Precarious Employment and Health-Related Outcomes in the European Union

EUROPEAN FOUNDATION
for the Improvement of Living and Working Conditions

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Foreword

The 1996 Second European Survey on Working Conditions undertaken by the European Foundation for the Improvement of Living and Working Conditions highlighted the poorer health outcomes and working conditions among workers with fixed-term and temporary contracts. It was considered that these results needed further exploration and the Foundation launched a research project to investigate the matter. The project has included the production of a secondary analysis of the 1996 Second European Survey complemented by other statistical data – the publication that you have in your hands – and a bibliographic review. In doing so, the Foundation takes into account the Treaties, the Commission initiatives and the agenda of the European social dialogue.

The Treaty of Amsterdam states that a high level of human health protection shall be ensured in the definition and implementation of all Community policies and activities. The Amsterdam Treaty also includes among the objectives of the European Union the promotion of balanced and sustainable economic and social progress and a high level of employment. Therefore employment policies would need to be formulated taking into account their implications for citizens' health.

The European Commission in its second report on the integration of health protection requirements in Community policies had already pointed out that employment and unemployment have broad repercussions on health. In addition, the European social dialogue has recently discussed a possible agreement among the social partners on atypical forms of work. Therefore, these results could be used by the social partners, governments and European institutions to improve health through employment.

We are grateful to the authors of the report, Fernando Garcia Benavides and Joan Benach, for the high quality of their research. We would like to thank as well the members of the working group that have helped to develop the project, Francisco Jesus Alvarez Hidalgo, Hans-Jürgen Bieneck, Fiona Murie, Olivier Richard and Laurent Vogel, and last but not least the Foundation team responsible for this project, Pascal Paoli, Sophia MacGoris and Jaume Costa.

Employment policies are usually produced without taking into account their health implications. If this reports fosters the debate among policymakers and the social partners on how to include health in the employment agenda the ambitions of the Foundation would be fulfilled.

Clive Purkiss
Director

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Introduction

The global market is introducing new labour relations in Europe. Flexibility in the job market has been proposed as a condition for economic competition and also as a solution to current high unemployment rates. Since the early 1980s Europe has experienced new types of work organisation and new forms of employment together with high unemployment rates, especially in some countries. Although the high level of unemployment is still clearly one of the major long-term social problems that European countries are facing, flexible forms of employment mean that the jobs available in the labour market are becoming increasingly precarious. Moreover, the distinction between precarious employment and unemployment is becoming more blurred. Research has found clear positive associations between unemployment and higher mortality and many physical and psychological problems related to socio-economic difficulties, risky lifestyles and unfavourable environments. However, little is known about the impact of new forms of employment on most health-related outcomes. Although some studies have shown the effects that precarious employments have on several health outcomes, the possible connection between precarious employment and health outcomes has not yet been fully investigated.

Hypotheses and objectives

This report has investigated two main hypotheses: first, that workers with precarious contracts show worse health-related outcomes than permanent employees; second, that these associations persist after adjusting for individuals working conditions and for social and environmental indicators. Consequently, this study has two main objectives: first, to assess the associations between employment and health-related outcomes before and after, taking into account the

potential effects played by a number of structural, physical, and psychosocial variables; second, to explore the potential influence played in this relationship by several group indicators (ecological or contextual variables) drawn from the 15 European Union Member States.

Methods

Design and data sources

The epidemiological design was cross-sectional. Two data sources were used: first, individual data for 15,146 workers drawn from the Second European Survey of Working Conditions (i.e. a representative sample of the total active population across 15 European countries); and second, four ecological variables for the same countries.

Variables

Nine or four different types of employment were used as independent variables. As dependent variables, six health-related outcomes were considered: four prevalent health outcomes (fatigue, stress, backache, muscular pains) and two health-related outcomes (dissatisfaction and health-related absenteeism). For nine categories, the reference category was workers with 'permanent employment working more than 35 hours per week' (full-time) and for four categories, 'permanent employment' (including both part-time and full-time workers) was taken as the reference category.

At the individual level, three groups of covariates were used: five structural variables (gender, age, size of company, work shifts and hours worked per week), six physical variables (vibrations, noise, temperature, breathing vapours, short repetitive tasks, repetitive movements) and three psychosocial variables (control, demand, social support). In the stratified analysis ten job categories and eleven economic sectors as well as the 15 EU countries were used.

Finally, in the multilevel analysis four ecological variables were used (unemployment, temporary contracts, social protection and Gross National Product) for each of the 15 member states of the European Union. The multilevel analysis was conducted in a data base with 11,727 people.

Analysis

Preliminary analyses by types of employment and health outcomes included univariate distribution for all variables and bivariant analyses. To assess whether there were significant associations between different types of employment and each of the health-related outcomes, unconditional logistic regression models were selected as the best choice for dichotomous-outcome analyses. Crude and adjusted odds ratios (OR) for structural, physical and psychosocial variables and confidence intervals at 95% were the main measures. Stratified regression models for four types of employment were carried out by job category, economic sector and country.

Multivariate models for each health-related outcome were adjusted, first by age and gender and, second, by adding a third variable. This strategy allowed us to assess the impact that structural,

working conditions and psychosocial variables had on the crude ORs obtained in unadjusted regression models.

Regarding multilevel analysis, the relationship between ecological variables and the estimated association between types of employment and health-related outcomes as well as interactions between ecological variables and types of employment were investigated by plotting odds ratios by quartiles of ecological variables. Multilevel models were used to investigate the relationship between types of employment and health-related outcomes of interest before and after adjustment for ecological variables as well as the interactions between types of employment and ecological variables.[1]

Main findings

Overall results

Distribution of each health-related outcome by employment category produced interesting findings. Full-time workers always had worse health-related outcomes as compared to part-time workers for all types of employment except in the case of dissatisfaction, absenteeism and stress for temporary contracts. Differences in health outcomes between part- and full-time contracts across types of employment suggest lack of homogeneity within sole traders and workers in precarious employment.

Associations between nine and four employments and the health-related outcomes produced the following results:

- Precarious and sole traders employments reported twice as much dissatisfaction as other forms of employment;
- All types of contracts (except full-time fixed-term contracts and part-time permanent contracts) showed much lower levels of absenteeism as compared to full-time permanent employments.
- Small employers, full-time sole-traders and full-time permanent employments showed the highest levels of stress.
- Sole traders, small employers and precarious employments showed significant high levels of fatigue as compared to permanent contracts.
- Sole traders and temporary contracts showed higher levels of backache as compared to permanent employments.
- Reporting muscular pains was more likely among sole traders (especially full-time) and other precarious employments as compared to permanent employments.

[1] The calculations on which the findings are based are contained in an Annex to the report. An electronic version of the Annex is available on request from the Foundation (Publications Unit). Please see contact details on the title page.

Most covariates, especially physical and psychosocial variables, were clearly associated to almost all health-related outcomes. However, results were almost never modified when they were adjusted by covariates.

Results by job category

When these relationships were analysed by job category showed we found similar results. Precarious employments were more likely to report dissatisfaction and less stress than permanents employments across job categories. Sole traders were more likely to report fatigue and muscular pains and less absenteeism than permanent employments across job categories. Small employers were more likely to report fatigue than permanent employements across job categories. The worst health-related outcomes were observed in craft and trade workers, elementary occupations, service and sales workers and clerks.

Results by economic sector

By and large the worst health outcomes were mainly observed in the following economic sectors: other services, mining and quarrying, and manufacturing, and wholesale and retail trade, repairs. Results by economic sectors showed similar patterns to those found above for job categories. In comparison to permanent employments, dissatisfaction was higher among precarious employments but stress was lower in the majority of economic sector categories. Similar findings were found when sole traders were compared with permanent employments. Also, a clearer pattern appeared for health-related absenteeism when comparing small employers with permanent employments but differences between small employers and permanent employments were negligible for other health-related outcomes. None of these results were modified, when adjusted by a number of covariates, for four large and representative economic sectors categories (mining and quarrying, and manufacturing, construction, wholesale and retail trade, repairs, and transportation and communication).

Results by country

Germany and Greece had the highest percentages for almost all outcomes. Germany was the only country with double figures in each outcome, while Greece also showed very high percentages except for health-related absenteeism. Apart from Germany and Greece, the highest dissatisfaction levels were found in southern European countries: France, Italy, Spain and Portugal. The highest percentages of health-related absenteeism were found in Germany and Austria.

In regard to the comparison between precarious and permanent employments, we observed that the first category reported more dissatisfaction in Germany, Spain, Austria, Ireland, Italy, Greece and Portugal. Another consistent pattern was observed for stress. Precarious employments were less likely to report stress than permanent employments in Belgium, Finland, Portugal, the Netherlands, and Sweden. In most countries both patterns (i.e. more dissatisfaction and less stress among precarious employments in comparison to permanent employments) persisted after adjusting for several covariates. For sole traders, health-related absenteeism was significantly

lower in eight countries: France, Luxembourg, Germany, Belgium, Finland, Italy, the Netherlands and Austria. Conversely, the ORs among sole traders for muscular pains were higher than among permanent employments. The main differences between sole traders and permanent employments persisted after adjusting for covariates. No clear patterns emerged when assessing the associations between small employers and permanent employments for the health outcomes by country. The only exception was health-related absenteeism where ORs of small employers tended to be generally lower in most countries.

Multilevel analysis results

Considerable variation in each ecological variable across the fifteen European countries was observed. Additionally, the two types of employment analysed (i.e. permanent and precarious employments) also varied across quartiles of the four ecological variables. However, despite ecological variables varied across countries and they were related to the types of employment, after adjusting by individual (gender and age) and ecological variables (separately and together), the association between the types of employment (precarious and permanent) and each one of the health-related outcomes did not change significantly. Thus, dissatisfaction remained significantly high among precarious employments and stress remained significantly low among precarious employments.

Conclusions

This report examined for the first time the complex relationships among precarious and other types of employments and six health-related outcomes for all 15 Member States. Several clear-cut associations were documented for which odds ratios were statistically significant. In other cases, associations were not statistically significant but consistent patterns across employments, job categories, economic sectors and countries makes it unlikely that they are chance findings:

- Full-time contracts almost always had worse health-related outcomes as compared to part-time contracts. Three exceptions to this overall pattern were found: part-time temporary contracts were more likely to report dissatisfaction, absenteeism and stress. This finding is likely to reflect the different meaning that full- and part-time contracts have among employments.
- By and large the worst health outcomes were observed in four job categories (i.e. craft and trade workers, elementary occupations, service and sales workers and clerks) and two economic sectors (i.e. other services, and mining and quarrying, and manufacturing). These findings agree with previously reported poor working conditions in these job categories and economic sectors
- In regard to the analysis by country, Germany and Greece showed the highest percentages in almost all health-related outcomes. In addition, Germany and southern European countries reported higher probabilities of reporting dissatisfaction while Austria and Germany had higher probabilities of absenteeism. In order to explain these results more research at national as well as regional levels is needed.

- Workers in precarious employments were more likely to report dissatisfaction but less likely to report stress in comparison to workers in permanent employments. These results persisted when the same analysis was conducted by job category, economic sector, and country. In comparison to stress, we hypothesise that dissatisfaction is a more sensitive indicator of short-term health changes.
- Permanent employments were less likely to report fatigue, backache and muscular pains but more likely to report health-related absenteeism in comparison to other types of employments. Similar findings were observed across job categories, economic sectors and countries.
- In comparison to permanent employments, sole traders were more likely to report fatigue and muscular pains but less likely to report health-related absenteeism. Similar findings were observed across job categories, economic sectors, and countries.
- Associations between the types of employment and health outcomes almost always persisted after the adjustment by individual working conditions. This interesting finding suggests that different types of employments have an independent effect on the health-related outcomes studied regardless of working conditions.
- The ecological effects observed were very weak. Ecological variables did not significantly change the individual effects between employments and health outcomes.

Nevertheless, since several limitations may reduce the validity and reliability of these findings, the results should be considered with caution. First, because of its cross-sectional nature, only associations were reported and no causal relationships were derived. Second, this study suffers from a number of data limitations: the fact that the European Survey was not specifically designed to assess the impact of types of employment on health outcomes, the relatively small size for some of the categories analysed, the variations in the response rate across countries, and the heterogeneity in the categories of employment used are perhaps the most important ones. Although this study has filled a significant gap in the knowledge of the relationships between several types of employment and health, the findings need to be replicated before they are taken as causal evidence.

Further research should take into account at least the following issues:

- New models and more specific hypotheses should be tested in further investigations. Refinement of these conceptual issues will be helpful both to improve data collection and data analysis.
- The homogeneity and specificity of the categories of employment analysed should increase in further studies. To achieve this objective, ad hoc analyses comparing employment definitions across countries might be conducted.
- The use of new sources of primary data would permit us to have more valid, reliable and comparable information. More efficient epidemiological designs, such as case-control or cohort studies, could overcome some of the limitations of cross-sectional studies.
- The use of other ecological or contextual variables should be explored. Whenever possible, multilevel analysis should be conducted using ecological data at the regional level.

Chapter 1 Introduction

Unemployment and precarious employment in Europe

The global market is changing labour relations in Europe. Technological development, new divisions of work, and economic competition in different geographical areas are creating new demands for productivity that have led to high unemployment rates. Thus, in the European Union the average unemployment rate increased from 8.2% in 1991 to 10.7% in 1995, varying from 2.9% in Luxembourg to 22.9% in Spain[1].

