant and machine workers (OR = 1.03). Another interesting finding was a higher probability among agriculture and fishery workers of reporting more stress (OR = 2.21), fatigue (OR = 3.01), backache (OR = 2.48) and muscular pains (OR = 2.27).

## Economic sectors

The distribution for each health indicator by economic sector showed some interesting results (see *Table 5*). The worst health were found among agriculture, hunting, forestry and fishing (25.5% for dissatisfaction, 39.8% for fatigue, 52.3% for backache and 45.5% for muscular pains) and construction (46.3% for backache and 45.3% for muscular pains). Transportation and communication showed the highest level for health-related absenteeism. In contrast, financial intermediation reported low levels in most health indicators, although, similarly to ES1995, this sector had one of the worst levels for stress. In ES1995, agriculture, hunting, forestry and fishing, and construction were the sectors with worse health.

The association between types of employment and health have been analysed for each of the economic sectors (see *Figures 17 to 19*). In relation to non-permanent versus permanent employment, several clear patterns for each economic sector could be observed (see *Figure 17*).

Non-permanent employment showed more job dissatisfaction, but less absenteeism and stress. For job dissatisfaction, only a barely positive association was found among construction (OR = 1.50). No clear patterns were shown for the other indicators, although positive associations were observed for agriculture, hunting, forestry and fishing, and for construction, which was the only category with positive associations for all health indicators.

**Table 5 Distribution of health indicators (frequencies and percentages) by economic sector in ES2000**

Health indicators	Job dissatisfaction		Health-related absenteeism		Stress		Fatigue		Backache		Muscular pains	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Agriculture, hunting, forestry and fishing (A-B)	185	25.5	97	13.7	198	27.2	290	39.8	381	52.3	332	45.5
Mining and quarrying (C) and manufacturing (D)	551	16.4	512	15.4	839	24.8	698	20.6	1,089	32.2	1,055	31.2
Electricity, gas and water supply (E)	17	10.2	20	11.9	41	24.4	31	18.5	54	32.1	46	27.4
Construction (F)	226	17.3	245	19.3	286	21.7	335	25.4	612	46.3	598	45.3
Wholesale and retail trade, repairs (G)	469	14.0	303	9.2	832	24.7	670	19.9	899	26.7	836	24.8
Hotels and restaurants (H)	162	18.6	100	11.8	263	30.0	257	19.9	287	32.7	283	32.2
Transportation and communication (I)	224	17.1	213	16.6	486	36.8	328	24.8	486	36.8	454	34.4
Financial intermediation (J)	64	9.4	62	9.3	225	32.8	96	14.0	128	18.7	143	20.9
Real estate and business activities (K)	131	10.1	133	10.4	376	28.8	216	16.6	281	21.5	339	26.0
Public administration (L)	178	13.5	175	13.6	435	32.8	251	18.9	349	26.3	352	26.5
Other services (M-Q)	604	12.6	656	13.9	1,622	33.7	1,076	22.4	1,542	32.1	1,498	31.2

Similar to the findings reported in ES1995, the self-employed had more risk of reporting worse health than permanent workers, except for absenteeism (see Figure 18). Overall, the worst levels of health were mainly observed in the following economic sectors: agriculture, hunting, forestry and fishing, mining and quarrying and manufacturing, construction, and transportation and communication. Conversely, the public administration sector reported low stress and absenteeism levels. Financial intermediation showed very low levels of fatigue, backache and muscular pains.

Small employers had more risk of reporting higher levels of stress and fatigue, and low job dissatisfaction and absenteeism in almost all economic sectors (see Figure 19). Overall, the worst health levels were observed in agriculture, hunting, forestry and fishing.

## Countries

Tables 6 and 7 show the distribution of types of employment and health indicators by country. In Germany, Austria, Luxembourg and the Nordic countries, more than 60% of the sample was in full-time permanent employment (see Table 6), whereas small employers and full-time self-employed accounted for small percentages of the total (2.5-9%). The Netherlands, France, Spain and especially Greece (25.4%) showed low levels of full-time permanent employment. In Greece, there was a high percentage of small employers and self-employed; in Spain, a large percentage of the sample was in non-permanent employment, whereas in the Netherlands and France part-time employment was high.

Table 6 Distribution of employment categories (frequencies and percentages) by country in ES2000

Health indicators	Permanent employment				Small employers				Self-employed				Non-permanent employment					
	Full-time		Part-time		No.		%		Full-time		Part-time		Fixed term, part-time		Temporary, full-time		Temporary, part-time	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Belgium	764	53.8	313	22.1	57	4.0	146	10.3	30	2.1	36	2.5	42	3.0	21	1.5	10	0.7
Denmark	837	65.5	268	21.0	32	2.5	38	3.0	9	0.7	59	4.6	22	1.7	8	0.6	4	0.3
Germany	844	60.5	275	19.7	81	5.8	61	4.4	20	1.4	70	5.0	37	2.7	5	0.4	3	0.2
Greece	285	25.4	133	11.9	106	9.4	279	24.9	250	22.3	26	2.3	19	1.7	12	1.1	12	1.1
Italy	760	53.4	163	11.5	90	6.3	71	16.4	71	5.0	27	1.9	29	2.0	24	1.7	25	1.8
Spain	605	43.6	126	9.1	100	7.2	224	16.1	35	2.5	197	14.2	81	5.8	16	1.2	4	0.3
France	640	45.5	403	28.7	56	4.0	111	7.9	29	2.1	56	4.0	78	5.5	22	1.6	11	0.8
Ireland	695	51.8	246	18.3	80	6.0	153	11.4	29	2.2	48	3.6	29	2.2	23	1.7	39	2.9
Luxembourg	326	68.2	86	18.0	17	3.6	22	4.6	1	0.2	16	3.3	7	1.5	2	0.4	1	0.2
Netherlands	649	47.5	479	35.0	28	2.0	24	1.8	16	1.2	62	4.5	80	5.9	17	1.2	12	0.9
Portugal	686	52.2	174	13.2	62	4.7	172	13.1	45	3.4	116	8.8	53	4.0	6	0.5	-	-
United Kingdom	709	52.1	330	24.2	46	3.4	96	7.0	44	3.2	74	5.4	37	2.7	9	0.7	17	1.2
Finland	790	60.9	139	10.7	38	2.9	117	9.0	21	1.6	134	10.3	54	4.2	3	0.2	1	0.1
Sweden	913	62.3	271	18.5	46	3.1	61	4.2	33	2.3	81	5.5	55	3.8	4	0.3	1	0.1
Austria	853	63.2	266	19.7	61	4.5	68	5.0	14	1.0	47	3.5	25	1.9	13	1.0	2	0.1

The health indicators investigated also varied by country. Greece, Spain and Finland showed the highest percentages of health indicators (see Table 7). However, absenteeism in Greece and Spain was low, but very high in Finland (23.9%). High percentages of health indicators were also found in other Southern European countries. For example, in the case of job dissatisfaction, results were as follows: Spain (22.2%), Italy (20.1%), France (19.6%) and Portugal (18.1%). Besides Finland, the highest percentage of absenteeism was found in the Netherlands (20.6%). The lowest percentages of health indicators were found in Ireland: stress (13.1%), backache (11.3%), muscular pains (10.5%), low job dissatisfaction (8.1%) and fatigue (8.9%). Austria showed low percentages of health indicators: dissatisfaction (9.4%), stress (19.6%), fatigue (4.8%) and muscular pains (20.4%), but absenteeism was quite high (16.0%). Denmark showed low levels of dissatisfaction (5.1%) and fatigue (10.6%). By and large, results were consistent with those found in ES1995.

**Table 7 Distribution of health indicators (frequencies and percentages) by country in ES2000**

Health indicators	Job dissatisfaction		Health-related absenteeism		Stress		Fatigue		Backache		Muscular pains	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Belgium	165	11.7	206	14.6	415	29.2	323	22.8	381	26.8	343	24.2
Denmark	65	5.1	151	11.9	358	28.0	135	10.6	368	28.8	500	39.2
Germany	181	13.0	241	17.8	342	24.5	221	15.8	487	34.9	362	25.9
Greece	393	35.1	66	5.9	588	52.4	715	63.7	472	42.1	456	40.6
Italy	285	20.1	108	7.9	500	35.1	331	23.3	457	32.1	348	24.5
Spain	307	22.2	142	10.6	386	27.8	496	35.7	545	39.3	488	35.2
France	274	19.6	173	12.6	457	32.5	478	34.0	551	39.2	436	31.0
Ireland	109	8.1	102	7.7	176	13.1	120	8.9	152	11.3	141	10.5
Luxembourg	59	12.4	74	16.4	180	37.7	81	16.9	170	35.6	117	24.5
Netherlands	165	12.1	274	20.6	357	26.1	275	20.1	369	27.0	395	28.9
Portugal	238	18.1	94	7.5	262	19.9	260	19.8	411	31.3	351	26.7
United Kingdom	148	10.9	154	11.6	315	23.1	225	16.5	345	25.3	310	22.8
Finland	91	7.0	303	23.9	445	34.3	342	26.4	513	39.6	754	58.1
Sweden	223	15.3	229	16.0	584	39.9	188	12.8	522	35.6	693	47.3
Austria	120	9.4	214	16.0	264	19.6	65	4.8	399	29.6	275	20.4

Associations between health in persons with non-permanent employment compared to those with permanent employment by country are shown in Figure 20. For job dissatisfaction, non-permanent employment had more risk of reporting dissatisfaction than permanent employment in Austria (OR = 3.70; 95% CI 2.15-6.34) and Luxembourg (OR = 3.40; 95% CI 1.39-8.28). Similar findings but with lower results were found in Denmark (OR = 2.33), Germany (OR = 2.10), Spain (OR = 1.97), Sweden (OR = 1.97) and Italy (OR = 1.64). In addition, risks of Greece, Portugal, Ireland, the Netherlands and United Kingdom were above the unit, although they were not statistically significant. Only Finland and Belgium did not show differences between both types of employment, whereas France showed an almost negative significant association (OR = 0.65; 95% CI 0.42-1.02).

Another consistent pattern was observed for stress (see Figure 20). Non-permanent employment was significantly less likely to report stress in five countries: Belgium (OR = 0.38; 95% CI 0.22-0.65), France (OR = 0.61; 95% CI 0.42-0.89), the Netherlands (OR = 0.54; 95% CI 0.35-0.82), Italy (OR = 0.61; 95% CI 0.39-0.95) and Ireland (OR = 0.51; 95% CI 0.26-1.00). Differences were not statistically significant in three countries: Luxembourg (OR = 0.38), Finland (OR = 0.76) and Sweden (OR = 0.79). No association was found in seven countries (Denmark, Germany, Greece, Spain, Portugal, United Kingdom and Austria). In the case of other health indicators, patterns were

less clear and only rarely statistically significant results were found. In addition, it was interesting to note that Spain showed positive association in most health indicators, whereas France had negative associations in almost all indicators. Overall, similar patterns were found in both the ES1995 and ES2000 surveys.

Associations between self-employed and each health indicator by country are shown in Figure 21. By and large, patterns of negative association were found for absenteeism and stress. Thus, for the self-employed, absenteeism was significantly low in five countries: France (OR = 0.13; 95% CI 0.04-0.41), Germany (OR = 0.23; 95% CI 0.08-0.64), Portugal (OR = 0.37; 95% CI 0.17-0.83), Belgium (OR = 0.47; 95% CI 0.27-0.84) and Spain (OR = 0.54; 95% CI 0.31-0.93). In almost all other countries, risks were lower than the unit, although they were not statistically significant. Similarly, the self-employed reported lower levels of stress in the majority of countries, although results were statistically significant only in Italy (OR = 0.60; 95% CI 0.45-0.79) and Sweden (OR = 0.63; 95% CI 0.40-0.99). On the other hand, patterns of positive associations were observed for fatigue and backache. In many countries, the self-employed had more risk of fatigue than permanent employment, although results were not significant. Only in the case of backache did the self-employed show positive statistically significant associations in four countries: Finland (OR = 2.01), Ireland (OR = 1.79), Greece (OR = 1.53) and Portugal (OR = 1.38). In ES1995, muscular pains showed a positive associative pattern, which in ES2000 tended to reduce in magnitude.

When assessing the associations between small employers and health indicators by country, two patterns emerged (see Figure 22). On the one hand, negative associations were found for job dissatisfaction and absenteeism. Thus, for example, for small employers, dissatisfaction was significantly lower in four countries: Italy (OR = 0.27; 95% CI 0.12-0.63), Portugal (OR = 0.30; 95% CI 0.11-0.85), Germany (OR = 0.35; 95% CI 0.13-0.97) and Spain (OR = 0.45; 95% CI 0.23-0.89). For the other countries, risks were lower than the unit, but not statistically significant. As found in ES1995, small employers reported lower levels of absenteeism in the majority of countries, although results were not statistically significant except for Belgium (OR = 0.30). On the other hand, patterns of positive associations were observed for stress and fatigue. Thus, small employers tended to report high associations for fatigue and stress, although results were very rarely statistically significant.

## Country-level variables

This section explores the possible influence of four contextual variables — unemployment, social protection benefits, Gross Domestic Product/GDP (Purchasing Power Parity/PPP) and temporary contracts — at country-level on the individual relationships between employment status and health. Considerable variation in each contextual variable was observed across the 15 EU Member States studied. As Figure 23 shows, unemployment percentages ranged from 2.8% for Luxembourg or 4% for the Netherlands to 18.7% for Spain; social protection benefits went from 18.9% for Ireland to 34.8% for Sweden; GDP ranged from 13,330 PPP for Greece to 35,489 PPP for Luxembourg; and finally, temporary contracts ranged from 2.9% for Luxembourg to 32.9% for Spain.

In addition, as seen in Table 8, the two types of employment analysed in this section (permanent and non-permanent employment) also varied across quartiles of the four country variables. By and



large, these findings showed a consistent pattern between the contextual variables at country level and percentages of non-permanent employment at individual level. For example, countries with unemployment rates located in the highest quartile (>11.40%) presented the highest percentages of non-permanent employment (17.4%). Similarly, countries in the lowest quartile of social protection benefits ( $\leq 23.30$ ) presented the highest percentage of non-permanent employment (18.7%). Countries in the lowest quartile of GDP ( $\leq 19,956$  PPP) presented the highest percentage of non-permanent employment (18.8%). Finally, countries in the highest quartile (>13.90%) of temporary contracts at country level also presented the highest percentage of non-permanent employment at individual level (20.9%).

**Table 8 Distribution of country-level variables (quartile) by two types of employment (permanent and non-permanent) in ES2000**

Country-level variables	Permanent employment (%)	Non-permanent employment (%)
<b>Unemployment (%)</b>		
Lowest quartile ( $\leq 5.10$ )	89.3	10.7
Second quartile ( $>5.10 \leq 8.30$ )	88.4	11.6
Third quartile ( $>8.30 \leq 11.40$ )	88.0	12.0
Highest quartile ( $>11.40$ )	82.6	17.4
<b>Social protection (%)</b>		
Lowest quartile ( $\leq 23.30$ )	81.3	18.7
Second quartile ( $>23.30 \leq 29.50$ )	90.8	9.2
Third quartile ( $>29.50 \leq 30.90$ )	88.6	11.4
Highest quartile ( $>30.90$ )	88.3	11.7
<b>Gross Domestic Product (Purchasing Power Parity)</b>		
Lowest quartile ( $\leq 19,956$ )	81.2	18.8
Second quartile ( $>19,956 \leq 20,613$ )	87.7	12.3
Third quartile ( $>20,613 \leq 22,542$ )	90.5	9.5
Highest quartile ( $>22,542$ )	90.1	9.9
<b>Temporary contracts (%)</b>		
Lowest quartile ( $\leq 7.80$ )	90.2	9.8
Second quartile ( $>7.80 \leq 12.30$ )	91.0	9.0
Third quartile ( $>12.30 \leq 13.90$ )	87.4	12.6
Highest quartile ( $>13.90$ )	79.1	20.9

After adjusting by individual (gender and age) and country variables (separately and together), the association between types of employment (permanent compared to non-permanent) and health indicators did not show significant changes (see Figure 24).

This report has examined for the first time the associations between various types of employment and six health indicators by comparing the data obtained in the second (ES1995) and third (ES2000) European surveys on working conditions for all 15 EU Member States. The investigation employed individual data from ES2000 linked to country-level data drawn from Eurostat, using two pertinent epidemiological approaches — logistic regression and multilevel analysis. These methodological designs permitted an examination of the associations before and after, taking into account a number of selected individual and country-level variables.

In comparison to ES1995, an increase in all health indicators and a reduction in absenteeism were observed. By and large, most patterns in ES2000 were similar to those found in ES1995, as were the results by country. A number of suggestive patterns were documented. In other cases, associations were not statistically significant, but consistent patterns were observed across types of employment, job categories, economic sectors and countries. Some important differences across countries were found.

Associations between types of employment and health almost always persisted after the adjustment by individual-level variables. This finding suggests that types of employment may have an independent effect on health, regardless of working conditions. Similar to the findings reported in ES1995, country-level effects were very weak. Results suggest that selected contextual variables did not change the individual effects between employment and health.

## Main findings

- **Overall patterns:**
  - In comparison to ES1995, an increase in all health indicators and a reduction in absenteeism were observed.
  - By and large, most patterns in ES2000 were similar to those found in ES1995.
  - For all types of employment except self-employed, full-time workers usually reported worse health compared to part-time workers.
  - Small employers and self-employed showed high levels of all health indicators, but very low levels of absenteeism.
  - Non-permanent workers, especially those with temporary employment, were highly dissatisfied, but their stress level was low.
- **Job dissatisfaction:** Non-permanent and self-employed were more dissatisfied than permanent workers, while small employers were less dissatisfied.
- **Health-related absenteeism:** All types of employment showed lower levels of absenteeism as compared to permanent employment.
- **Stress:** Small employers showed high levels of stress, while non-permanent employment reported low levels of stress.
- **Fatigue:** Small employers, self-employed and full-time fixed-term employment showed significant high levels of fatigue compared to full-time permanent employment.
- **Backache:** Self-employed showed significant high levels of backache compared to permanent employment.

- **Muscular pains:** Muscular pains were more likely among self-employed and full-time fixed-term employment compared to permanent employment.
- **Covariates:** Most covariates, especially physical and psychosocial variables, were associated to almost all health indicators.
- **Job categories:**
  - The worst results were observed in agriculture and fishery workers, and craft and related trades workers.
  - The best results were observed in legislators and managers, and professionals.
  - Non-permanent employment was more likely to report dissatisfaction in elementary occupations, and service and sale workers.
  - Agriculture and fishery workers, and legislators and managers were more likely to report health indicators.
  - Self-employed had more risk of reporting worse health and less absenteeism than permanent employment across job categories.
  - Small employers were less likely to report absenteeism than permanent employment across most job categories.
- **Economic sectors:**
  - The worst levels of health were observed in agriculture, hunting, forestry and fishing, and construction.
  - The best level of health was observed in financial intermediation.
  - For most economic sectors, non-permanent employment showed more dissatisfaction, but less absenteeism and stress.
  - For most economic sectors, self-employed were more likely to report lower levels of health than permanent workers, but lower absenteeism.
- **Countries:**
  - By and large, distribution of health indicators in ES2000 was similar to that found in ES1995.
  - Greece showed the highest percentages of health indicators, whereas Ireland showed the lowest.
  - High percentages in most indicators were found in Southern European countries.
  - Non-permanent employment were much more likely to report dissatisfaction and less likely to report stress across countries.
  - Self-employed had less risk of reporting absenteeism across countries.
- **Country-level variables:**
  - Countries with high unemployment percentages, temporary contracts, low social protection benefits and Gross Domestic Products at the contextual level also showed the highest percentage of non-permanent employment at the individual level.
  - Contextual variables did not change the individual effects between types of employment and health.
  - The positive association between non-permanent employment and dissatisfaction remained after taking into account individual and country-level variables.
  - The negative association between non-permanent employment and stress continued after taking into account individual and country-level variables.

## Future research and policy issues

This study has compared two cross-sectional European surveys testing several hypotheses, which have to be more deeply investigated. Although the study has filled a significant gap in the knowledge of the relations between several types of employment and health, hypotheses and data need to be refined and findings need to be replicated. A number of potentially important methodological limitations have been considered in interpreting the results (*see Appendix 1, page 38*). The study of the effects of types of employment on health is a challenge for researchers.

To better understand the relations between types of employment and health, future studies should take into account the need to examine the following issues:

- increasing the sample size of future European surveys;
- improving the questionnaire, standardising categories of employment and health indicators;
- including information on social security systems, incapacity benefit schemes and other socio-economic features at regional level;
- testing more specific hypotheses and more refined theoretical models;
- using more powerful epidemiological designs that integrate individual and contextual variables at regional level; and
- developing and integrating quantitative and qualitative studies capable of understanding the relations between types of employment and health.

Despite concerns about the methodological limitations of this study, the consistency of the results found in both surveys suggest that they need to be seriously considered. Specifically, the following policy issues have to be taken into account:

- A healthy, productive and well-motivated workforce is a key agent for overall socio-economic development. Given the worsening in health indicators and their likely large economic and health-related costs, European governments should develop effective policies to promote a healthier work environment.
- Given the health differences across types of employment, priorities and interventions should be adapted to each type of employment and company. Additional efforts should be made to promote better working conditions among non-permanent workers, self-employed and small employers.
- Given the marked cross-national differences, specific attention should be directed at countries showing the worst results, especially in Southern Europe. These countries should be encouraged to implement preventive resources and actions to promote additional legislative, organisational and individual interventions capable of reducing the health problems detected.
- Finally, for many types of employment, greater gains in health might be made from the application of current knowledge. However, there is still a strong need for expanding and improving national and company systems on health information.



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# Appendix 1

## Data collection, variables and analysis

### Sampling methods and data collection

The sample design employed was a multi-stage random sampling. Individuals were interviewed from the age of 15 who did any work for pay or profit during the reference week, or who were not working but had a job from which they were temporarily absent.

The target was to obtain 1,500 'persons in employment' per country, except in the cases of Luxembourg (n = 500) as defined by the *Labour Force Survey* (Eurostat). All interviews were scheduled at times of the day when employed and self-employed could be reached. The respondents were interviewed at home. All retired, unemployed people, and homemakers were excluded. Non-Europeans were included on the condition that they could be interviewed in the respective national languages of the countries where they worked. The final number of subjects included in the survey was 21,703 workers. Response rates ranked by country were as follows: Germany 76%, France 74%, Spain 73%, Luxembourg and Portugal 68%, Austria 67%, Sweden and Ireland 58%, Belgium, Finland and United Kingdom 56%, Greece 47%, Denmark 42%, the Netherlands 41%, and Italy 39%.

From the sample, 2,298 subjects were excluded from this analysis since information was missing or incomplete: people who did not specify their type of contract (i.e. apprenticeship and trainees and 'other'), self-employed who did not say how many people they managed, employers employing more than nine people, and people working less than ten hours per week. Therefore, the final number of people included in the individual database was 19,405. On the other hand, we have analysed separately the 1,023 people (4.7% of the survey) included in the job category 'other'. About 53% of those individuals belong to only three countries: Greece (29.6%), Denmark (12.8%) and Portugal (10.5%). It is important to note that, in comparison to the sample analysed, these subjects show some clear differences with regard to socio-demographic (e.g. they were younger and there were more women); they had worse work environment and working conditions variables (e.g. more short repetitive tasks 57.7% vs. 49.4%); and they had worse health (especially in the case of dissatisfaction (19.9% compared to 14.6%) and fatigue (30.7% compared to 21.9%)). In addition, differences by job category and economic sector were observed: for example, there were more elementary occupations (18.1% vs. 8.8%) and other services (31.6% vs. 24.9%).

### Definition of variables

**Health problems** (i.e. fatigue, backache and muscular pains) were based on a positive response ('Yes') of participants to the following question:

- *Q35: Does your work affect your health, or not? (If yes) How does it affect your health?*  
This question had a list of 22 options among which fatigue, backache and muscular pains could be selected. The last item included any positive response to at least one of three different choices (i.e. muscular pains in shoulders and neck, muscular pains in upper limbs, or muscular pains in lower limbs) while in the ES1995 there was only one item referring to muscular pains.