Flexibility in the job market has been proposed as a condition for economic competition, and also as a solution to current high unemployment rates[2]. Consequently, since the early 1980s Europe is facing new types of work organisation and new forms of employment together with high unemployment rates[3]. 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, self-employment, etc.[4]

While the high level of unemployment still is clearly one of the major long-term social problems that European countries are facing, flexible forms of employment mean that the jobs available in

[1] International Labour Organization, *World Employment 1996/1997 National Policies in a Global Context*, Geneva, 1997.
[2] European Commission Directorate General for Employment, Industrial, Relations and Social Affairs, *Employment in Europe 1995*, Luxembourg, Office for Official Publications of the European Communities, 1995.
[3] Marshall A, 'Secuelas del paro: El nuevo papel del trabajo temporal y del trabajo a tiempo parcial en Europa occidental', in: Rodgers G, Rodgers J (eds), *El trabajo precario en la regulación del mercado laboral*. Ministerio de Trabajo y Seguridad Social. Madrid, 1992, pp.43-90.
[4] World Health Organization, *Global Strategy on Occupational Health for all: The way to health at work*, Recommendation of the Second Meeting of the WHO Collaborating Centres in Occupational Health 11-14 October 1994 Beijing, China; Geneva, WHO, 1995.

the labour market are becoming increasingly precarious. In addition, it has been pointed out that the distinction between precarious employment and unemployment is becoming more blurred. According to a previous report published by the European Foundation for the Improvement of Living and Working Conditions, precarious status and 'insecure' work are strongly linked when people whose employment status is precarious work part-time[5]. It can be assumed that part-time work is not freely chosen when it is accompanied by unstable employment status and it is therefore an additional factor of insecurity. In contrast, part-time work associated with a permanent contract is more likely to have been chosen voluntarily. Therefore, it is necessary to move away from comparing 'unemployed people' to 'people with jobs' towards comparing 'precarious and unemployed workers' to 'workers having stable jobs and good working conditions'. In order to define precariousness, four major dimensions have been identified: unstable jobs, low work-control, low social or legal protection, and low income levels[6]. There are substantial proportions of precarious employment at the time of recruitment almost everywhere in Europe. Overall, precarious employment (i.e. defined as non-permanent contracts) accounts for more than 12% of total employment in the European Union (EU) and over 15% of paid employment. The highest percentages of precarious contracts are shown in Spain (40% of total employment), France (22%) and Greece (18%) while Austria and Luxembourg show the lowest percentage of precarious jobs. Detailed information on the distribution across a number of variables (e.g. countries, economic sector, size of enterprise, occupation, sex, age, or length of education) may be consulted in the report of the Foundation referred to above[7].

Impact of unemployment and precarious employment on health

At the same time that unemployment imposes negative economic and social effects on society, research has also established clear associations of unemployment with many health outcomes. Studies on the impact of unemployment on health have increased during this century showing two major peaks: first, during the Great Depression of the 1930s and second, in and since the late 1960s[8]. In recent years an increasing number of studies have found that unemployment is associated with health hazards related to economic difficulties, major social problems, health-related physical problems, unfavourable lifestyles, reckless behaviour and psychological problems as well as with higher mortality[9].

Although precarious employment is likely to be a major long-term problem with adverse effects on health, knowledge on the impact of new forms of employment on most health outcomes

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[5] Letourneux, V., *Precarious employment and working conditions in Europe*, Dublin, European Foundation for the Improvement of Living and Working Conditions, (mimeo) 1997.

[6] Rodgers G, 'El debate sobre el trabajo precario en Europa Occidental', in: Rodgers G, Rodgers J (eds), *El trabajo precario en la regulación del mercado laboral*, Ministerio de Trabajo y Seguridad Social, Madrid, 1992, pp15-42.

[7] Letourneux, *Precarious employment and working conditions* in Europe.

[8] Rodriguez E, '*The Impact of Unemployment on Health: Personal and Sociological Consequences of Unemployment in Barcelona'*, thesis dissertation, University of California at Berkeley, 1991.

[9] Janlert U, 'Unemployment as a disease and diseases of the unemployed', *Scandinavian Journal of Work and Environmental Health*, 23, supplement 3, pp.79-83. Dooley D, Fielding J, Levi L. 'Health and unemployment', *Annual Review of Public Health*, 17, pp.449-65, 1996. Shortt SE, 'Is unemployment pathogenic? A review of current concepts with lessons for policy planners', *International Journal of Health Services*, 26, 3, pp.569-89.

remains unknown or is scarce. The previously mentioned report found that, overall, workers on precarious contracts in the EU, and in particular temporary workers, were more exposed to working conditions (e.g. vibrations, loud noise, hazardous products, etc.) that might affect and in some cases be a threat to their health[10]. Detailed information on the distribution of employment status across a number of variables related to the working conditions (e.g. working environment, control over comfort factors, pace of work, etc.) may also be consulted in the same study.

In recent years, some studies have analysed the effects of precarious employment on several health outcomes showing that new types of contracts are linked with ill-health[11]. For instance, in Spain it was found that work accidents were twice as frequent for temporary workers as compared to permanent workers[12]. In France, a study suggested that being employed on a precarious contract was correlated with health problems due to work[13]. However, in spite of these findings, an exhaustive analysis of the potential associations between precarious employment and health outcomes has not yet been conducted. Thus, a number of important questions remain to be answered. First, to what extent does precarious employment go together with the most common work-related health outcomes? Second, what is the role played by potential intervening variables such as individual job factors (e.g. low job income) or environmental factors (e.g. poor working conditions)? Third, what is the effect that social and structural factors at the national level may have on the health of employees working under precarious conditions? Thus, social welfare or some kind of social support at the national level might buffer the potential relationship between precarious employment and health. A conceptual model with some of the possible joint effects of unemployment and precarious employment on mental and physical health is shown in a frame below.

Data from the Second European Survey on Working Conditions linked to ecological data drawn from Eurostat and other data files provide an excellent opportunity to examine for the first time all these questions. Findings may help to clarify the complex relationship between new types of precarious employment and a number of health-related outcomes.

Hypotheses and objectives

Two hypotheses have been investigated: first, that precarious employees report worse health-related outcomes than permanent employees; and second, that there is considerable variation in health-related outcomes among different types of employment, countries and other working and social variables.

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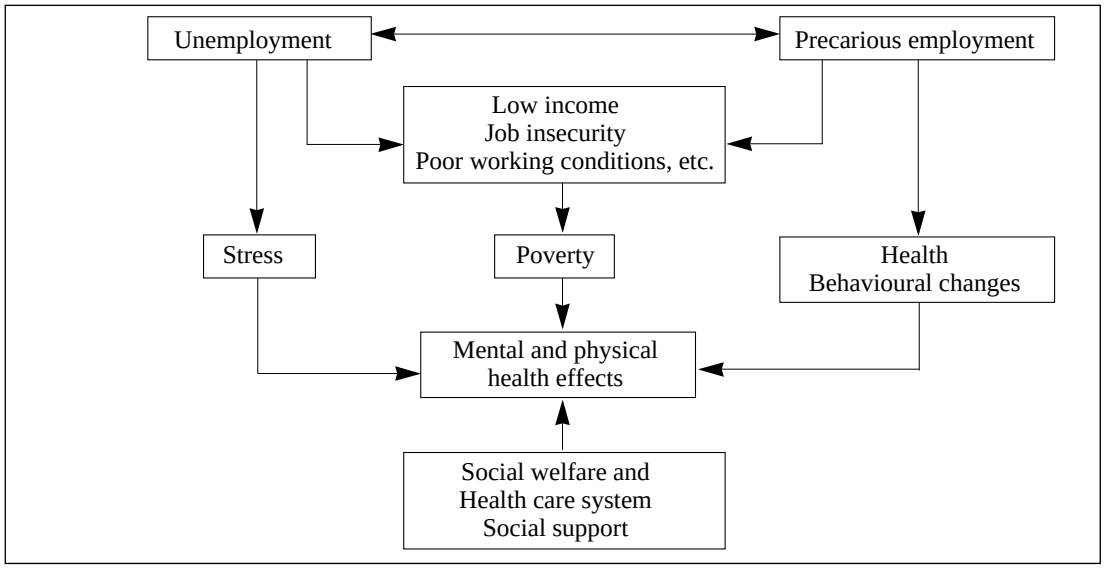
[10] Letourneux.
[11] Carré A, 'Précarisation, précarité, santé', *Travail*, 30, Winter 1993/94, pp.55-61. Sandret N. 'Precarité, précarisation, santé et travail. Comment aborder cette question? Comment délimite son champ?' *Travail*, 30, Winter 1993/94, Thébaud-Mony A, 'Précarisation et santé... un couple à définir. *Travail*, 30, Winter 1993/94, pp.27-35.
[12] Boix P. et al., 'Trabajo temporal y siniestralidad laboral en España en el período 1988-1995', *Cuadernos de Relaciones Laborales*, 11, 1997, pp.275-319.
[13] Sandret, 'Précarité, précarisation, santé et travail…'

Conceptual framework of unemployment and precarious employment on health[14]



In order to test those hypotheses, this report has used an epidemiological approach[15]. In the last two decades the theories, methods and uses of epidemiology have become of increasing interest to a growing number of health professionals as well as to the public at large. Epidemiology has become one of the essential public health sciences used in identifying associations between risk factors and health outcomes, shedding light on the related causal mechanisms, and evaluating public health programmes. This report has focused on the first of these aims.

Consequently, this report has two main objectives: first, to assess the associations between employments and health-related outcomes before and after, taking into account the potential effects played by a number of structural variables and working conditions (e.g. physical and psychosocial); and second, to explore the potential influence in this relationship of several ecological indicators (contextual effects) of the 15 EU countries.

[14] Modified from model of recession effects on health by Unemployment and Health Study Group.
[15] Wegman DH, 'The potential impact of epidemiology on the prevention of occupational disease'. *American Journal of Public Health*, 82, 1992, pp.944-54.

Chapter 2 Methods

Design

A cross-sectional design employed individual data drawn from the Second European Survey of Working Conditions conducted at the end of 1995 and beginning of 1996[16]. In addition, a multilevel analysis was conducted using ecological data taken from the 15 EU Member States.

Sampling methods and data collection

In the Second European Survey on Working Conditions a representative sample of the total active population (i.e. people who were, at the time of interview, employed or self-employed) was carried out in all member states of the European Union. The sample design employed was a multi-stage random sampling. Individuals were interviewed from the age of 15 (knowing that after the age of 65 the number of active people would level off rapidly). The target was to obtain 1,000 'persons in employment' per country, except in the cases of Luxembourg (n=500), and Germany (n=2,000: 1,000 for eastern Germany and 1,000 for western Germany) as defined by the Labour Force Survey (EUROSTAT). 'Persons in employment' refers to those who during the reference week (that varied by country) did any work for pay or profit, or were not working but had jobs from which they were temporarily absent. 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, as well as housewives etc., were excluded. Non-

[16] Paoli P, *Second European Survey on Working Conditions*, European Foundation for the Improvement of Living and Working Conditions, Luxembourg, Office for Officail Publications of the European Communities, 1997.

Europeans were included, on the condition that they could be interviewed in the respective national languages of the countries where they worked. The response rates by country varied from the lowest levels in Denmark (35%) and Italy (43%) to the highest in France (79%) and Austria (81%). The final number of subjects included in the survey were 15,986 workers, a representative sample of the total active population across all European Union countries. From the sample, 840 subjects were excluded from this analysis since information was missing or incomplete: people who did not specify their type of contract (i.e. trainees, apprentices and others not performing a job in the strict sense), self-employed workers 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 data base was 15,146.

Definition of variables

The main independent variable was **type of employment**, which was defined in nine categories according to criteria previously defined in a previous Foundation report[17]:

Types of employment (nine categories)

1. Employed on a permanent basis working more than 35 hours per week (full-time)
2. Employed on a permanent basis working between 10 and 35 hours per week (part-time)
3. Self-employed working alone more than 35 hours per week (full-time)
4. Self-employed working alone between 10 and 35 hours per week (part-time)
5. Self-employed employing between one and nine people
6. Employed on a fixed-term contract working more than 35 hours per week (full-time)
7. Employed on a fixed-term contract working between 10 and 35 hours per week (part-time)
8. Employed on a temporary contract working more than 35 hours per week (full-time)
9. Employed on a temporary contract working between 10 and 35 hours per week (part-time).

The first category, i.e. employed on a permanent basis working more than 35 hours per week, was always employed as the reference category.

Additionally, due to their small numbers, those nine categories were merged and stratified analyses were conducted employing only **four categories:**

Types of employment (four categories)

- Employed on a permanent basis (included categories 1 and 2)
- Self-employers or sole-traders (included categories 3 and 4)
- Small employers (included category 5)
- Precarious contracts (included categories 6, 7, 8 and 9).

The last category of contracts, which included fixed-term and both part-time and full-time temporary contracts, was defined as ‘precarious employments’, while the first category,

[17] Letourneux.

permanent employments (including both part-time and full-time), was always taken as the reference category in all analyses.

Six **health-related outcomes** were considered as dependent variables. First, we selected the four most prevalent health outcomes (fatigue, stress, backache and muscular pains), all of which were divided into two categories.