**Three health-related outcomes** (i.e. stress, job dissatisfaction and health-related absenteeism) were based on the following questions:



Stress was based on a positive response ('Yes') of participants to the following question:

- *Q35: Does your work affect your health, or not? (If yes) How does it affect your health?*  
This question had a list of 22 options among which stress could be selected.

Job dissatisfaction was based on participants' response to the following question:

- *Q38: On the whole are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with working conditions in your main paid job?*

Persons were classified as having 'job dissatisfaction' if they reported to be 'not very satisfied' or 'not at all satisfied', while they were classified as 'satisfied' when responding to any of the two other options ('very satisfied' or 'fairly satisfied'). This question in ES2000 was modified from that in ES1995 and asked about satisfaction with 'working conditions in your main paid job' (ES1995 had asked about satisfaction with 'your main paid job').

Health-related absenteeism was based on participants' responses to the following two questions:

- *Q36a: 'In your main job, how many days over the past 12 months were you absent due to an accident at work?'*
- *Q36b: 'In your main job, how many days over the past 12 months were you absent due to health problems caused by your work?'*

Persons were classified as subject to absenteeism if they reported being absent one or more days over the past year in any of these two questions. It is important to note that only one question concerning absenteeism was used in the ES1995 questionnaire ('due to health problems caused by your work') while in the ES2000 questionnaire, three questions were used: (Q36a) 'due to an accident at work', (Q36b) 'due to health problems caused by your work', and (Q36c) 'due to other health problems'.

The nine **categories of employment** were based on participants' responses to the following questions:

- *Q4a: Are you mainly . . . self-employed without employees, self-employed with employees, employed or other?*
- *Q4b: If employed, is it . . . on an unlimited permanent contract, on a fixed-term contract, on a temporary employment agency contract, on apprenticeship or other training scheme, or other?*

Participants responding that they were 'self-employed without employees' were classified into self-employed. Those that were 'self-employed with employees' were classified as small employers, based on the positive response of having 'between 1 and 9 employees' in a subsequent question on number of employees (Q8).

- *Q14: How many hours do you usually work per week, in your main paid job?*  
Based on standard definitions of part-time work, participants were classified as 'part-time' if they reported working 35 hours per week or less, and as 'full-time' if they reported working more than 35 hours per week.

The five **work environment variables** (i.e. company size, work shifts, hours worked per week, job categories and economic sectors) were based on participants' responses to the following questions:

Company size was based on participants' response to the following question:

- *Q7: How many people in total work in the local unit of the establishment where you work?*

Work shifts were based on a positive response ('Yes') of participants to the following question:

- *Q18b: Do you work shifts?*

It is important to note that this question was also used in ES1995 and that there were more than two response options (i.e. 'not working shifts or irregular hours', 'working irregular hours but not in a shift' or '2 shifts and over'), while in ES2000 there were only two options given ('Yes' or 'No').

Hours worked per week were based on participants' response to the following question:

- *Q14: How many hours do you usually work per week, in your main paid job?*

Based on standard definitions of part-time work, participants were classified as 'part-time' if they reported working 35 hours per week or less, and as 'full-time' if they reported working more than 35 hours per week.

Job categories were drawn from the following question:

- *Q2a: What is your main paid job? Please give me your job title.*

All answers were recorded according to the International Standard Classification of Occupations (ISCO) code in 10 categories: legislators and managers; professionals; technicians; clerks; service and sales workers; agriculture and fishery workers; craft and trade workers; plant and machinery operators; elementary occupations; and armed forces (ILO, 1990).

Economic sectors were drawn from the following question:

- *Q5: What is the main activity of the company or organisation where you work?*

Using the Statistical Classification of Economic Activities (NACE), the economic categories were collapsed into 11 final categories: agriculture, hunting, forestry and fishing; mining and quarrying and manufacturing; electricity, gas and water supply; construction; wholesale and retail trade/repairs; hotels and restaurants; transportation and communication; financial intermediation; real estate business; public administration; and other services (European Commission, 1990).

**Physical variables** (i.e. vibrations, noise too loud, extreme temperatures, breathing vapours or fumes, repetitive hand or arm movements, and short repetitive tasks) were based on participants' responses to the following questions:

The first four physical variables were based on participants' response to the following question:

- *Q11: Please tell me, using the following scale, are you exposed at work to . . . ?*

This question had a list of 7 options (including vibrations, noise too loud, high or low temperatures, and breathing in vapours or fumes) and a frequency scale of 7 options (running

from 'all of the time' to 'never'). Persons were classified as being negatively exposed when they reported to be 'almost never' or 'never', while they were positively classified when responding to any of the other options on the scale ('all of the time', 'almost all of the time', 'around 3/4 of the time', 'around half of the time' and 'around 1/4 of the time').

'Extreme temperatures' was aimed at those participants who reported to be exposed to both high and low temperatures.

'Repetitive hand or arm movements' was based on participants' response to the following question:

- *Q12: Please tell me, using the following scale, does your main paid job involve . . . ?*  
This question had a list of 8 options (including 'repetitive hand or arm movements') and a frequency scale of 7 options (running from 'all of the time' to 'never'). Persons were classified as being negatively exposed when they reported to be 'almost never' or 'never', while they were positively classified when responding to any of the other options on the scale ('all of the time', 'almost all of the time', 'around 3/4 of the time', 'around half of the time' and 'around 1/4 of the time').

'Short repetitive tasks' was based on participants' response to the following question:

- *Q21a: Please tell me does your job involve short repetitive tasks of less than . . . ?*  
This question had a list of 5 options ('less than 5 seconds', 'less than 30 seconds', 'less than 1 minute', 'less than 5 minutes' and 'less than 10 minutes'). Participants with a positive response ('Yes') to any of those options were considered to be exposed to 'short repetitive tasks'. It is important to note that this question was not exactly the same as in ES1995, where the question only referred to 'short repetitive tasks of less than 10 minutes'.

**Psychosocial variables** (i.e. control, demand and social support) were based on participants' responses to the following questions:

To build the 'control' variable, 11 items were drawn from the following questions:

- *Q24: Generally, does your main paid job involve, or not . . . ?*  
This question had a list of 6 items, 3 of which were 'solving unforeseen problems on your own', 'learning new things' and 'monotonous tasks'. Participants with a negative response ('No') to the first and second items, and with a positive response ('Yes') to the third item, were considered to have lack of control (1 point).
- *Q25: Are you able, or not, to choose or change . . . ?*  
This question had a list of 3 items: 'your order of tasks', 'your methods of work' and 'your speed or rate of work'. Participants with a negative response ('No') to these items were considered to have lack of control (1 point).
- *Q26: For each of the following statements, please answer yes or no.*  
This question had a list of 6 items, 3 of which were 'you can take your break when you wish', 'you are free to decide when to take holidays or days off' and 'you can influence your working hours'. Participants with a negative response ('No') to these items were considered to have lack of control (1 point).

■ *Q30a: Within your workplace, are you able to discuss . . . ?*

This question had a list of 2 items: 'your working conditions in general' and 'the organisation of your work when changes take place'. Participants with a negative response ('No') to these items were considered to have lack of control (1 point).

All these 11 items were added into a score ranging from 0 to 11. This score was categorised according to their distribution by tertiles: 'high control' (less or equal to 2 points), 'medium control' (3 and 4 points) and 'low control' (more than 4 points).

Demand was based on participants' response to the following questions, including 6 different items:

■ *Q12: Please tell me, using the following scale, does your main paid job involve . . . ?*

This question had a list of 8 items (including 'painful or tiring positions' and 'carrying or moving heavy loads') and a frequency scale of 7 options (running from 'all of the time' to 'never'). Persons were classified as not having demand when they reported to be 'almost never' or 'never', while they were classified as having demand when responding to any of the other options on the scale ('all of the time', 'almost all of the time', 'around 3/4 of the time', 'around half of the time' and 'around 1/4 of the time'). (1 point).

■ *Q21b: Please tell me does your job involve . . . ?*

This question had a list of 2 items ('working at very high speed' and 'working to tight deadlines') and a frequency scale of 7 options (running from 'all of the time' to 'never'). Persons were classified as not having demand when they reported to be 'almost never' or 'never', while they were classified as having demand when responding to any of the other options on the scale ('all of the time', 'almost all of the time', 'around 3/4 of the time', 'around half of the time' and 'around 1/4 of the time'). (1 point).

■ *Q26: For each of the following statements, please answer yes or no.*

This question had a list of 6 items, one of which was 'you have enough time to get the job done'. Participants with a negative response to this item were considered to have demand (1 point).

■ *Q28: How well do you think your skills match the demands imposed on you by your job?*

Persons were classified as having demand when they responded 'the demands are too high' and as not having demand when responding to either of the other options ('they match' or 'the demands are too low').

All these 6 items were added into a score ranging from 0 to 6. This score was categorised according to their distribution by tertiles: 'low demand' (less or equal to 2 points), 'medium demand' (3 points) and 'high demand' (more than 3 points).

Social support was based on a positive response ('Yes') of participants to the following question:

■ *Q26: For each of the following statements, please answer yes or no.*

This question had a list of 6 items, one of which was 'you can get assistance from colleagues if you ask for it'. Participants with a positive response to this item were considered to have social support.

### Statistical analysis

Logistic regression models have been used as the best choice for dichotomous-outcome analyses (Hosmer and Lemeshow, 1989). Multivariate models for each health indicator were built, adjusting for age and gender in a first step and adding additional individual-level covariates in a second step. This strategy allowed the assessment of the impact that the variables of work environment and working conditions had on crude odds ratios (ORs) obtained in simple unadjusted regression models. Finally, all selected covariates were included in the models. However, this report mainly includes crude ORs. The main reasons to choose this strategy were (1) by and large, differences between crude and adjusted ORs by age, gender or a third variable did not differ significantly, and (2) due to the large amount of information generated, only the more meaningful results have been included.

Multilevel models were used to investigate and quantify (1) variability in the outcomes across countries (after controlling for type of employment and individual-level variables), as well as variability in the effects of non-permanent employment across countries; and (2) the extent to which the variability is a function of the country-level variables (i.e. associations of country-level variables with the outcome after controlling for type of employment, as well as interactions between country-level variables and type of employment).

The multilevel models were conceptualised as two-level models. In the first stage (individual-level), a regression model was defined for each country including the four employment categories plus all individual-level variables. In the second stage (country-level), country-specific intercepts and the country-specific regression coefficients corresponding to non-permanent employment were modelled as random across countries. Variability in outcomes across countries (after controlling for type of employment and individual-level variables) and in the effects of non-permanent employment was quantified by the variances of the random effects. Country-level variables were subsequently added to the second-level models for the intercept and for the coefficient corresponding to non-permanent employment to determine whether they were independently associated with the outcomes or modified the effects of non-permanent employment on the outcomes. Initially, each country-level variable was investigated separately. Models were also designed to include all country-level variables simultaneously. Out of the 19,405 persons in the database, 3,847 were excluded from the multilevel analyses because they were missing one or more of the individual-level variables. There were no substantial differences between excluded and included participants. All analyses were performed using SPSS® 9.0.1<sup>1</sup> and HLM® 4.0.4<sup>2</sup> programs.

### Potential methodological limitations

Firstly, because of its cross-sectional nature, the present study cannot firmly establish causal relationships and the 'reverse causation' hypothesis (i.e. health would modify employment status) cannot be categorically ruled out. Secondly, this study has faced the problems inherent in many large-scale international comparative studies with limited resources. Sample sizes in individual countries were not very large and response rates showed a great deal of variation (ranging from

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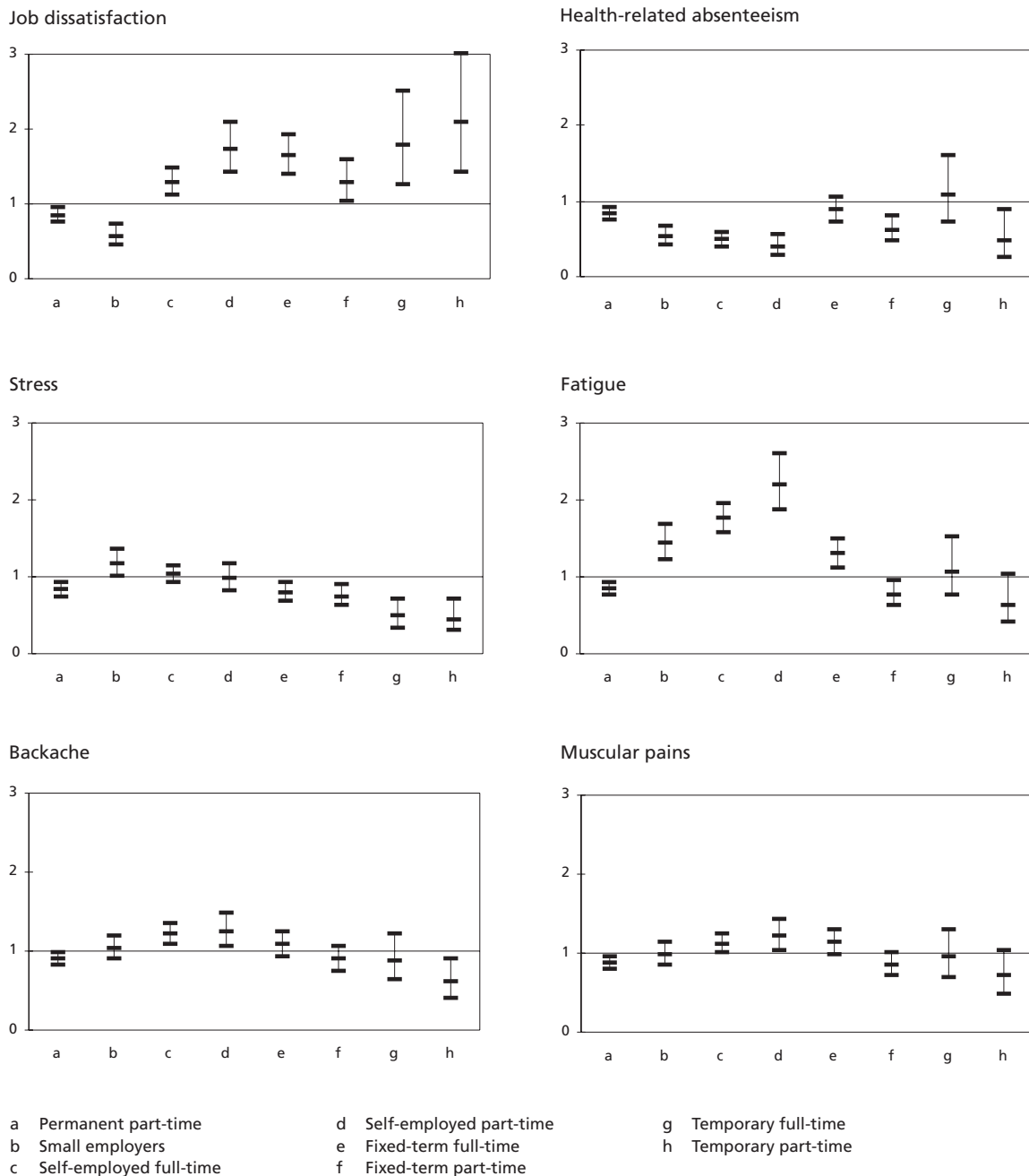
39% in Italy to 76% in Germany). This fact limited the ability to conduct country- and employment-specific analyses. Thirdly, there is no strong guarantee that the different types of employment categories had the same meaning in the different countries and no agreement on the use of types of employment categories has been reached among researchers. Fourthly, the analysis of the job category 'other' (1,023 people) showed that there were more elementary occupations than the sample analysed in this report (18.1% compared to 8.8%). Worse results in both working conditions and health were found in the category 'other' compared to the total sample analysed. Special caution should be applied in the cases of Greece (29.6%), Denmark (12.8%) and Portugal (10.5%). Finally, differences in defining absenteeism, muscular pains and job dissatisfaction between ES1995 and ES2000 make it difficult to compare both surveys. Similarly, measurement error in the individual-level covariates may have limited the ability to control for these variables in adjusted analyses.



# Appendix 2

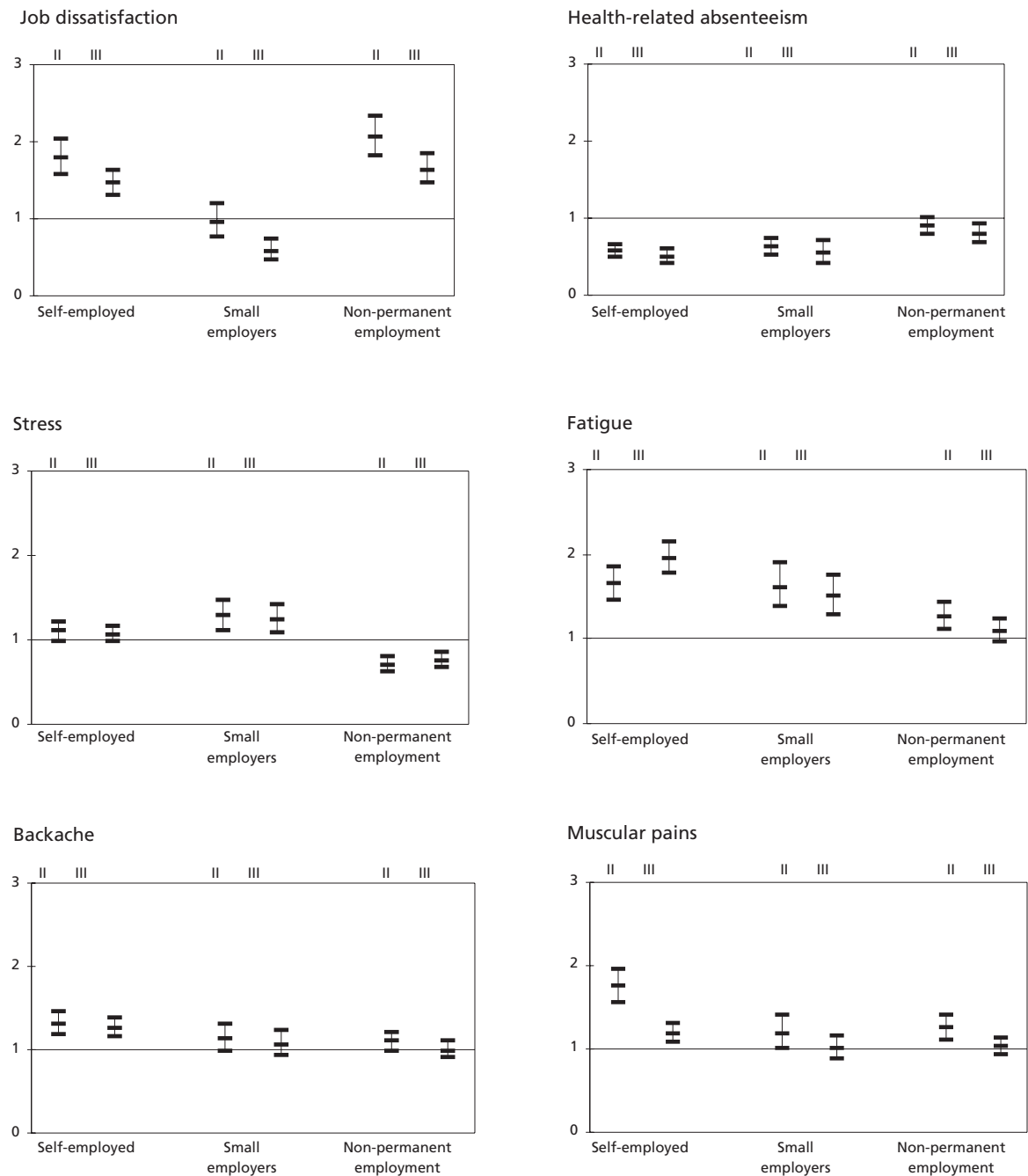
Figures illustrating associations between employment status and health indicators (see text on pp. 14-24)

**Figure 10 Association (crude OR and 95% CI) between types of employment and health indicators (nine categories) in ES2000 (permanent employment full-time as baseline)**