Health outcomes	Categories
1. Fatigue	yes / no
2. Stress	yes / no
3. Backache	yes / no
4. Muscular pains	yes / no

In addition, two **health-related outcomes** were selected: **job satisfaction** which could mean an intermediate variable between work and health, and **health-related absenteeism,** which could be considered to be a surrogate of a health outcome[18]. Likewise, these variables were codified into two categories:

Health-related outcomes	Categories
1. Job satisfaction:	satisfied: (including 'very' and 'fairly satisfied') dissatisfied (including 'not very' and 'not at all satisfied')
2. Health related absenteeism:	'none' 'one episode or more'

On the other hand, at the individual level, we considered three groups of covariates. First, we selected five **structural variables**:

Structural variables	Categories
1. Gender	male / female
2. Age	15-24 / 25-34 / 35-44 / 45-54 / 55 or over
3. Company's size	less than 10 workers / 10-499 / 500 or over
4. Work shifts	yes / no
5. Hours worked per week	less than 35 hours / 35 hours or more

Furthermore, we selected six **physical variables** and three **psychosocial variables**.

Physical variables	Categories
1. Vibrations	yes / no
2. Noise too loud	yes / no
3. Extreme temperatures	yes / no
4. Breathing vapours and fumes	yes / no
5. Short repetitive tasks	yes / no
6. Repetitive hand or arm movements	yes / no

[18] Marmot M et al., 'Sickness absence as a measure of health status and functioning: from the UK Whitehall II study', *Journal of Epidemiology and Community Health*, 49, 1995, pp.124-30.

Psychosocial variables	Categories
1. Control	High / medium / low
2. Demand	Low / medium / high
3. Social support	yes / no

Fourteen items were drawn from the questionnaire to build the variable control: Q20b, Q20c, Q22a, Q22b, Q22c, Q23c, Q23d, Q23f, Q23h, Q26a, Q26b, Q26c, Q26d, and Q26e; for demand we employed six items: Q15a, Q15b, Q15g, Q15h, Q20e and Q24; finally, for the indicator of social support we used question Q20a. All these items were grouped into two categories (yes = 0, when at least a quarter of the working time was exposed, and no = 1). For control, scores ranged from 0 to 14 ('high', less or equal to 4 points; 'medium' 5-7 points; and 'low', 7 or more points). For demand, scores ranged from 0 to 6 ('low', less or equal to 1 point; 'medium' 2-3 points; and 'high', more than 3 points). Social support was employed as a categorical variable divided into two categories (yes or no).

In the stratified analysis ten **job variables** and eleven **economic sectors** as well as the 15 EU **countries** were used. However, due to the small number of workers, multivariate regression models were built for only four job categories and four economic sectors.

Finally, in the multilevel analysis, four **ecological variables** at national level for each of the 15 EU Member States were employed. Unemployment rates, temporary contracts and social protection were drawn from Eurostat, and Gross National Product from the World Bank.

Job variables	Categories
Job categories:	1. Legislators and managers
	2. Professionals
	3. Technicians
	4. Clerks
	5. Service and sales workers
	6. Agricultural and fishery workers
	7. Craft and trade workers
	8. Plant and machinery operators
	9. Elementary occupations
	10. Armed forces

Economic variables	Categories
Economic sectors:	1. Agriculture, hunting, forestry and fishing
	2. Mining and quarrying and manufacturing
	3. Electricity, gas and water supply
	4. Construction
	5. Wholesale and retail trade, repairs
	6. Hotels and restaurants
	7. Transportation and communication
	8. Financial intermediation
	9. Real estate business
	10. Public administration
	11. Other services

Country variables	Categories
1. Unemployment rate[19] (1995)	Percentage
2. Temporal contracts[20] (1996)	Percentage
3. Social protection benefits[21] (1993)	Percentage
4. Gross National Product per capita[22] (GNP) (1995)	Purchasing Parity Power (PPP)

All participants were linked to ecological variables. Because information relating to some individuals was incomplete it could not be included in the statistical software used (HLM)[23] and 3,419 people were excluded from the multilevel analysis. Therefore, this analysis was conducted in a data base with 11,727 people. All the above variables are summarised by the following level of analysis:

Health-related outcomes	Main variable	Variables at the individual level	Variables at the country level
Dissatisfaction	Types of	Age	Unemployment
Absenteeism	employment	Gender	Temporary contracts
Fatigue	(nine or four)	Company size	Social protection
Stress		Work shifts	GNP
Backache		Hours worked per week	
Muscular pains		Vibration	
		Noise too loud	
		Extreme temperature	
		Breathing in vapours and fumes	
		Short repetitive tasks	
		Repetitive hand or arm movements	
		Psychosocial demand	
		Psychosocial control	
		Social support	
		Job categories	
		Economic sectors	
		Countries	

Statistical methods

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

Univariate distribution for all variables are presented at the European level using absolute figures and percentages. Bivariant analyses using absolute numbers, percentages and crude odds ratios

[19] Annual average rate, EUROSTAT. *Basic Statistics from the European Union. 33 ed. 1996*, Eurostat, Regions, Statistical Yearbook 1996.
[20] EUROSTAT, *Statistiques en bref. Population et conditions sociales*, 1997/8. Enquête sur les forces de travail. Principaux résultats, Luxembourg, 1996.
[21] Percentage of Gross Domestic Product at market price, EUROSTAT, *Facts through Figures*, Eurostat, 1996.
[22] *World Bank Atlas*, 1997.
[23] A.S. Bryk, S.W. Raudenbush, R.T. Congdon Jr, *Hierarchical Linear and Nonlinear Modeling*, Chicago, SSI Scientific Software International, 1996.

(OR) with confidence intervals at 95% (95% CI) have been carried out to assess the relationship between types of employment and each of the outcomes selected.

The **Odds Ratio** (OR) is a common and useful measure that allows assessment of relatives risks. It can be expressed as the relative difference between the occurrence of an event (e.g. dissatisfaction) in a group of workers (e.g. precarious employments) as compared to the occurrence of the same event in another group of workers (e.g. permanent employments)[24].

Confidence Intervals (95% CI) are often employed as a mean to assess 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).

Two-tailed tests with alpha levels of less than 0.05 were used to define statistical significance. Regression models are the most widely used epidemiological data analysis technique. In this study, unconditional logistic regression models have been selected as the best choice for dichotomous-outcome analyses[25]. Those statistical 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-related outcomes taken as dependent variables. The effects of structural, physical and psychosocial variables on the relationships between types of employment and health outcomes were assessed by taking them into account in the regression models. Due to small numbers, stratified regression models by job category, economic sector or country were adjusted for only four types of employment. However, the variable 'hours worked per week' was taken into account in multivariate regression models. Additionally, associations between those types of employment and each health outcome were analysed for four large and representative job categories (i.e. professionals, clerks, craft and trade workers and elementary occupations) and for four economic sectors (i.e. mining and quarrying and manufacturing, construction, wholesale and retail trade and repairs, and transportation and communication). In spite of the relatively small number of workers in each country, due to its interest, analyses by each country were carried out for four types of employment.

Multivariate regressions for each health-related outcome were built adjusting by age and gender in a first step and adding a third variable in a second step. This strategy allowed us to assess the impact that structural, physical and psychosocial variables had on crude odds ratios (ORs) obtained in simple unadjusted regression models. Finally, all selected covariates were included into the models. However, this report mainly includes crude ORs while all adjusted results have been added in tables and figures in the Annex. (Copies of the Annex to this report are available on request from the Foundation.) This strategy was chosen for three main reasons: first, due to

[24] For example, an OR equal to 2 for precarious employments will simply mean that the outcome studied (e.g. dissatisfaction) is two times more likely than for the baseline level that has been selected as comparison (e.g. permanent employments). In contrast, an OR of 0.70 would mean that in the outcome studied (e.g. stress), the occurrence of the outcome among precarious employments would be 30% (1-0.70) less probable than for the group selected as the comparison reference (e.g. permanent employments).

[25] Hosmer DW, Lemeshow S, *Applied logistic regression*, New York, John Wiley and Sons, 1989.

the large amount of information generated, only the more meaningful results have been included; second, since differences between crude and adjusted ORs by age, gender or a third variable did not differ significantly; and finally, because differences in ORs adjusted for all covariates are difficult to interpret due to statistical multicollinearity. However, whenever significant results on differences among crude and adjusted odds ratios were found, comments have been included in the report.

In regard to the multilevel analysis[26], exploratory analyses were initially used to investigate the relationship between each health-related outcome and the ecological variables. Variations in those outcomes across countries were explored by plotting proportions adjusted by age, gender and types of employment. The relationship between ecological variables and the estimated ORs between each health-related outcome and types of employment as well as interactions between ecological variables and types of employment were also explored by plotting odds ratios through quartiles of ecological variables.

Multilevel analysis is a relatively new technique that allows the integration of individual and group (also called ecological or contextual) variables and explains these relationships and interactions across levels

Multilevel models were used to assess the relationship between two types of employment (permanent and precarious) and health-related outcomes before and after they were adjusted for individual variables, the adjustment for ecological variables and interactions between types of employment and ecological variables. Interactions between ecological variables and types of employment were omitted from the models because they were not statistically significant. Each of the ecological variables was included in the model separately and together. All estimates were adjusted only for age and gender because other individual level variables were not statistically significant. Analyses were performed using SPSS 7.5.2S[27] and HLM 3.0 programs[28].

[26] Diez-Roux AV, 'Bringing context back into epidemiology: variables and fallacies in multilevel analysis', *American Journal of Public Health*, 88, 1998, pp.216-22.
[27] Green SB et al., *Using SPSS for Windows: Analyzing and Understanding Data.* book and disk edition, 1997.
[28] Bryk, Raudenbush, Congdon Jr, *Hierarchical Linear and Nonlinear Modeling*

Chapter 3 Results

Univariate distribution

The distribution of types of employment for nine and four categories is shown in Figures 1 and 2 respectively. Those employed with full-time permanent contracts represent almost 56% of all jobs while part-time permanent contracts account for almost 14%, small employers are only 6%, and sole traders (both full- and part-time) and workers with precarious contracts (i.e. non permanent contracts) represent about 12%.

The distribution of health-related outcomes is shown in Figure 3 where we see that almost 13% of the workers interviewed reported that they were dissatisfied and more than 23% reported health-related absenteeism in their job in the last year. The prevalence of the other four health outcomes ranged from almost 19% for muscular pains and fatigue to almost 30% for stress and backache.

Main findings:

- Backache and stress are the most prevalent health-related outcomes.
- Dissatisfaction is the least prevalent health-related outcome.

The distribution of variables which may confound the possible relationships between independent and dependent variables is shown in Figures 4 to 6. In Figure 4 we see that 38.7% are young workers under 35 years of age and more than 11% were aged 55 years and upwards, while male workers represent almost 58% of the total sampled workforce. On the other hand, almost two thirds of the companies studied (65.5%) had less than 500 workers, one third of the workers (32.6%) reported working shifts, and 20.6% were part-time workers.

Figure 5 provides data on physical variables. Prevalence of physical variables range from 22.1% for vibrations to 56.1% for repetitive hand or arm movements. In the same figure, we see that extreme temperatures account for 31.4% and short repetitive tasks are reported by more than one third of workers (36.7%). Finally, Figure 6 shows the distribution by psychosocial variables. Almost 30% of the workforce report 'low control' (28.5%) and 'high demand' (29.5%) in their job, while almost 14% of workers report lack of social support.

Regarding the two variables used in the stratified analysis, i.e. job categories and economic sectors, Figure 7 shows that craft and related trades, clerks, service and sales workers and technicians represent the highest percentages, accounting for 58.2% of the workforce. Elementary occupations, plant and machine operators and agricultural and fishery workers account for 21.8%, while 19.3% are legislators and managers, and professionals. Figure 8 shows that other services (22.1%), wholesale and retail trade, repairs (15.9%), and public administration (12.3%) account for more than half of the total (50.3%). Mining, quarrying and manufacturing are 18.2% while the remaining economic sectors show much lower percentages.

Simple analysis by health-related outcome

The distribution of each health-related outcome by nine categories of employment in Table 1 show three remarkable results. First, full-time workers always show worse health-related outcomes as compared to part-time workers for all types of employment except in the case of dissatisfaction, absenteeism and stress for temporary contracts. For example, 25% of part-time temporary contracts reported dissatisfaction compared to 22.5% for full-time temporary contracts. Second, differences in health outcomes between part- and full-time contracts across types of employment suggest a lack of homogeneity within sole traders and precarious employments. In addition, in the latter group there are also differences between fixed-term and temporary contracts. For example, 25% of workers with temporary part-time contracts are dissatisfied as compared to only 17.4% for fixed-term part-time, and 27% of full-time fixed-term workers show absenteeism in comparison to 18% for part-time fixed-term contracts or 19.5% for full-time temporary contracts. Finally, clear differences by health-related outcomes are found across types of employments. Although specific comments by health outcome are discussed later, four of the most interesting findings may be summarised as follows.

- Both types of temporary workers are highly dissatisfied and show quite high percentages of backache and muscular pains but low percentages of stress.
- Full-time sole traders show high levels of stress, fatigue, backache and muscular pains and very low levels of absenteeism.
- Full-time permanent and fixed-term contracts report high absenteeism levels and low dissatisfaction.
- Small employers show high levels of stress and fatigue but low levels of dissatisfaction and absenteeism.

Main findings:

- Full-time workers show worse health outcomes as compared to part-time workers, except for temporary contracts

- A lack of homogeneity was noted for the contract categories both within sole traders and precarious employment.