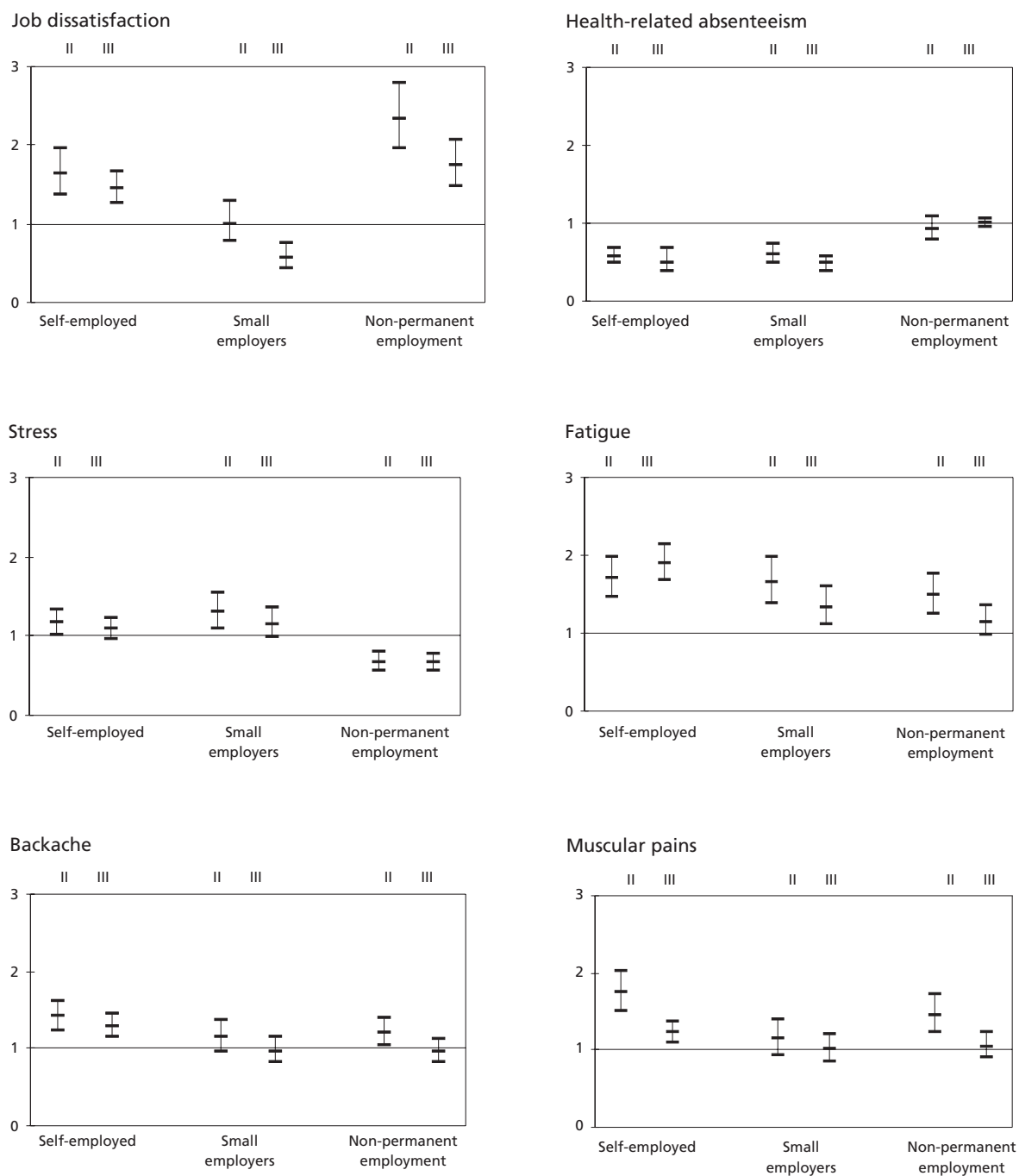




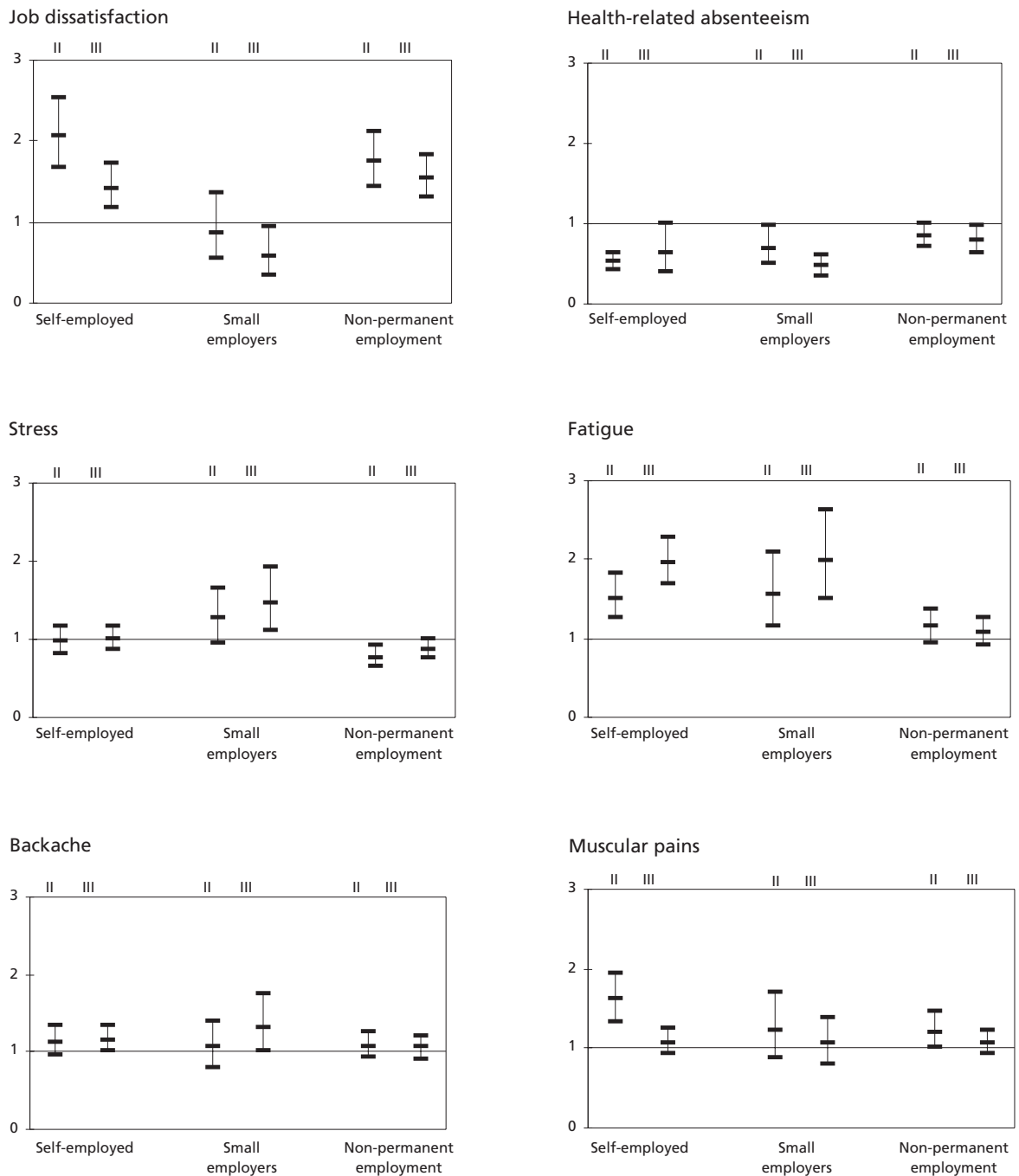
**Figure 11 Association (crude OR and 95% CI) between types of employment and health indicators (four categories) in ES1995 (II) and ES2000 (III) (permanent employment as baseline)**



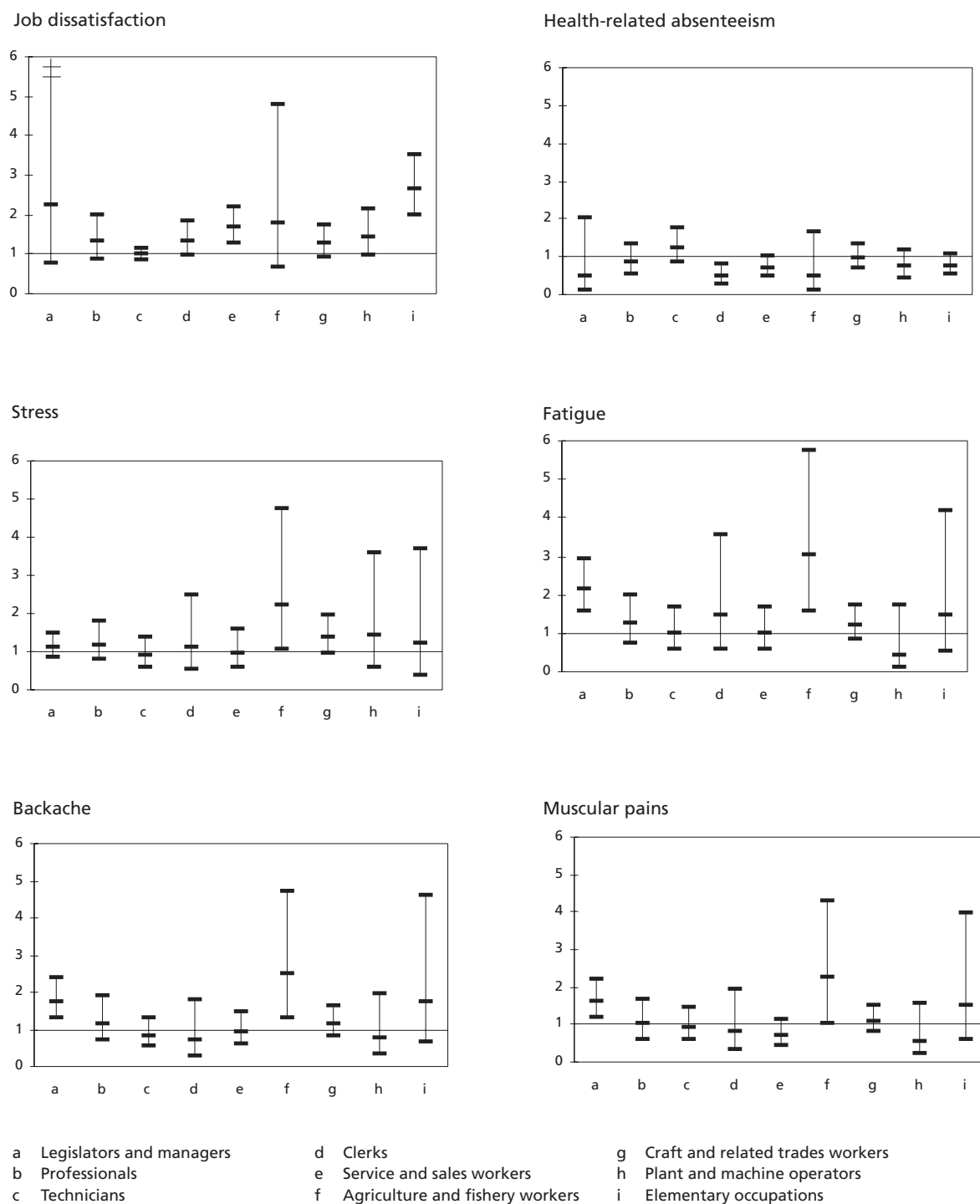
**Figure 12 Association (age-adjusted OR and 95% CI) between types of employment and health indicators (four categories) by men in ES1995 (II) and ES2000 (III) (permanent employment as baseline)**



**Figure 13 Association (age-adjusted OR and 95% CI) between types of employment and health indicators (four categories) by women in ES1995 (II) and ES2000 (III) (permanent employment as baseline)**

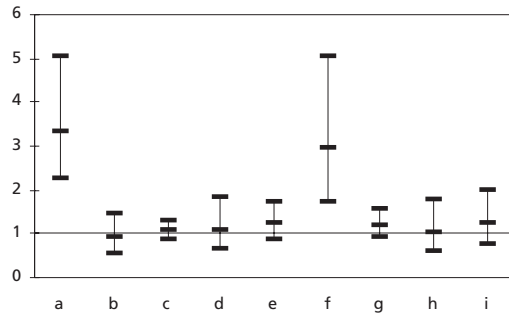


**Figure 14 Association (crude OR and 95% CI) between types of employment (permanent compared to non-permanent) and health indicators by job category in ES2000**

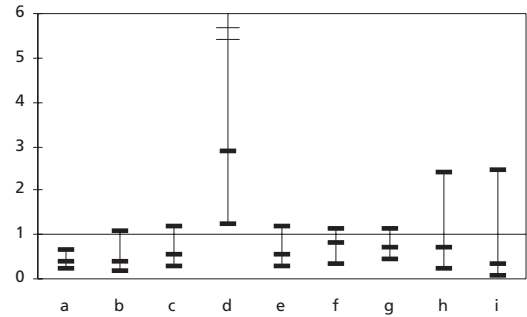


**Figure 15 Association (crude OR and 95% CI) between types of employment (permanent compared to self-employed) and health indicators by job category in ES2000**

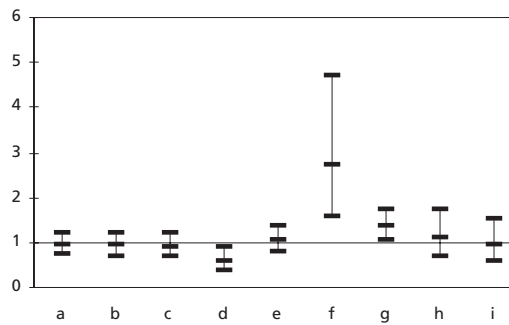
Job dissatisfaction



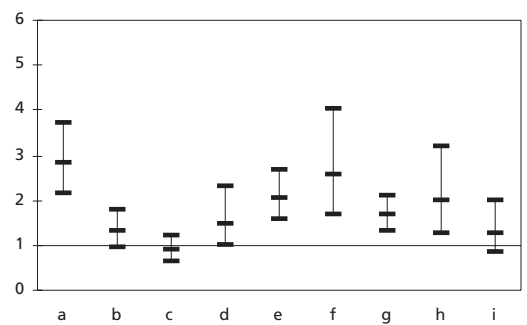
Health-related absenteeism



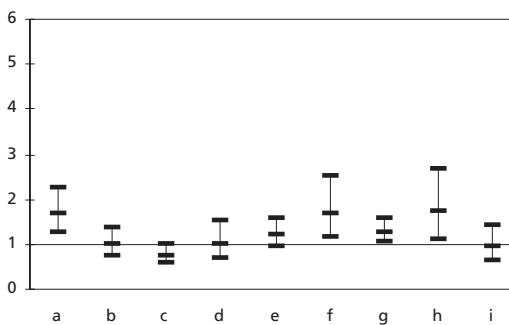
Stress



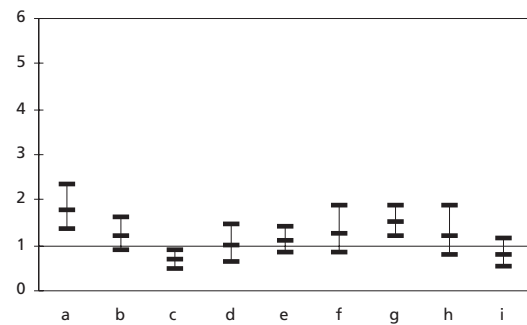
Fatigue



Backache



Muscular pains



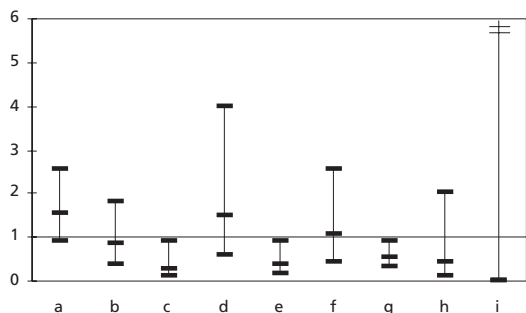
- a Legislators and managers
- b Professionals
- c Technicians

- d Clerks
- e Service and sales workers
- f Agriculture and fishery workers

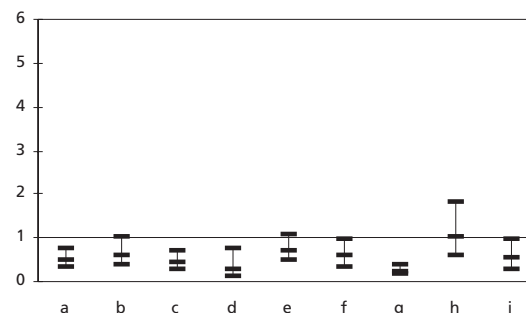
- g Craft and related trades workers
- h Plant and machine operators
- i Elementary occupations

**Figure 16 Association (crude OR and 95% CI) between types of employment (permanent compared to small employers) and health indicators by job category in ES2000**

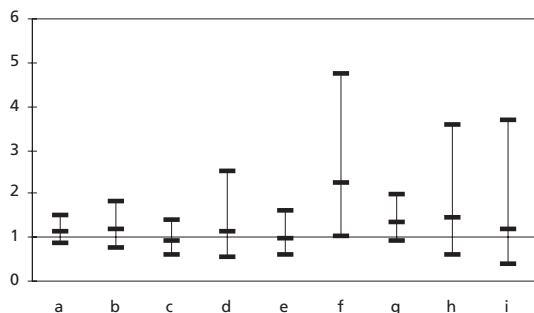
Job dissatisfaction



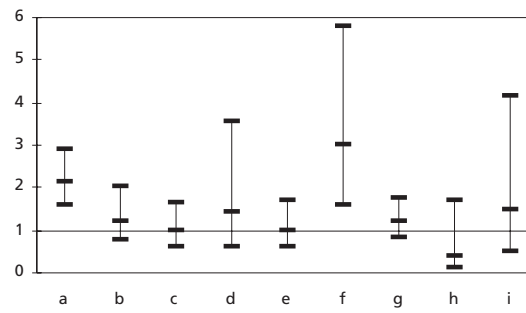
Health-related absenteeism



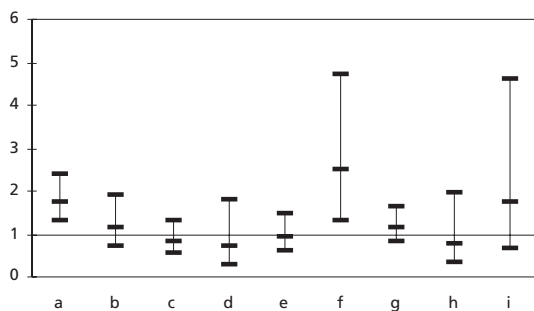
Stress



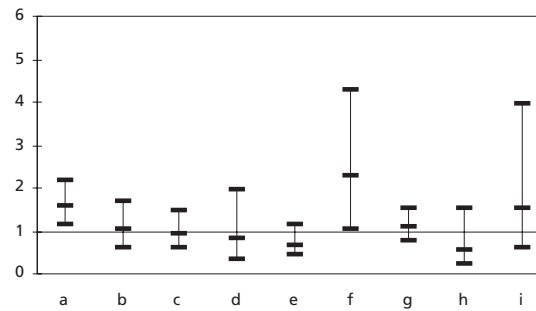
Fatigue



Backache



Muscular pains

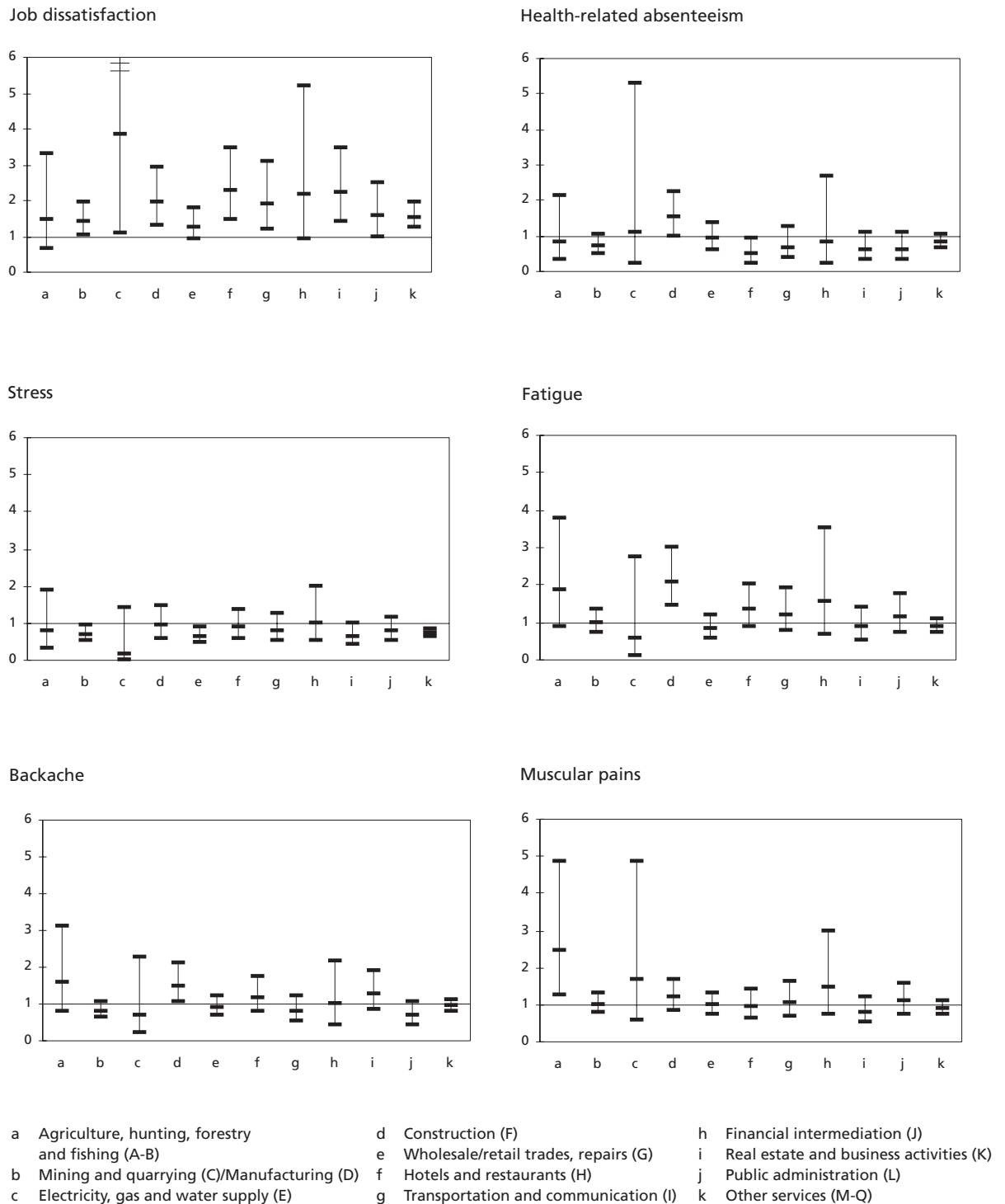


a Legislators and managers  
 b Professionals  
 c Technicians

d Clerks  
 e Service and sales workers  
 f Agriculture and fishery workers

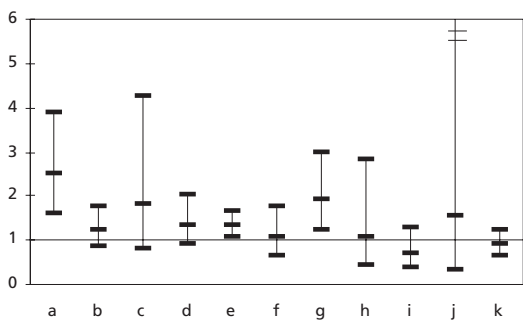
g Craft and related trades workers  
 h Plant and machine operators  
 i Elementary occupations

**Figure 17 Association (crude OR and 95% CI) between types of employment (permanent compared to non-permanent) and health indicators by economic sector in ES2000**

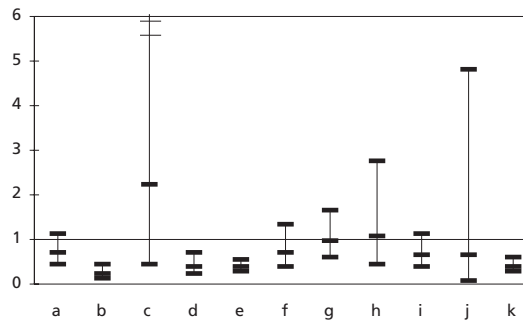


**Figure 18 Association (crude OR and 95% CI) between types of employment (permanent compared to self-employed) and health indicators by economic sector in ES2000**