Below the associations at the European level between employments and health outcomes are assessed. The estimated crude ORs and 95% CI for nine and four types of employment for each of the health-related outcomes are shown in Figures 9 and 10.

Job dissatisfaction

Permanent contracts and small employers have the lowest percentages of job dissatisfaction (around 10%), while sole traders and fixed-term contracts show higher percentages (around 18%), and temporary contracts (full-time and part-time) have the highest percentages of all, between 22.5 and 25% (see Table 1).

Among the main findings it is important to remark that the probability of being dissatisfied among temporary part-time workers is much higher (OR=2.55 and 95% CI ranges from 1.82 to 3.58) than the probability of being dissatisfied among full-time permanent contracts, which is the baseline level. In contrast, this probability is 22% lower among part-time permanent contract workers (OR=0.78 and 95% CI ranges between 0.66 and 0.92) than for full-time permanent contracts (Figure 9). Except for small employers, who don't show differences in comparison to full-time permanent contracts, the other categories of employment are significantly more dissatisfied than the two previously mentioned groups. These differences are statistically significant since the unit is not included within the confidence intervals.

Using three types of employment and permanent contracts (full-time and part-time together) as baseline, similar results were found, as shown in Figure 10. Higher dissatisfaction levels are much more likely among precarious employments and sole traders. Thus, for example, precarious contracts report being 2.05 times more dissatisfied (95% CI between 2.33 and 1.80) in comparison to permanent contracts. Conversely, dissatisfaction among small employers is similar than for workers with permanent contracts.

Crude ORs did not show significant changes after adjusting for gender and age or other variables (Annex, Tables 1A and 2A).

Main finding:

- There is a clear association between employment status and job dissatisfaction: precarious and sole traders employments report two times more dissatisfaction than other forms of employment.

Health-related absenteeism

In regard to health-related absenteeism, full-time permanent (25.6%) and full-time fixed-term employments (27.0%) are clearly above the average as can be seen in Table 1. In contrast, full-time and part-time sole traders show the lowest percentages (16.4% and 13.4% respectively).

When eight types of employment are compared to full-time permanent contracts (Figure 9), only full-time fixed-term employments show similar levels of health-related absenteeism. Small employers, sole traders, part-time fixed-term contracts and temporary contracts show much lower probabilities of reporting absenteeism with ORs ranging from 0.45 to 0.70. For instance, part-time sole traders have a 55% less probability to report absenteeism as compared to full-time permanent contracts (OR=0.45 and 95% CI ranges from 0.33 to 0.61).

Similar results for four groups of employment are shown in Figure 10. The ORs of the three types of employment are lower than those of permanent contracts. As expected, the lowest probability of reporting absenteeism is shown among sole traders, followed by small employers and precarious workers. For example, ORs of sole traders, are about 44% lower than permanent contracts. These results do not change significantly after adjusting for gender and age. Calculations are reported in Tables 3A and 4A of the Annex.

Main finding:

- All types of contracts (except full-time fixed-term contracts and part-time permanent contracts) show much lower levels of absenteeism as compared to full-time permanent employments

Stress

Small employers and full-time sole-traders show the highest percentages of stress (34.3% and 32.3% respectively) as is shown in Table 1. In contrast, part-time fixed-term contracts and full-time temporary contracts have the lowest percentages (17.5% and 21.5%, respectively).

In Figure 9 we can see a barely statistically significant positive association between stress and two types of employment: small employers and full-time sole traders. For example, the first category is 25% more likely to report stress (OR=1.25 and 95% CI rises from 1.08 to 1.44) as compared to full-time permanent contracts. On the other hand, the lowest probabilities are found among precarious employments with ORs ranging from 0.51 to 0.77.

Information with four types of employment it is also shown in Figure 10. Small employers report a significant 27% higher probability of reporting stress, while sole traders show a similar

probability and precarious employments a significant 30% lower probability. As in previous cases, results adjusted by gender, age and other variables, which show almost similar results, are included in the Annex (Tables 5A and 6A).

Main finding:

- Small employers, full-time sole-traders and full-time permanent employments show the highest levels of stress.

Fatigue

Table 1 shows that all full-time workers except permanent contracts report high levels of fatigue. While the highest percentages of fatigue are shown for full-time sole traders (27.2%) and small employers (25.8%), full-time fixed-term contracts and full-time temporary contracts also show high percentages (23.4% and 22.8%, respectively). In contrast, part-time contracts and both types of permanent employments show the lowest percentages of all: 16.3% for part-time permanent contracts, 16.5% for part-time fixed-term contracts, and 18.1% for part-time temporary contracts.

Small employers, full-time sole traders and full-time fixed-term contracts show significant high levels of fatigue as compared to full-time permanent contracts (Figure 9). For example, full-time sole traders are 71% more likely to report fatigue (OR=1.71; 95% CI rises from 1.50 to 1.94). However, after adjusting by gender and especially by age, results are also significant for full-time temporary contracts. Thus, for example, age-adjusted OR for full-time temporary contracts is 1.49 – 95% CI from 1.12 to 1.96 (Table 7A in the Annex).

These results are consistent when fatigue is analysed for four employment categories. Figure 10 shows higher probabilities of reporting fatigue for three types of employment as compared to permanent contracts. The range goes from 25% for precarious contracts (OR=1.25 and 95% CI from 1.11 to 1.42) to 64% for sole traders (OR=1.64 and 95% CI rises from 1.46 to 1.85). Adjusted results are included in the Annex (Table 8A).

Main finding:

- Sole traders, small employers and precarious employments show significant high levels of fatigue as compared to permanent contracts.

Backache

For backache we see in Table 1 that full-time employments in general, and both types of sole traders and temporary contracts in particular, show the highest percentages of all. For example, 35.6% of full-time sole traders report muscular pains and around 33% for temporary contracts. In contrast, permanent contracts (27.0% for part-time and 29.1% for full-time) and part-time fixed term contracts (24.5%) show the lowest levels of all.

Figure 9 shows that the highest positive associations between backache and the eight types of employment as compared to full-time permanent contracts are found among full-time sole

traders (OR=1.33) and full-time and part-time temporary contracts (ORs are 1.23 and 1.20 respectively) while part-time fixed-term contracts report a statistically significant lower association (OR=0.79). However, after adjustment for age, a statistically significant OR is shown for all full-time contracts, especially in the case of temporary contracts (OR=1.34) (Table 9A in the Annex).

Similar findings for four types of employment are shown in Figure 10. Only sole traders report a significantly high OR of backache as compared to permanent employments. Small employers and precarious employments reported more backache but their differences were not significant. Only small changes were found after the adjustment for different variables (Table 10A in the Annex).

Main finding:

- Sole traders and temporary contracts show higher levels of backache as compared to permanent employments.

Muscular pains

For muscular pains, we can see in Table 1 how full-time and part-time sole traders show the highest percentages of all (27.0% and 22.7% respectively). In contrast, part-time fixed-term contracts (14.9%) and both types of permanent contracts (15.6% and 17.2%) are below the average.

Sole traders (especially full-time) and others full-time fixed contracts are more likely to report muscular pains when compared to full-time permanent contracts as is shown in Figure 9. For example, full-time sole traders are 77% more likely to report muscular pains (OR=1.77 and 95% CI ranges from 1.56 to 2.01), 37% for full-time fixed-term contracts (that increases to 46% after adjusting by age) and 29% for full-time temporary employments (that increases to 41% after adjusting by age); adjusted results are shown in the Annex in Table 11A.

Similar results can be seen in Figure 10 in which sole traders are 74% more likely to report muscular pains than permanent employments (OR=1.74 and 95% CI 1.55 and 1.95) and only 24% for precarious employments (OR=1.24; 95% CI 1.09 and 1.40). These differences persisted after adjusting for each one of the covariates (Table 12A in the Annex).

Main finding:

- Reporting muscular pains is more likely among sole traders (especially full-time) and other precarious employments as compared to permanent employments.

Covariates

The assessment of whether there was a significant association between each of the covariates and each health-related outcome can be observed in Tables 2a and 2b. There were no differences by gender except for backache (where there is a 12% higher OR for females). In contrast, age and

company size are clearly associated to almost all health-related outcomes. The age group 55 and over reports higher probabilities of muscular pains, fatigue, backache and stress while workers of the biggest companies (500 or over) present lower probabilities of dissatisfaction, fatigue, muscular pains and backache but probabilities of health-related absenteeism and stress are higher.

In addition, hours worked per week and work shifts were associated to almost all health-related outcomes. Shift workers showed significantly higher dissatisfaction, absenteeism, stress, fatigue, backache and muscular pains while part-time workers have significantly low ORs for all health-related outcomes except dissatisfaction.

For all the other covariates (see Table 2b), there is a significant increase in the ORs of all health-related outcomes, especially for all psychosocial variables (lack of social support, low control and high demand). An interesting but unexplained exception was found for social support and health-related absenteeism.

Main finding:

- Most covariates, especially physical and psychosocial variables, are clearly associated to almost all health-related outcomes.

Analysis by job category

The distribution for each health-related outcome by job category (Table 3) shows some consistent patterns. The worst health outcomes are found among craft and trade workers: 17.2% for dissatisfaction, 19.5% for health-related absenteeism, 17.6% for fatigue, 21.6% for backache, and 24.8% for muscular pains. In addition, elementary occupations (12.9% for backache and 15.6% for muscular pains), services and sales workers (14% for health-related absenteeism and 13% for fatigue) and clerks (14.7% for dissatisfaction and 14% for stress) also present high percentages for some health-related outcomes. Finally, professionals and technicians reported the highest percentage of stress (14.6%). Due to the very small number of persons included in the armed forces, results are negligible.

Main finding:

- The worst health-related outcomes are observed in craft and trade workers, elementary occupations, service and sales and clerks.

The associations between employments and each health-related outcome have been analysed for each one of the job categories. In relation to precarious versus permanent employment we found consistent patterns across job categories, specifically for dissatisfaction and stress (Figure 11). For instance, clerks with precarious employment were 1.86 times more likely to report dissatisfaction than clerks with permanents contracts. Results were also statistically significant for service and sales workers (OR=2.37), craft and related trades workers (OR=2.36), elementary

occupations (OR=2.19), and plant and machine operators (OR=1.87). For the remaining job categories ORs were also above the unit although results were not statistically significant.

Conversely, probabilities to report stress were lower among precarious employments compared to permanent employments in almost all job categories. For example, clerks with precarious employment reported a 39% lower probability of stress than clerks with permanent employment. The same occurred for professionals (OR=0.71), technicians (OR=0.72), service and sales workers (OR=0.65), and crafts and related trade workers (OR=0.71). For health-related absenteeism a similar but less consistent pattern was observed: lower and non-statistically significant probabilities of reporting absenteeism were found among precarious employments in almost all job categories. Results were not modified, when adjusted by covariates, for four large and representative job categories – professionals, clerks, craft and related trade workers, and elementary occupations (Tables 22A to 45A in the Annex).

Main finding:

- Precarious employment were more likely to report dissatisfaction and less stress than permanent employments across job categories.

The comparison between sole traders and permanent employments (see Figure 12) shows a firm pattern across job categories for health-related absenteeism. Thus, sole traders were less likely to report absenteeism than permanent employments among legislators and managers (OR=0.64), professionals (OR=0.56), clerks (OR=0.46), craft and related trades workers (OR=0.44), service and sales workers (OR=0.42), technicians (OR=0.39), and plant and machine operators (OR=0.28). In contrast, for fatigue and muscular pains we can observe that ORs of the majority of job categories were higher than one, although some results were not statistically significant. It is also interesting to remark that sole traders working as legislators and managers reported the highest differences for dissatisfaction (OR=3.99), muscular pains (OR=3.19), and fatigue (OR=2.02), and one of the highest differences for backache (OR=1.9).

These results were only slightly modified when they were adjusted by psychosocial covariates (Tables 22A to 45A in the Annex). In general, all ORs adjusted by psychosocial variables presented a tendency toward null (OR=1). This finding could mean that health-related outcome differences between sole traders and permanent employments would be partly due to a higher demand and lower social support among the first job category.

Main finding:

- Sole traders were more likely to report fatigue and muscular pains and less absenteeism than permanent employments across job categories.

Except for fatigue, no clear patterns were found between small employers and permanent employments when compared by job categories, as can be observed in Figure 13. Thus, ORs were higher among small employers for seven out of nine categories although results were only

significant for services and sales workers (OR=2.14), agricultural and fishery workers (OR=1.87), legislators and managers (OR=1.48), and craft and related trades workers (OR=1.47).

Main finding:

- Small employers were more likely to report fatigue than permanent employments across job categories.

For four large and representative job categories (professionals, clerks, craft and related trade workers, and elementary occupations), results were not modified when adjusted by covariates (Tables 22A to 45A in the Annex).

Analysis by economic sector

By and large the worst health outcomes are mainly observed in the following economic sectors: 'other services' (20.8% for health-related absenteeism, 23.8% for stress, 21.6% for fatigue, and 21.5% for backache), 'mining and quarrying, and manufacturing' (20.2% for muscular pains), and 'wholesale and retail trade, repairs' (18.4% for dissatisfaction). Conversely, 'public administration' reported the lowest stress level (0.5%) and one of the highest health-related absenteeism levels (13.1%). In addition, 'electricity, gas and water supply' presented the best health related outcomes for dissatisfaction (0.8%), health-related absenteeism (1.5%), fatigue (0.9%), and backache (1.2%). However, it is in two economic sectors 'financial intermediation' and 'real estate and business activities' where health-related outcomes were steadily low.