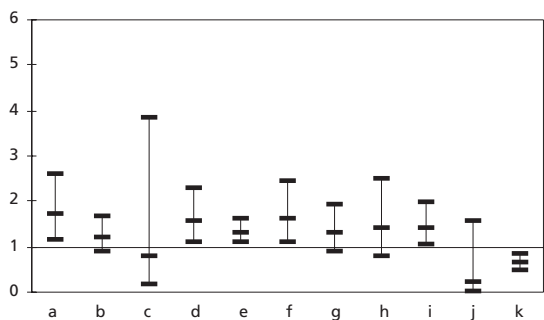
Job dissatisfaction



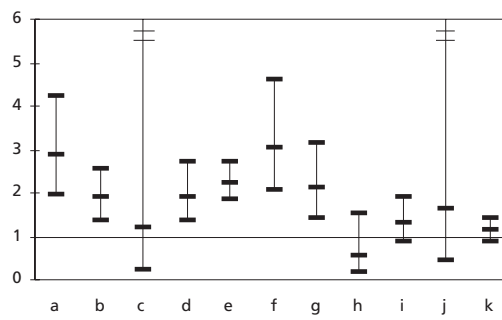
Health-related absenteeism



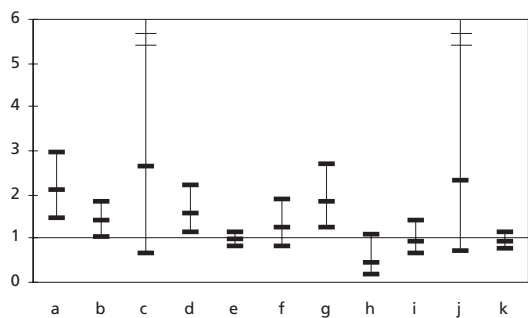
Stress



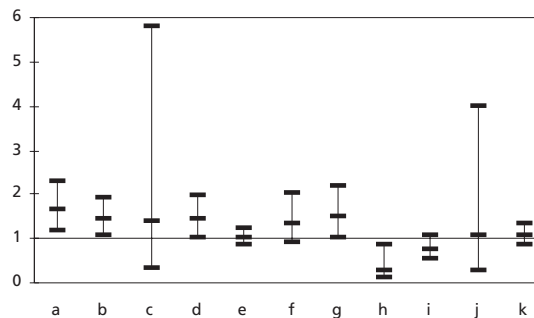
Fatigue



Backache



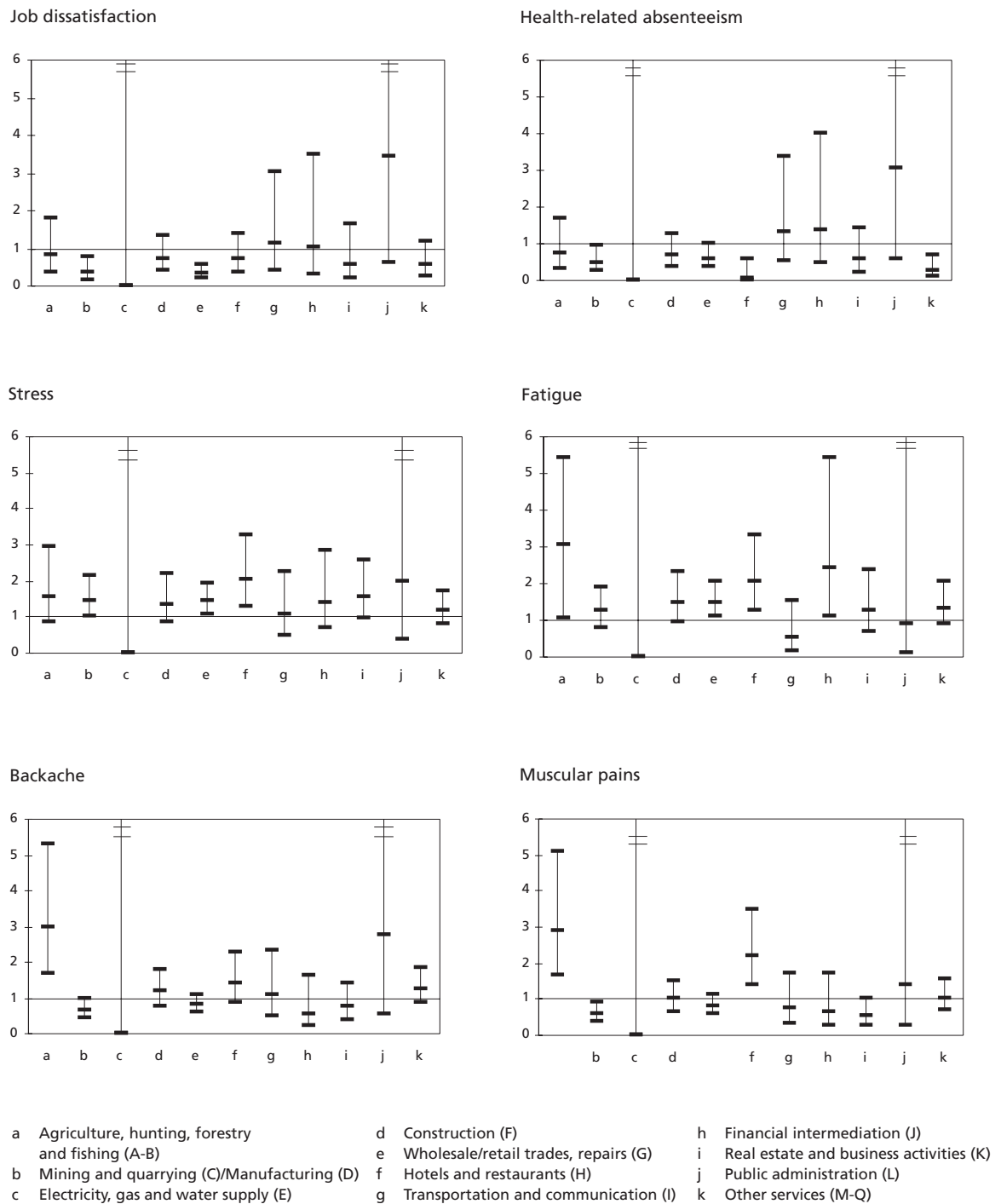
Muscular pains



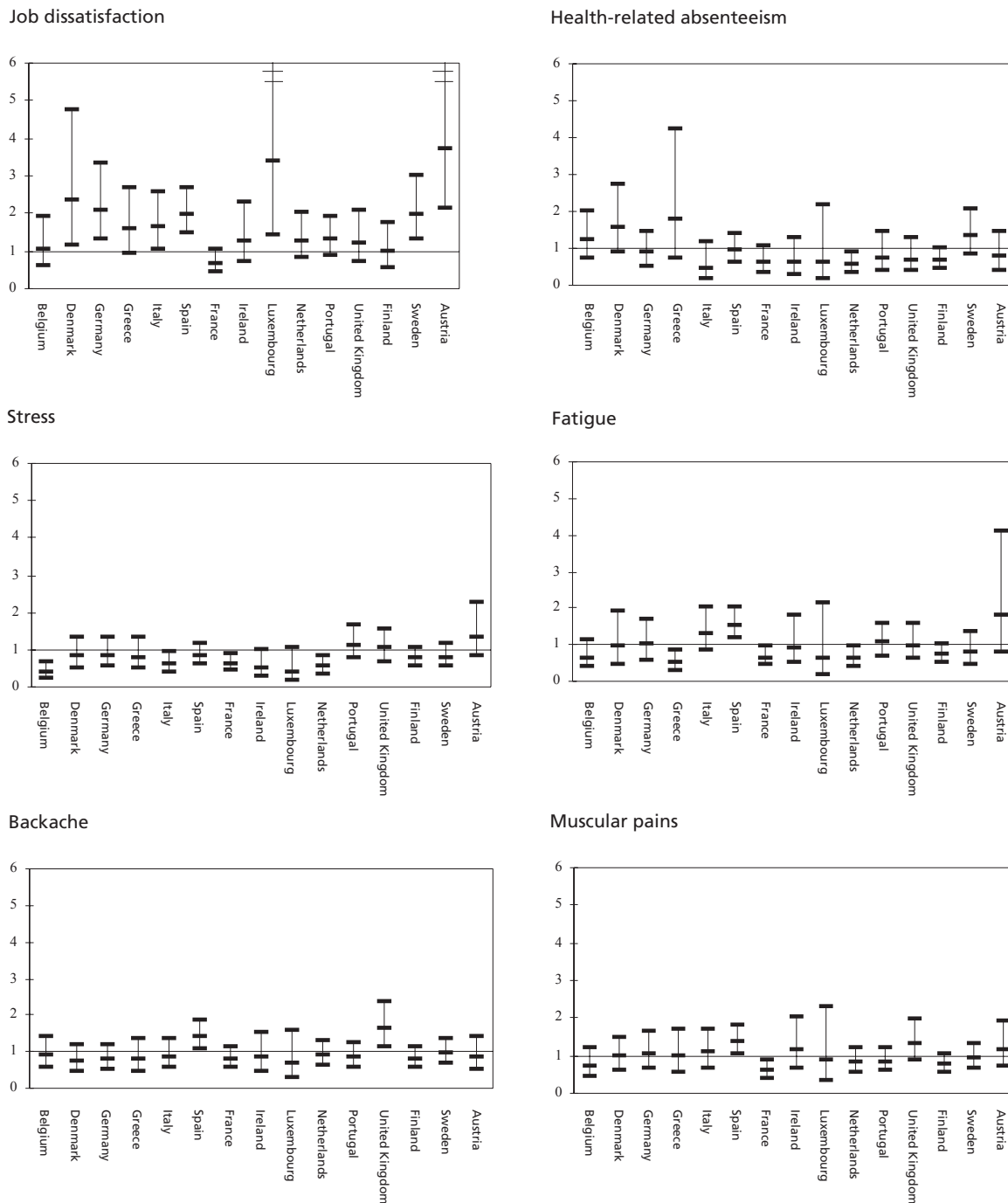
- |   |  |   |                                      |   |   |
|---|--|---|--------------------------------------|---|---|
| a | Agriculture, hunting, forestry and fishing (A-B) | d | Construction (F)                     | h | Financial intermediation (J)            |
| b | Mining and quarrying (C)/Manufacturing (D)       | e | Wholesale/retail trades, repairs (G) | i | Real estate and business activities (K) |
| c | Electricity, gas and water supply (E)            | f | Hotels and restaurants (H)           | j | Public administration (L)               |
|   |  | g | Transportation and communication (I) | k | Other services (M-Q)                    |



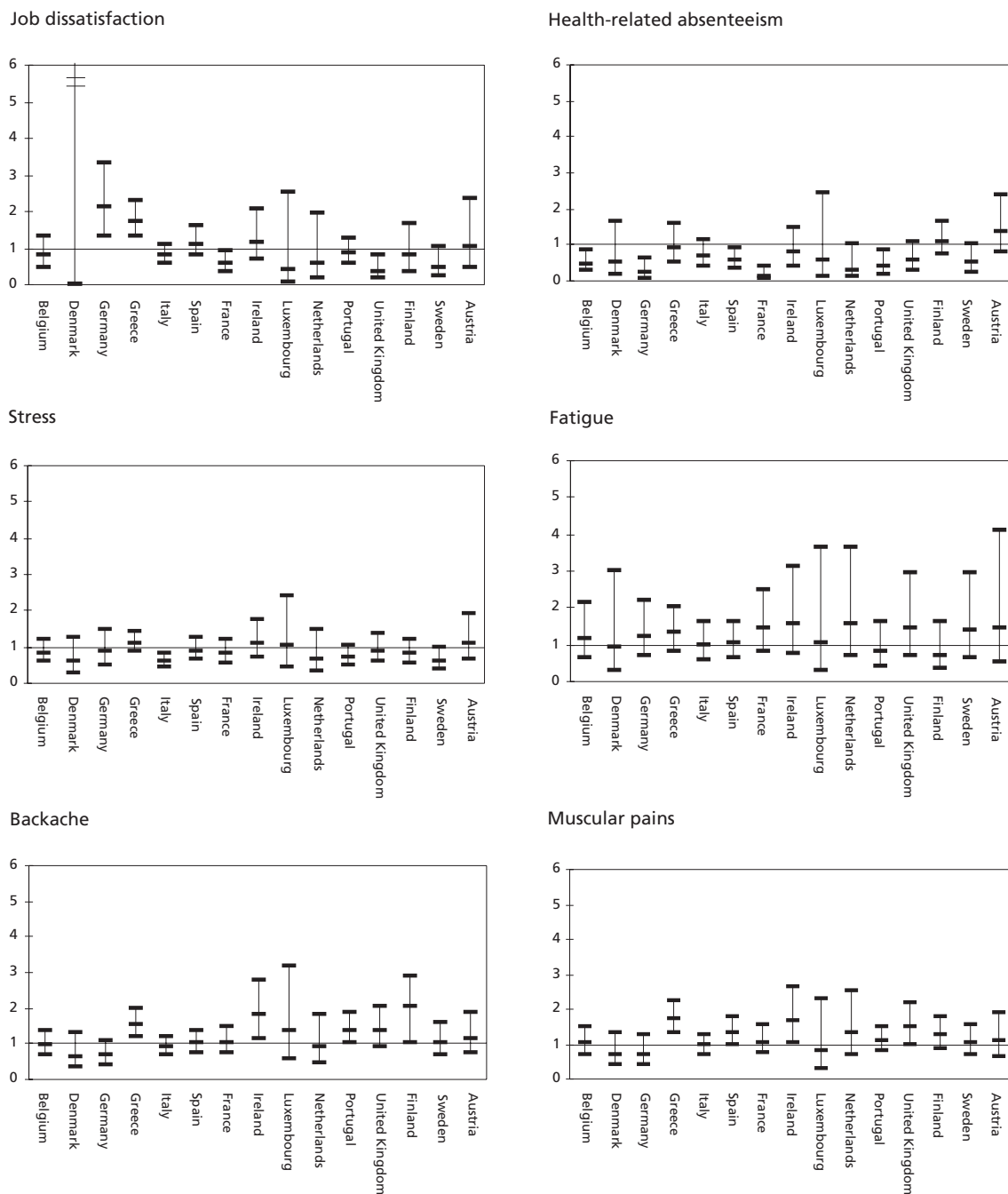
**Figure 19 Association (crude OR and 95% CI) between types of employment (permanent compared to small employers) and health indicators by economic sector in ES2000**



**Figure 20 Association (crude OR and 95% CI) between types of employment (permanent compared to non-permanent) and health indicators by country in ES2000**

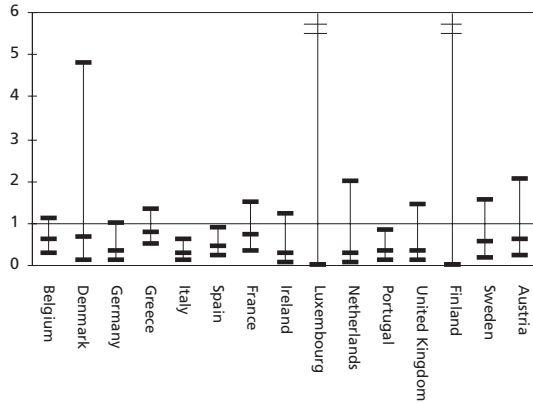


**Figure 21 Association (crude OR and 95% CI) between types of employment (permanent compared to self-employed) and health indicators by country in ES2000**