Main finding:

- Other services, mining and quarrying, and manufacturing economic sectors reported the worst health-related outcomes.

Results by economic sectors showed similar patterns to those found above for job categories. In comparison to permanent employments, dissatisfaction was higher among precarious employments but stress was lower in the majority of economic sector categories (Figure 14). However, for stress, we found lower differences between both types of employment for economic sectors than for job categories. In fact, differences were statistically significant for only four economic sectors: construction (OR=0.64), real estate and business (OR=0.42), public administration (OR=0.60), and other services (OR=0.66).

Similar findings were found when sole traders were compared with permanent employments. Sole traders reported significantly lower health-related absenteeism than permanent employments for all economic sectors, except for agricultural, hunting, forestry and fishing, and public administration, but both were not statistically significant. Furthermore, fatigue and muscular pains were also higher among sole traders than permanent employments, although for many economic sectors the differences were not significant, especially in relation to fatigue.

In contrast, a clearer pattern appeared for health-related absenteeism when comparing small employers with permanent employments. Differences across economic sectors were significantly low for mining and quarrying, and manufacturing (OR=0.31), wholesale and retail trade, repairs (OR=0.61), transportation and communication (OR=0.32), and real estate and business (OR=0.34), but the ORs for other economic sectors always were above average. The differences between small employers and permanent employments were negligible for the other health-related outcomes.

All these results were not modified, when adjusted by covariates, for four large and representative economic sectors categories: mining and quarrying, and manufacturing, construction, wholesale and retail trade, repairs, and transportation and communication (Tables 57A to 80A in the Annex).

Analysis by country

Distribution of health-related outcomes across countries was very unequal (Table 5). Germany and Greece had the highest percentages for almost all outcomes. Germany was the only country with double figures in each outcome while Greece also showed very high percentages except for health-related absenteeism. For example, Germany had the highest levels of absenteeism (18.8%), stress (12.4%) and backache (15.7%) and Greece had the highest levels of dissatisfaction (17.4%), fatigue (18.0%) and muscular pains (11.4%). Two other patterns were found regarding dissatisfaction and absenteeism. Aside from Germany and Greece, the highest dissatisfaction levels were found in southern European countries: France (9.4%), Italy (8.9%), Spain (8.7%) and Portugal (7.7%). The highest percentages of health-related absenteeism were found in Germany and Austria (18.8% and 10.5% respectively). Regarding the lowest percentages of health-related outcomes, a less clear pattern was found. Luxembourg had very low levels of dissatisfaction (1.8%), backache (2.9%) and muscular pains (1.8%) but the lowest levels of stress; health-related absenteeism and fatigue were found in Ireland (2.7%), Sweden (3.7%) and Austria (1.8%) respectively.

Main findings:

- Germany and Greece showed the highest percentages in most health-related outcomes.
- High percentages of dissatisfaction were found in Southern European countries and Germany.
- Health-related absenteeism was more frequent in Germany and Austria.

By and large, the range of health-related outcomes was narrow in most countries. Three examples are France (between 5.2% for stress to 8.7% for dissatisfaction), United Kingdom (between 4.8% for absenteeism to 6.4% for dissatisfaction) and Ireland (between 2.5% for muscular pains to 4.7% for absenteeism). However, large ranges were found in Greece (between 4.6% for absenteeism to 18.0% for fatigue) and Austria (between 1.8% for fatigue to 10.5% for absenteeism).

In regard to the comparison between precarious and permanent employments, a summary of crude ORs for all countries is shown in Figure 17 while full results are shown in Figures 1A to 15A in the Annex. For dissatisfaction, we observe that in Germany precarious employments were 3.52 times more likely to report dissatisfaction than permanent employments (OR=3.52; 95% CI 2.50 - 4.94) as it is shown in Figure 17. Similar findings but with lower results were found in Spain (OR=3.26), Austria (OR=2.91), Ireland (OR=2.29), Italy (OR=2.27), Greece (OR=1.77) and Portugal (OR=1.77). In addition, ORs of Belgium, The Netherlands, Luxembourg, Denmark, Finland and Sweden were above the unit although they were not statistically significant. Only France and the United Kingdom did not show differences between both types of employment. Another consistent pattern was observed for stress (Figure 17). Precarious employments were less likely to report stress than permanent employments except in Austria where OR was 1.54. Those differences were statistically significant for Belgium (OR=0.43), Finland (OR=0.50), Portugal (OR=0.54), the Netherlands (OR=0.58), and Sweden (OR=0.66). In most countries both patterns (i.e. more dissatisfaction and less stress among precarious employments in comparison to permanent employments) persisted after adjusting for several covariates (Tables 81A to 95A and 111A to 125A in the Annex). Nevertheless, in Ireland the difference between precarious and permanent employments for dissatisfaction decreased significantly after adjusting for company size (OR=1.60) (Table 88A in the Annex) and in Austria differences for stress increased significantly after adjusting for job control (OR=1.72) (Table 125A in the Annex). These findings could mean that in those two countries differences between precarious and permanent employments would be partly due to factors related to the company size and control respectively. No clear patterns across countries were found for other health-related outcomes (Tables 96A to 110A, 126A to 140A, and 141A to 155A in the Annex).

The crude associations between sole traders and permanent employments and each health outcome by country are shown in Figure 18. Perhaps the two clearest patterns are related to absenteeism and muscular pains. For sole traders, health-related absenteeism was significantly lower in eight countries: France (OR=0.28), Luxembourg (OR=0.34), Germany (OR=0.37), Belgium (OR=0.40), Finland (OR=0.43), Italy (OR=0.44), the Netherlands (OR=0.46) and Austria (OR=0.47). The other countries also reported ORs lower than the unit, although they were not statistically significant. Greece and Denmark were two exceptions since their ORs were above the unit (1.33 and 1.06 respectively but without statistical significance). Conversely, for muscular pains the ORs among sole traders were higher than among permanent employments. The highest ORs were found in Luxembourg (OR=4.03), Greece (OR=2.14), United Kingdom (OR=2.16), Sweden (OR=2.12) and Portugal (OR=1.48). Only in Belgium (OR=0.73) and the Netherlands (OR=0.77) sole traders were less likely to report muscular pains although this association was not statistically significant. Differences between sole traders and permanent employments persisted after adjusting for covariates (Tables 156A to 170A in the Annex) except in the case of the United Kingdom for muscular pains where there was a significant reduction after adjusting for job control (OR=1.62) and job demand which could mean that differences for muscular pains were partly due to psychosocial variables (OR=1.66) (Table 167A).

No clear patterns emerged when assessing the associations between small employers and permanent employments for the health outcomes by country (Figure 19). The only exception was health-related absenteeism where ORs of small employers tended to be generally lower in most countries. The lowest ORs were found in Luxembourg (OR=0.16), the Netherlands (OR=0.31), Ireland (OR=0.41), Austria (OR=0.43) and Germany (OR=0.46). However, interestingly enough, statistically significant high ORs were found in Greece and Finland for stress (ORs were 2.42 and 1.99 respectively) which increased to 3.46 and 2.25 after the adjustment for company size (Tables 114A and 123A in the Annex). Finally, Finland showed a statistically significant high OR for muscular pains (OR=2.73) which also increased (OR=4.09) after adjusting for company size (Table 168A in the Annex), which is consistent with the fact that in small companies, where most small employers are found, there are higher levels of muscular pains.

Main findings:

- Precarious employments were much more likely to report dissatisfaction and less likely to report stress across countries.
- Sole traders were much less likely to report health-related absenteeism across countries.

Multilevel analysis

This section explores the possible influence of four ecological (or contextual) variables at the country-level on the individual relationships between employment status and health-related outcomes.

Considerable variation in each ecological variable across the 15 EU countries was observed. As is shown in Figure 20, unemployment rates range from 2.95% for Luxembourg or 3.85% for Austria to 22.9% for Spain; social protection benefits range from 15.5% for Greece to 39.7% for Sweden; Gross National Product ranges from 11,710 ppp for Greece to 37,930 ppp for Luxembourg; and finally, temporary contracts range from 5.9% for Belgium to 33% for Spain.

Furthermore, health-related outcomes adjusted by age, gender, and types of employment vary across countries as shown in Figure 16A.

Additionally, as Table 6 shows, the two types of employment analysed in this section (i.e. permanent and precarious employments) also vary across quartiles of the four ecological variables. These findings show a clear consistency between the ecological variables at national-level and percentages of precarious employments at the individual level. For example, countries with unemployment rates located in the highest quartile (>11.9%) also present the highest percentages of precarious employment (22.4%). Likewise, countries in the lowest quartiles (23.20%) of social protection benefits and the lowest quartile (≤£15,680 ppp) of Gross National Product present the highest percentage of precarious employment (20.3%). Finally, countries in the highest quartile (>12%) of temporary contracts at the country-level also present the highest percentage of precarious employments at the individual level (25%).

The interactions between each ecological variable and the types of employment were explored by plotting ORs through quartiles of ecological variables for each health-related outcome (Figures 17A to 22A in the Annex).

However, despite the fact that ecological variables varied across countries and they were related to the types of employment, after adjusting by individual (gender and age) and ecological variables (separately and together) as is displayed in Figure 21, the association between the types of employment (precarious and permanent) and each of the health-related outcomes did not change significantly. Results suggest that ecological variables used in this study do not change the individual effects observed between types of employment and the health-related outcomes.

Thus, for example, dissatisfaction remained significantly high among precarious employments and stress remained significantly low among precarious employments.

Main findings:

- Countries with high unemployment rates, low social protection benefits, low Gross National Products, and high precarious employments at the ecological level also show a higher number of precarious employments at the individual level.
- With only one exception, ecological variables did not change the individual effects between employments and health-related outcomes.
- The positive association between the precarious employment and dissatisfaction remains after taking into account individual and ecological level variables.
- The negative association between the precarious employment and stress remains after taking into account individual and ecological-level variables.

Chapter 4

Conclusions

This report has examined for the first time the complex relationships among precarious and other types of employments and six health-related outcomes for all fifteen member states of the European Union.

This investigation has employed individual data from the Second European Survey on Working Conditions linked to national-level group data drawn from Eurostat and other data and two pertinent methodological approaches (i.e. unconditional logistic regressions and multilevel analysis). Those epidemiological methods permitted an examination of those associations before and after taking into account a number of selected individual and ecological variables.

Several clear-cut associations were documented for which odds ratios were statistically significant. In other cases, associations were not statistically significant but consistent patterns across employments, job categories, economic sectors and countries makes it unlikely that they are chance findings.

1. Full-time contracts almost always had worse health-related outcomes as compared to part-time contracts. Three exceptions to this overall pattern were found: part-time temporary contracts were more likely to report dissatisfaction, absenteeism and stress. This finding is likely to reflect the different meaning that full- and part-time contracts have among employments.
2. By and large the worst health outcomes were observed in four job categories (i.e. craft and trade workers, elementary occupations, service and sales workers and clerks) and two economic sectors (i.e. other services, and mining and quarrying, and manufacturing). Those

findings are in accordance with existing information about poor working conditions in these job categories and economic sectors.

3. In regard to the analysis by country, Germany and Greece showed the highest percentages in almost all health-related outcomes. In addition, Germany and southern European countries reported higher probabilities of reporting dissatisfaction and Austria and Germany had higher probabilities of absenteeism. In order to explain these results more research at the national as well as the regional levels is needed.
4. Precarious employments were more likely to report dissatisfaction but less likely to have stress in comparison to permanent employments. These results persisted when the same analysis was conducted by job category, economic sector, and country. In comparison to stress, we hypothesise that dissatisfaction is a more sensitive indicator of short-term health changes.
5. Permanent employments were less likely to report fatigue, backache and muscular pains but more likely to report health-related absenteeism in comparison to other types of employments. Similar findings were observed across job categories, economic sectors and countries.
6. In comparison to permanent employments, sole traders were more likely to report fatigue and muscular pains but less likely to report health-related absenteeism. Similar findings were observed across job categories, economic sectors, and countries.
7. In comparison to permanent employments, small employers were more likely to report fatigue but less likely to report health-related absenteeism although no consistent patterns across job categories, economic sectors and countries were found.
8. Associations between the types of employment and health outcomes almost always persisted after the adjustment by individual working conditions. This interesting finding suggests that different types of employments have an independent effect on the health-related outcomes studied regardless of working conditions.
9. Company size and psychosocial variables modified weakly some of the crude results. Both variables could be related to organisational conditions and should be taken into account in further research.
10. The ecological effects observed were very weak. Results suggest that ecological variables did not change the individual effects between employments and health outcomes.

Nevertheless, since several limitations may reduce the validity and reliability of these findings, the results should be considered with caution. First, because of its cross-sectional nature, this study documented associations with prevalent employments and health-related outcomes, and no causal relationships can be derived. Second, this study suffers from a number of data limitations: the fact that the European Survey was not specifically designed to assess the impact of types of employment on health outcomes, the relatively small size for some of the categories analysed, the variations in the response rate across countries, and the heterogeneity in the categories of employment used are perhaps the most important ones. The following are three examples of these limitations:

- The response rates across countries varied from 35% for Denmark to 81% for Austria. This difference might have introduced a selection bias in the overall findings while confidence intervals tended to increase.
- The meaning and characteristics of the types of employment differ by country, and comparability is not straightforward.
- Although stratified analyses were very useful in documenting the associations among different groups (i.e. job categories, economic sector and countries), it also led to reduced sample size and increased random variation.

This study allowed us to analyse several hypotheses which have to be investigated further. Although it has filled a significant gap in the knowledge of the relationships between several types of employment and health, findings need to be replicated before they are taken as causal evidence. Further research should take into account at least the following five issues:

1. New models and more specific hypotheses should be tested in further investigations. Refinement of these conceptual issues will be helpful both to improve data collection and data analysis.
2. The homogeneity and specificity of the categories of employment analysed should increase in further studies. To achieve this objective, ad hoc analyses comparing employment definitions across countries might be conducted.
3. The use of new sources of primary data would provide more valid, reliable and comparable information. More efficient epidemiological designs, such as case-control or cohort studies, could overcome some of the limitations of cross-sectional studies.
4. The use of other ecological or contextual variables should be explored. Whenever possible, multilevel analysis should be conducted using ecological data at the regional level.
5. Many of the theoretical and methodological issues involved in linking both individual and ecological levels of analysis in the study of the relationship between employment and health are still largely unresolved. A theory of causation that integrates individual and ecological variables, as well as empirical studies that explain these potential relationships and interactions are still needed.

Tables and Figures

Fatigue		Backache		Muscular pains		Stress	
Types of employment	No.	%	No.	%	No.	%	No.	%
Permanent employment	1,138	10.9	2,643	25.2	3,051	29.5	1,855	17.7
	3,010	28.7	1,774	16.9				
full-time	950	11.5	2,159	25.6	2,484	29.5	1,516	18.0
	2,448	29.1	1,450	17.2				
part-time	188	9.2	484	23.3	567	27.2	339	16.3
	562	27.0	324	15.6				
Small employers	96	10.6	160	17.3	317	34.3	238	25.8
	287	31.1	179	19.4				
Sole traders	327	17.9	290	15.8	567	30.9	479	26.1
	635	34.6	480	26.1				
full-time	264	18.0	242	16.4	478	32.3	403	27.2
	522	35.6	399	27.0				
part-time	63	17.6	48	13.4	89	24.9	76	21.3
	113	31.7	81	22.7				
Precarious	377	20.1	430	22.8	422	22.4	401	21.3
	576	30.5	380	20.1				
Fixed term contract, full-time	191	20.0	264	27.0	239	24.4	229	23.4
	311	31.8	218	22.3				
Fixed term contract, part-time	72	17.4	75	18.0	73	17.5	69	16.5
	102	24.5	62	14.9				
Temporary, full-time	68	22.5	59	19.5	65	21.5	69	22.8
	101	33.4	64	21.2				
Temporary, part-time	46	25.0	57	22.0	45	23.9	34	18.1
	62	33.0	36	19.1				
Total	1,938	12.8	3,523	23.3	4,357	28.8	2,973	19.6
	4,508	29.8	2,813	18.6				

Table 2a. *Association (crude OR and 95% CI) between the structural covariates (baseline) and health-*

Fatigue	Dissatisfaction Backache	Absenteeism Muscular pains	Stress
Covariates OR (95 % CI)	OR (95 % CI) OR (95 % CI)	OR (95 % CI) OR (95 % CI)	OR (95 % CI)
Age (15-24)			
25-34 1.12 (0.97-1.31)	0.85 (0.75-1.00) 1.19 (1.04-1.36)	0.99 (0.87-1.14) 0.98 (0.84-1.14)	1.52 (1.33-1.74)
35-44 1.21 (1.04-1.41)	0.76 (0.64-0.89) 1.30 (1.14-1.48)	1.01 (0.88-1.16) 1.17 (1.00-1.36)	1.72 (1.50-1.97)
45-54 1.24 (1.06-1.44)	0.71 (0.60-0.85) 1.33 (1.17-1.52)	1.00 (0.87-1.15) 1.30 (1.11-1.52)	1.63 (1.42-1.88)
55 and over 1.51 (1.27-1.79)	0.92 (0.76-1.12) 1.49 (1.28-1.74)	0.99 (0.85-1.17) 1.57 (1.32-1.86)	1.39 (1.18-1.63)
Gender (male) 1.03 (0.95-1.12)	0.98 (0.89-1.08) 1.12 (1.04-1.20)	1.00 (0.92-1.08) 1.02 (0.94-1.11)	1.06 (0.98-1.14)
Company size (none/1 to 9)			
10 to 499 0.78 (0.70-0.86)	0.82 (0.73-0.92) 0.95 (0.88-1.04)	1.54 (1.40-1.69) 0.85 (0.77-0.94)	1.08 (0.99-1.18)
500 and over 0.79 (0.72-0.88)	0.73 (0.65-0.83) 0.92 (0.84-1.00)	1.44 (1.30-1.59) 0.75 (0.68-0.84)	1.37 (1.25-1.50)
Hours per week (full time) 0.82 (0.74-0.91)	0.93 (0.82-1.05) 0.87 (0.80-0.95)	0.84 (0.76-0.92) 0.83 (0.75-0.92)	0.82 (0.75-0.90)
Shifts (No) 1.81 (1.66-1.96)	1.38 (1.25-1.52) 1.56 (1.45-1.68)	1.11 (1.03-1.21) 1.55 (1.42-1.68)	1.46 (1.36-1.57)

OR= odds ratio, 95% CI = confidence interval

Fatigue	Dissatisfaction Backache	Absenteeism Muscular pains	Stress
Covariates OR (95 % CI)	OR (95 % CI) OR (95 % CI)	OR (95 % CI) OR (95 % CI)	OR (95 % CI)
Vibrations (No) 1.87 (1.71-2.04)	1.76 (1.58-1.95) 2.62 (2.42-2.83)	1.61 (1.48-1.76) 2.90 (2.66-3.17)	1.14 (1.05-1.24)
Noise too loud (No) 1.97 (1.81-2.14)	1.75 (1.58-1.93) 2.31 (2.15-2.50)	1.66 (1.53-1.79) 2.66 (2.45-2.90)	1.40 (1.29-1.51)
Extreme temperatures (No) 2.15 (1.98-2.33)	2.03 (1.84-2.24) 2.53 (2.35-2.72)	1.54 (1.42-1.66) 3.06 (2.81-3.33)	1.48 (1.37-1.59)
Breathing vapours (No) 2.39 (2.19-2.61)	2.20 (1.99-2.43) 2.88 (2.66-3.11)	1.57 (1.44-1.71) 3.29 (3.02-3.59)	1.53 (1.41-1.65)
Short repetitive tasks (No) 1.64 (1.51-1.78)	1.81 (1.64-1.99) 1.87 (1.74-2.01)	1.45 (1.34-1.57) 2.12 (1.95-2.30)	1.16 (1.08-1.25)
Repetitive movements (No) 2.03 (1.87-2.22)	1.98 (1.78-2.19) 2.63 (2.44-2.84)	1.49 (1.38-1.61) 3.71 (3.36-4.09)	1.18 (1.10-1.27)
Social support (Yes) 1.33 (1.19-1.49)	2.06 (1.83-2.33) 1.20 (1.09-1.33)	0.82 (0.73-0.92) 1.35 (1.21-1.51)	1.03 (0.93-1.15)
Control (High control)			
Medium control 1.10 (0.99-1.23)	1.52 (1.31-1.78) 2.31 (2.15-2.50)	1.06 (0.96-1.17) 1.39 (1.24-1.56)	0.77 (0.70-0.84)
Low control 1.37 (1.23-1.53)	3.39 (2.94-3.91) 2.53 (2.35-2.72)	1.27 (1.15-1.41) 1.83 (1.63-2.06)	0.59 (0.53-0.65)
Demand (Low demand)			
Medium demand 1.89 (1.65-2.18)	1.20 (1.03-1.41) 1.25 (2.31-2.99)	1.25 (1.12-1.40) 2.89 (2.43-3.44)	1.96 (1.75-2.19)
High demand 4.73 (4.12-5.43)	3.06 (2.63-3.56) 8.75 (7.69-9.96)	2.41 (2.15-2.70) 9.60 (8.09-11.3)	4.03 (3.59-4.53)

OR= odds ratio, 95% CI = confidence interval

Table 3. *Distribution of health-related outcomes (frequencies and percentages) by job categories*

Job categories	Fatigue		Backache		Muscular pains			
	No.	%	No.	%	No.	%	No.	%
Legislators & managers	129	6.7	223	6.3	462	10.6	268	9.0
	291	6.5	176	6.3				
Professionals	130	6.7	285	8.1	636	14.6	321	10.8
	315	7.0	140	5.0				
Technicians	155	8.0	438	12.4	635	14.6	348	11.7
	501	11.1	247	8.8				
Clerks	284	14.7	490	13.9	612	14.0	612	10.7
	506	11.2	227	8.1				
Services & sales workers	269	13.9	493	14.0	575	13.2	387	13.0
	591	13.1	355	12.6				
Agricultural & fishery workers	153	7.9	138	3.9	176	4.0	191	6.4
	284	6.3	232	8.2				
Craft & trade workers	334	17.2	688	19.5	602	13.8	524	17.6
	972	21.6	698	24.8				
Plant & machine operators	164	8.5	290	8.2	307	7.0	253	8.5
	443	9.8	282	10.0				
Elementary occupations	301	15.5	456	12.9	330	7.6	340	11.4
	580	12.9	439	15.6				
Armed forces	19	1.0	22	0.6	19	0.5	19	0.8
	25	0.6	17	0.6				

Fatigue		Backache		Muscular pains			
Economic sector		No.	%	No.	%	No.	%
No.	%	No.	%	No.	%		
Agriculture, hunting, forestry & fisheries.(A-B)	211 7.1	180 335	9.3 7.4	162 259	4.6 9.2	207	10.6
Mining & quarrying (C)/ Manufacturing (D)	524 17.6	377 840	9.5 18.6	705 569	20.0 20.2	769	14.6
Electricity, gas & water supply (E)	28 0.9	16 54	0.8 1.2	52 29	1.5 1.0	51	14.6
Construction (F)	239 8.0	154 482	7.9 10.7	321 316	9.1 11.2	285	14.0
Wholesale & retail trade, repairs (G)	459 15.4	356 621	18.4 13.8	465 410	13.2 14.6	588	13.2
Hotels and restaurants (H)	138 4.6	92 163	4.7 3.6	143 124	4.1 4.4	168	4.0
Transport & communication	178 6.0	112 305	5.8 6.8	239 194	6.8 6.9	268	13.8
Financial intermediation (J)	76 2.6	62 106	3.2 2.4	123 25	3.5 0.9	192	7.0
Real estate & business (K)	110 3.7	78 135	4.0 3.0	118 71	3.3 2.5	190	7.6
Public administration (L)	368 12.4	180 497	9.3 11.0	463 282	13.1 10.0	604	0.5
Other services (M-Q)	642 21.6	331 970	17.1 21.5	732 534	20.8 19.0	1,035	23.8

Table 5. *Distribution of health-related outcomes (frequencies and percentages) by country*

Country	Fatigue		Backache		Muscular pains	
	No.	%	No.	%	No.	%
Belgium	64	3.3	254	7.2	201	4.6
	132	4.4	197	4.4	93	3.3
Denmark	50	2.6	136	3.9	264	6.1
	98	3.3	271	6.0	220	7.8
Germany	242	12.5	663	18.8	542	12.4
	322	10.8	706	15.7	283	10.1
Greece	338	17.4	162	4.6	471	10.8
	536	18.0	388	8.0	320	11.4
Italy	173	8.9	167	4.7	387	8.9
	235	7.9	292	6.5	164	5.8
Spain	183	9.4	175	5.0	200	4.6
	258	8.7	308	6.8	207	7.4
France	168	8.7	193	5.5	226	5.2
	223	7.5	271	6.0	171	6.1
Ireland	53	2.7	166	4.7	119	2.7
	96	3.2	141	3.1	70	2.5
Luxembourg	35	1.8	142	4.0	170	3.9
	63	2.1	129	2.9	52	1.8
Netherlands	81	4.2	281	8.0	194	4.5
	117	3.9	176	3.9	113	4.0
Portugal	150	7.7	213	6.0	265	6.1
	261	8.8	376	8.3	291	10.3
United Kingdom	125	6.4	170	4.8	275	6.3
	153	5.1	246	5.5	137	4.9
Finland	78	4.0	302	8.6	366	8.4
	221	7.4	343	7.6	287	10.2
Sweden	82	4.2	130	3.7	399	9.2
	204	6.9	339	7.5	256	9.1
Austria	116	6.0	369	10.5	278	6.4

Table 6. *Distribution of ecological variables (quartile) by two types of employment (permanent and precarious)*

	Permanent (%)	Precarious (%)
Unemployment (%)		
Lowest quartile (≤7.30)	86.7	13.3
Second quartile (>7.30-≤9.10)	87.5	12.5
Third quartile (>9.10-≤11.90)	85.1	14.9
Highest quartile (>11.90)	77.6	22.4
Social protection (%)		
Lowest quartile (≤23.20)	79.7	20.3
Second quartile (>23.20-≤26.70)	89.5	10.5
Third quartile (>26.70-≤31.90)	84.1	15.9
Highest quartile (>31.90)	85.7	14.3
Gross National Product (Purchasing Parity Power)		
Lowest quartile (≤15,680)	79.7	20.3
Second quartile (>15,680-≤19,870)	85.9	14.1
Third quartile (>19,870-≤21,230)	85.7	14.3
Highest quartile (>21,230)	88.0	12.0
Temporary contracts (%)		
Lowest quartile (≤7.50)	89.6	10.4
Second quartile (>7.50-≤11.0)	85.8	14.2
Third quartile (>11.0-≤12.00)	85.7	14.3
Highest quartile (>12.00)	74.9	25.1