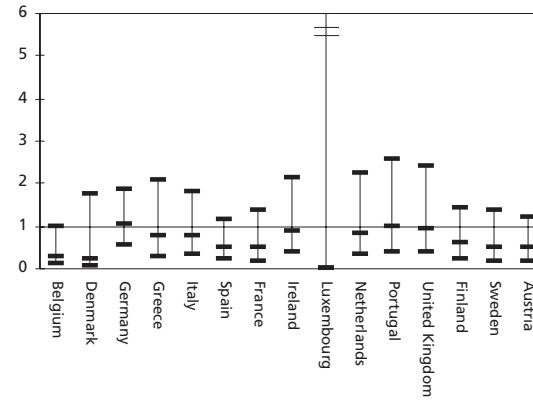


**Figure 22 Association (crude OR and 95% CI) between types of employment (permanent compared to small employers) and health indicators by country in ES2000**

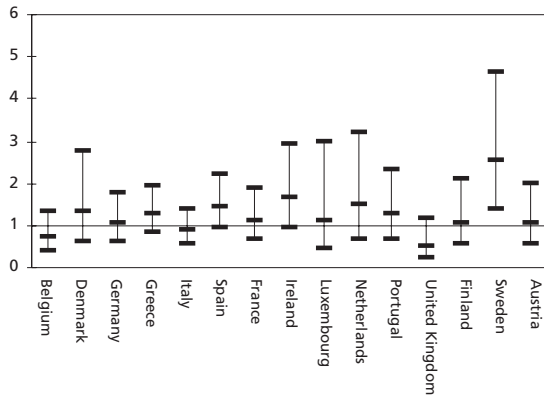
Job dissatisfaction



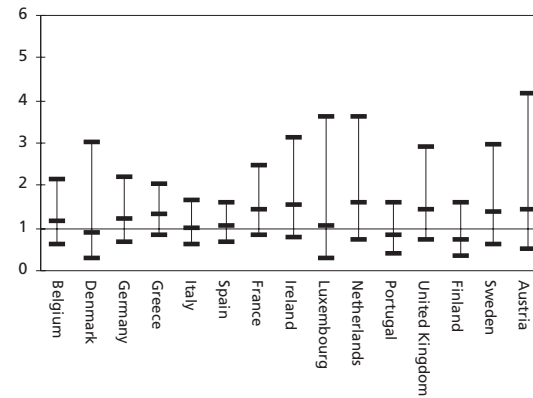
Health-related absenteeism



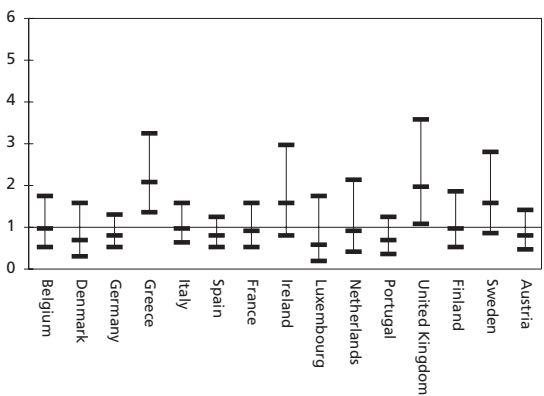
Stress



Fatigue



Backache



Muscular pains

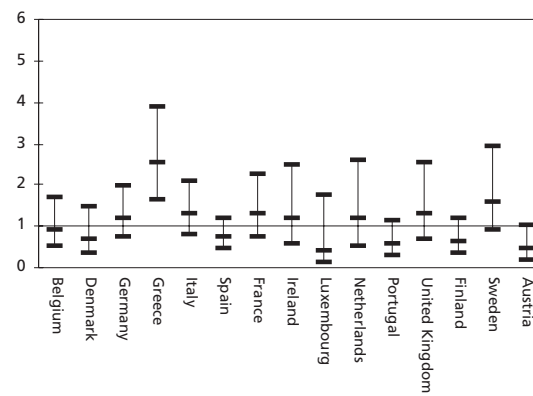
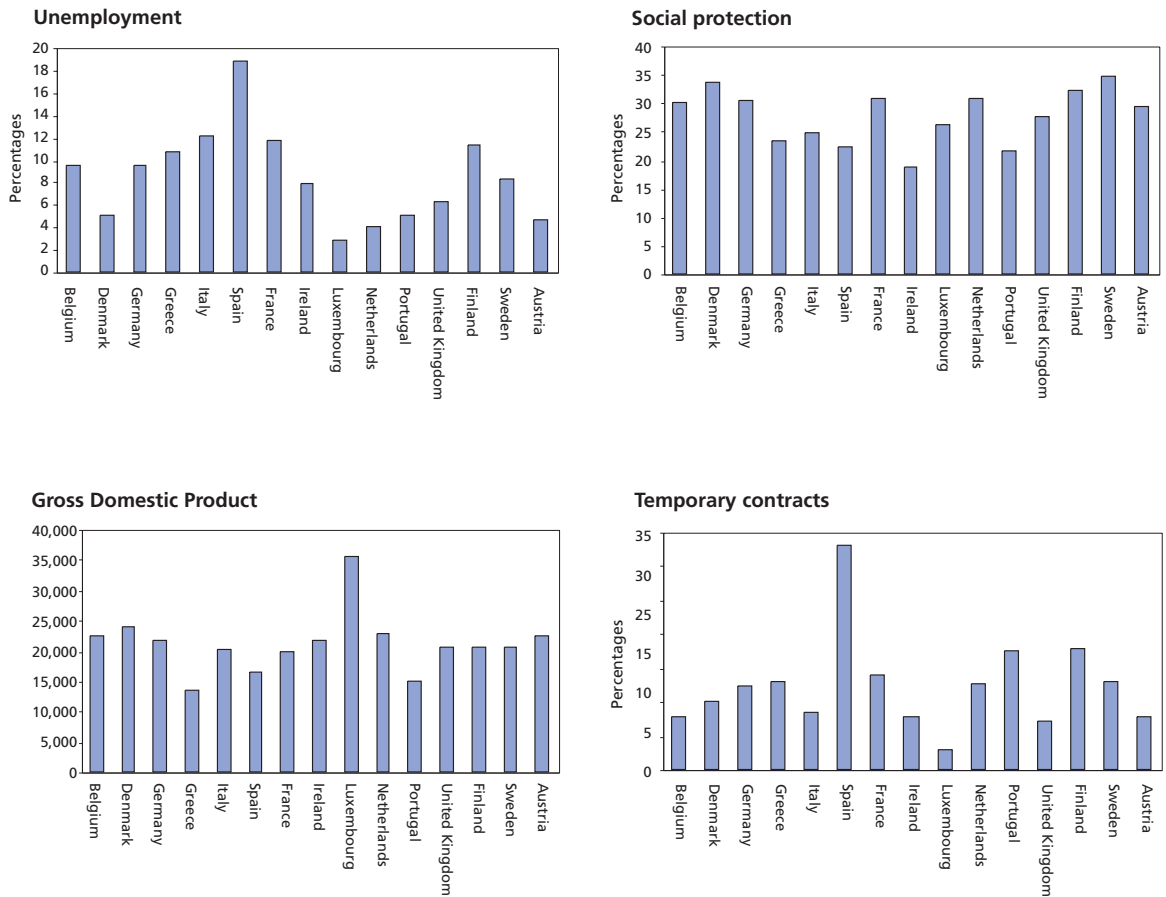
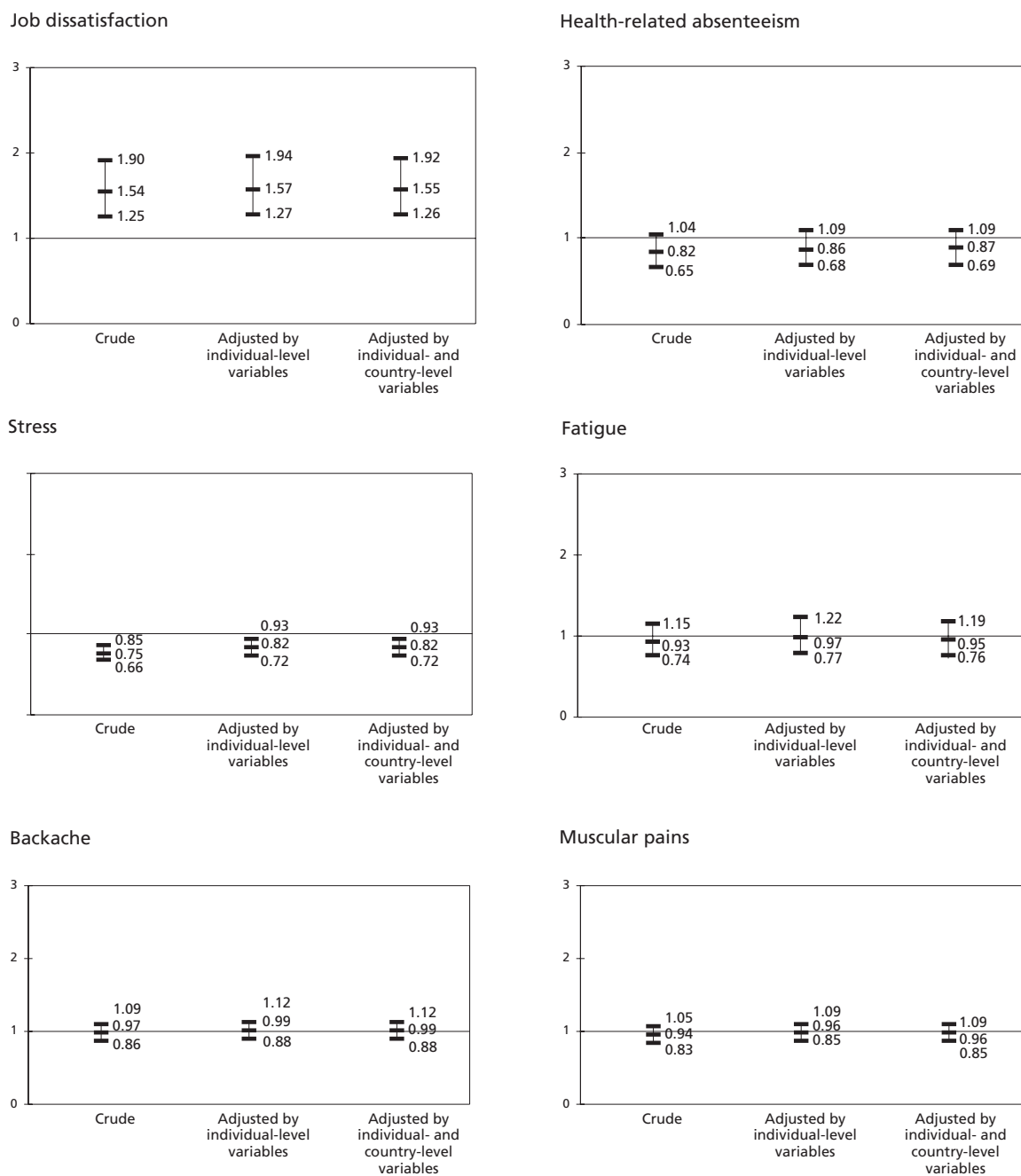


Figure 23 Distribution by contextual variables by country in ES2000



**Figure 24 Association<sup>1</sup> (crude OR and 95% CI) between types of employment (permanent compared to non-permanent) and health indicators, adjusted by individual<sup>2</sup> and country-level<sup>3</sup> variables in ES2000**



<sup>1</sup> From multilevel models with a random intercept for each country and a random effect of employment

<sup>2</sup> Age and gender

<sup>3</sup> Unemployment, social protection, GDP and temporary contracts



European Foundation for the Improvement of Living and Working Conditions

**Types of employment and health in the European Union**

Luxembourg: Office for Official Publications of the European Communities

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