Figure 1. *Distribution by types of employment (nine categories)*

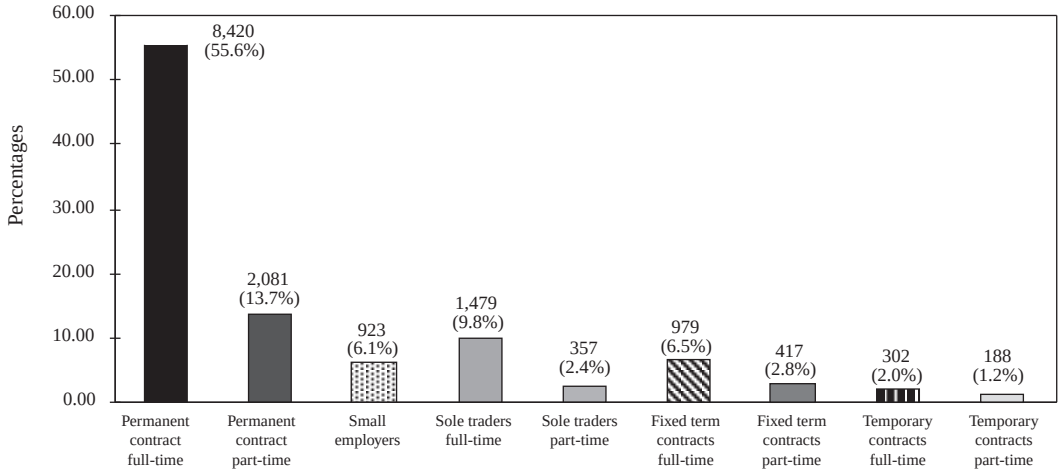


Figure 2. *Distribution by types of employment (four categories)*

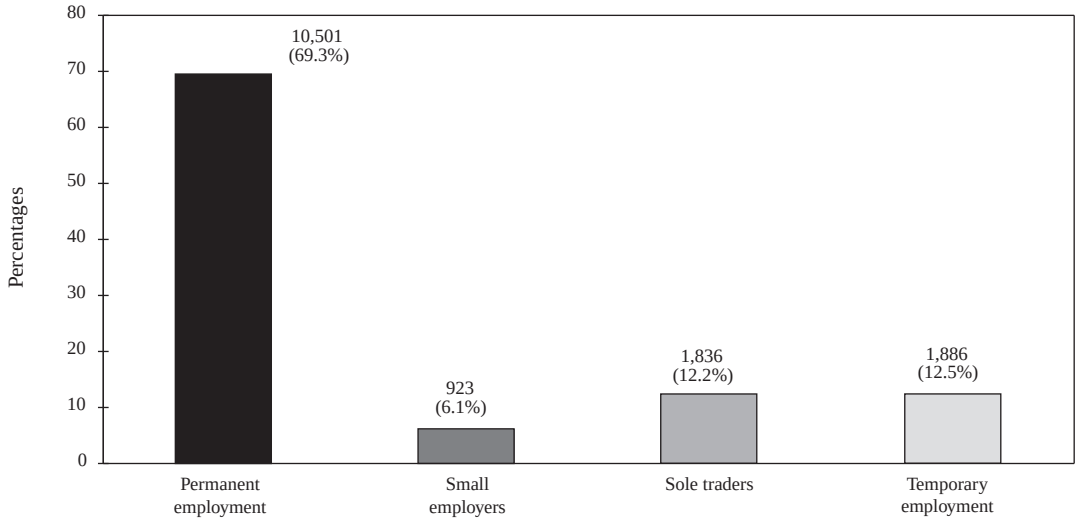


Figure 3. *Distribution by health-related outcomes*

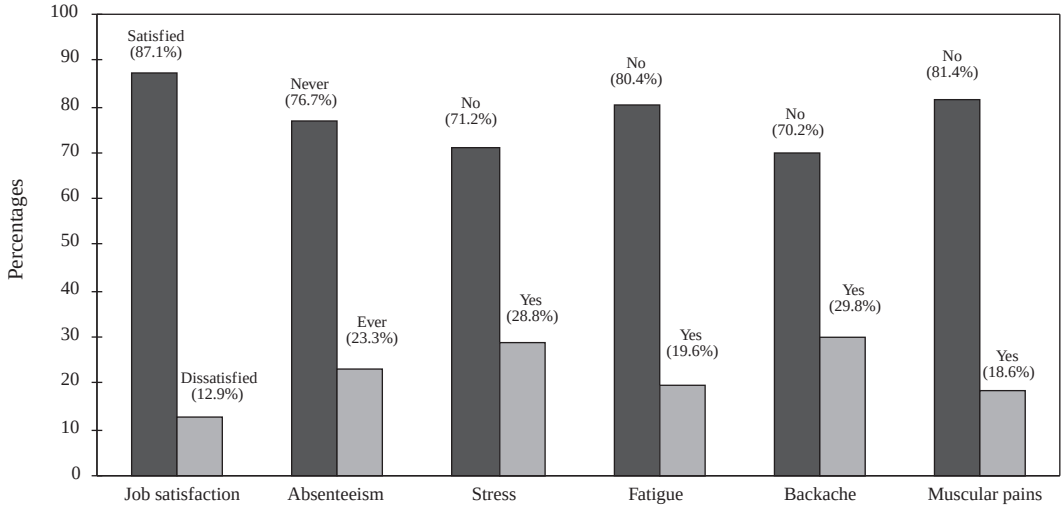


Figure 4. *Distribution by structural variables*

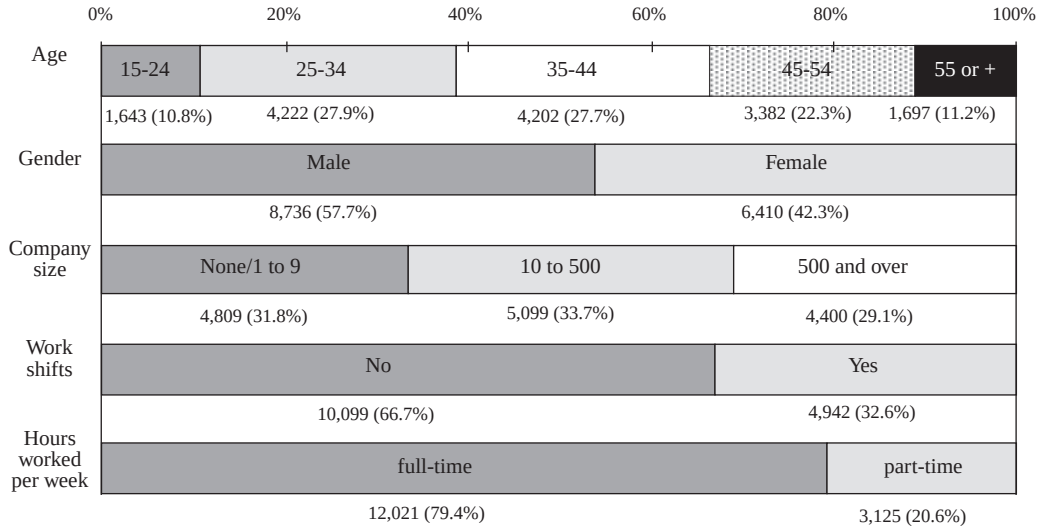


Figure 5. *Distribution by physical variables*

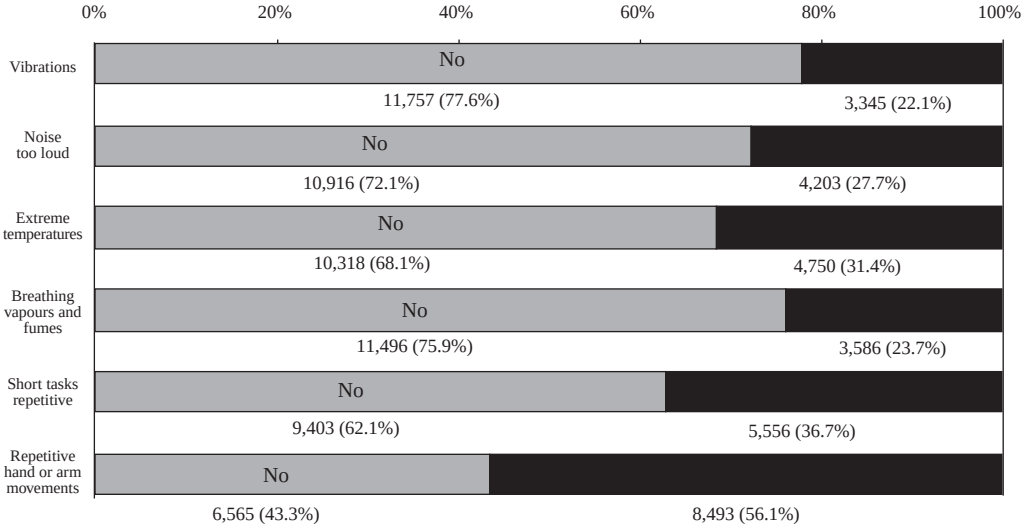


Figure 6. *Distribution by psychosocial variables*

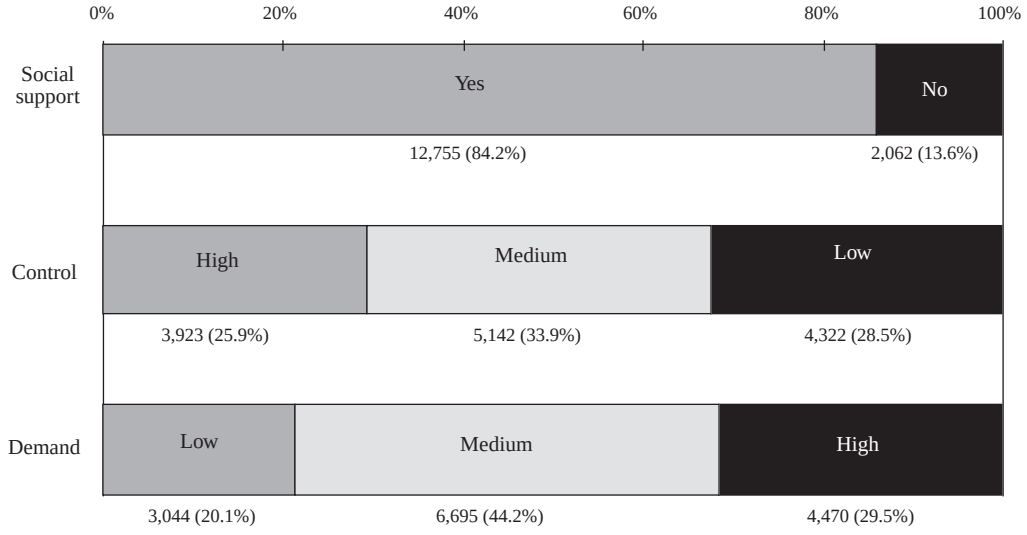


Figure 7. *Distribution by job categories*

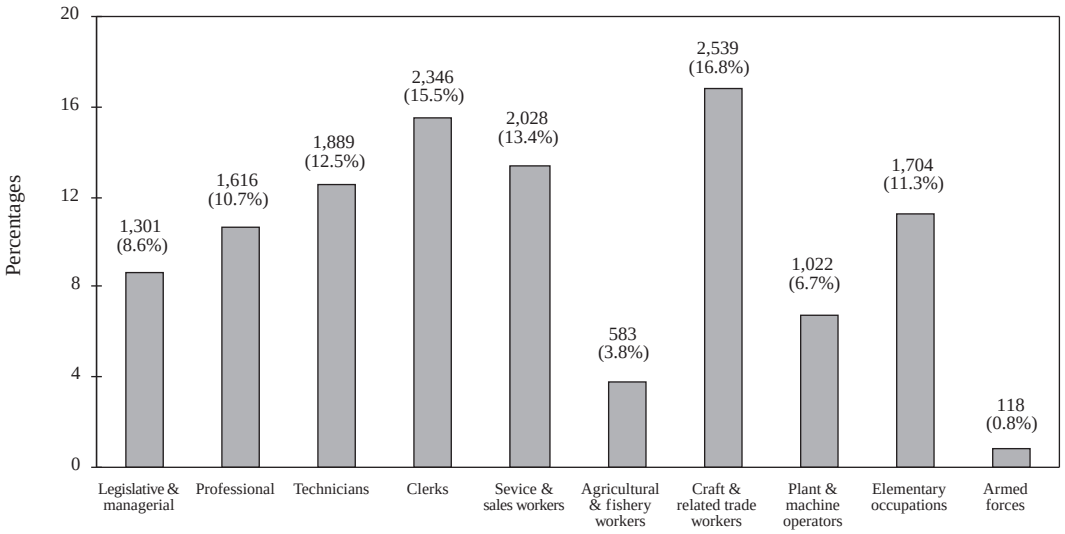


Figure 8. *Distribution by economic sectors categories*

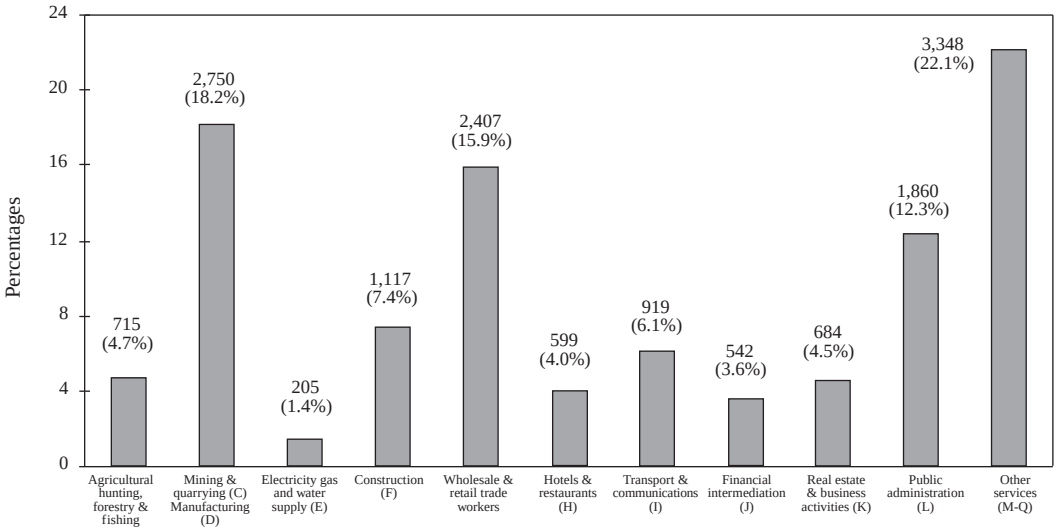
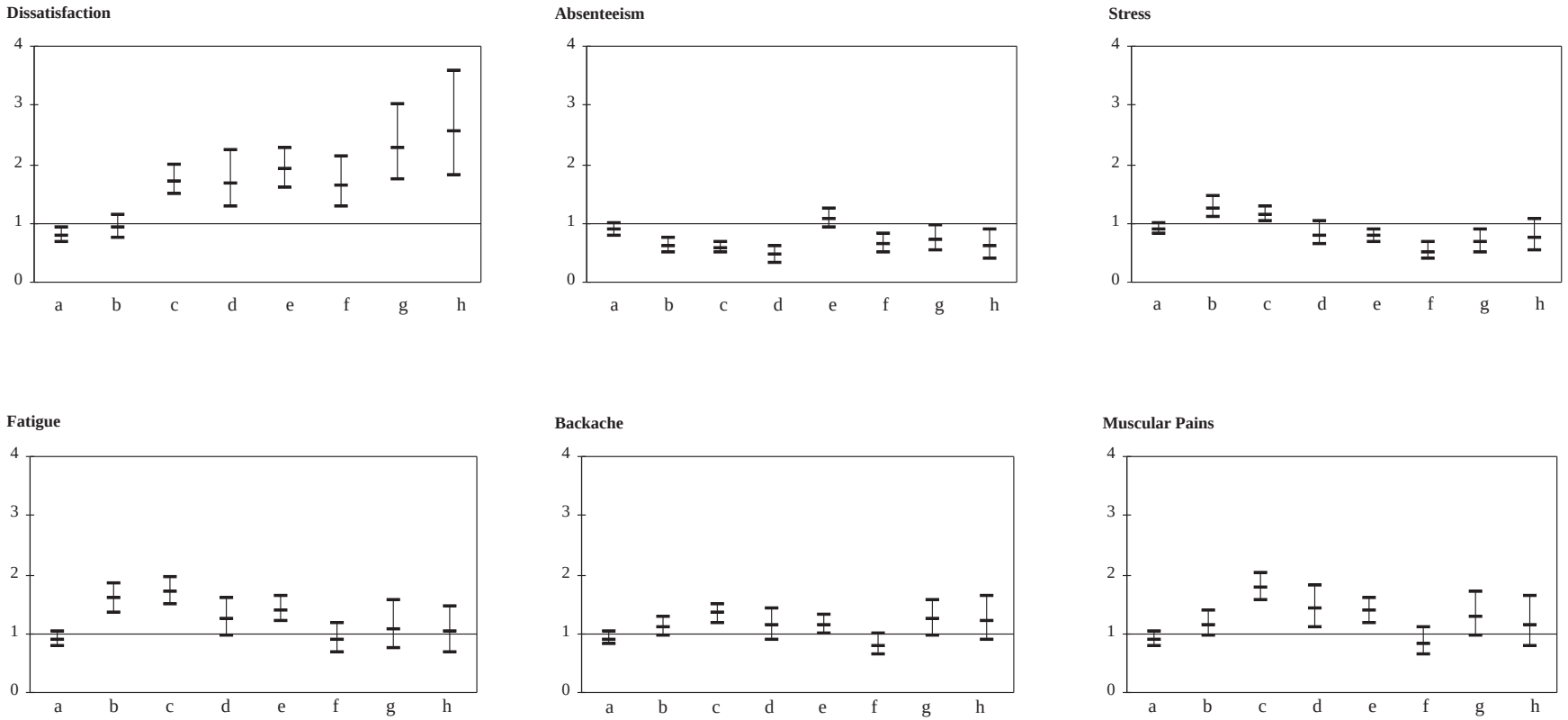


Figure 9. *Association (crude OR and 95% CI) between types of employment (permanent contract full-time as baseline) and health-related outcomes (nine categories)*



a Permanent part-time
b Small employer
c Sole trader full-time
d Sole trader part-time
e Fixed term full-time
f Fixed term part-time
g Temporary full-time
h Temporary part-time

Figure 10. *Association (crude OR and 95% CI) between types of employment (permanent employment as baseline) and health-related outcomes (four categories)*

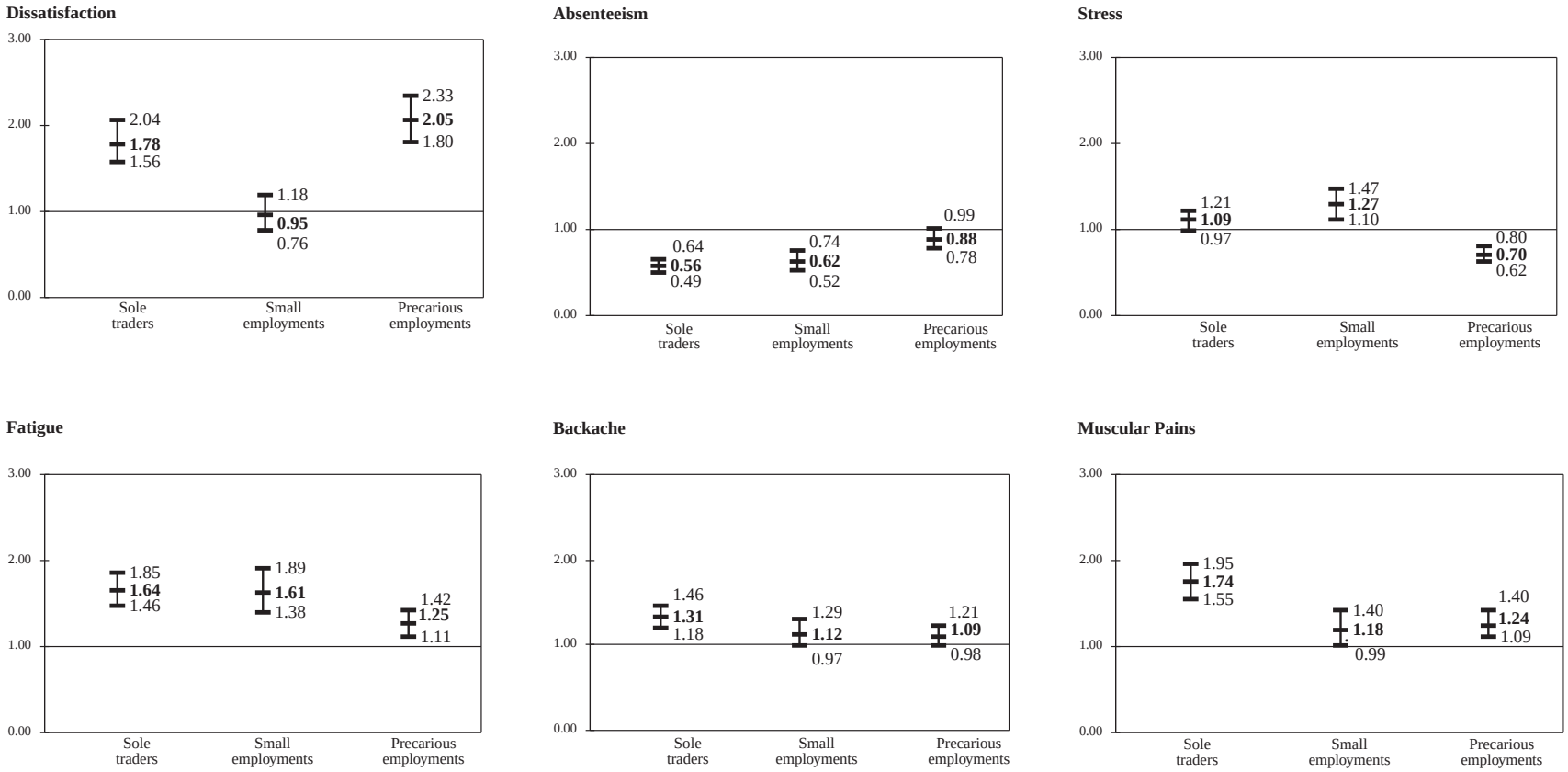
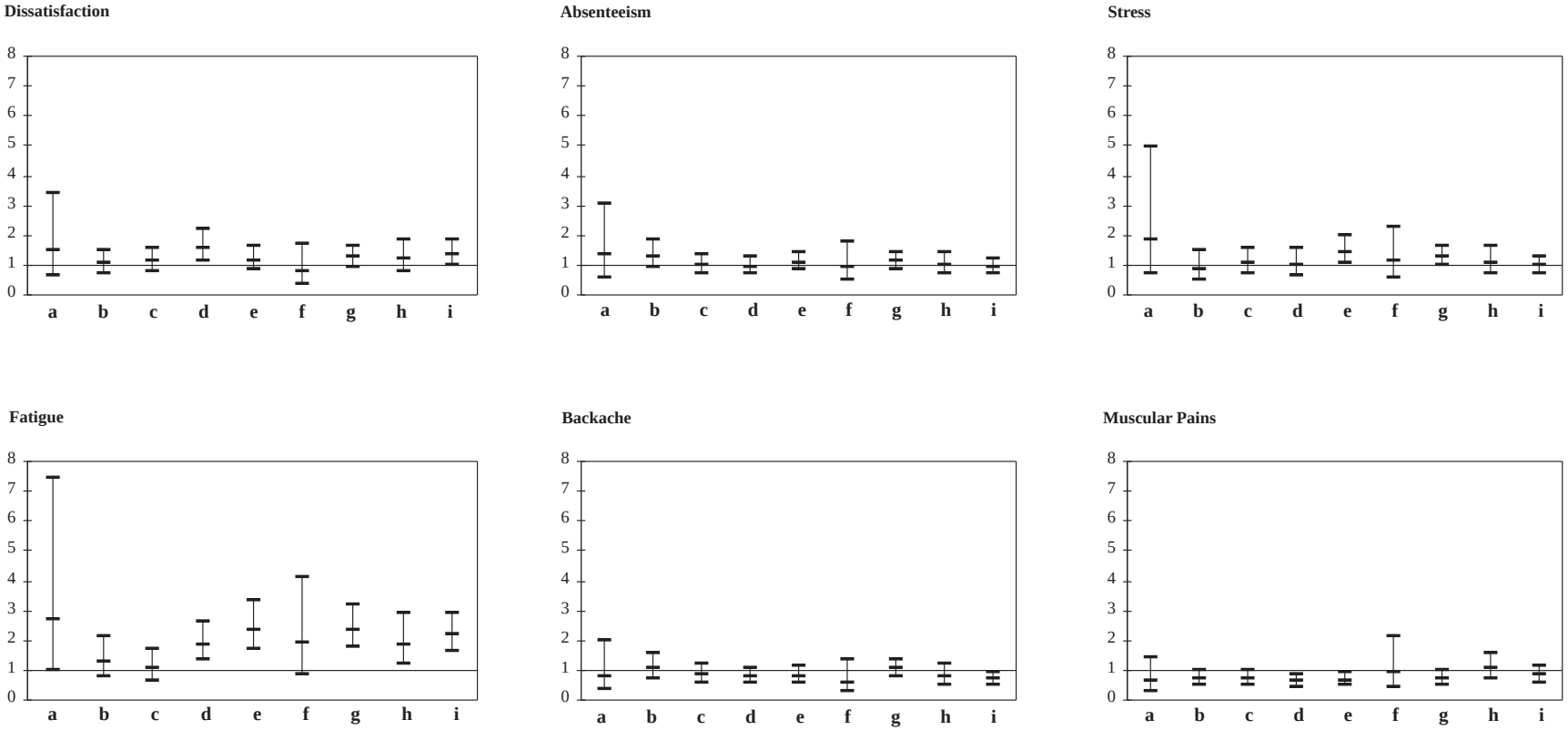
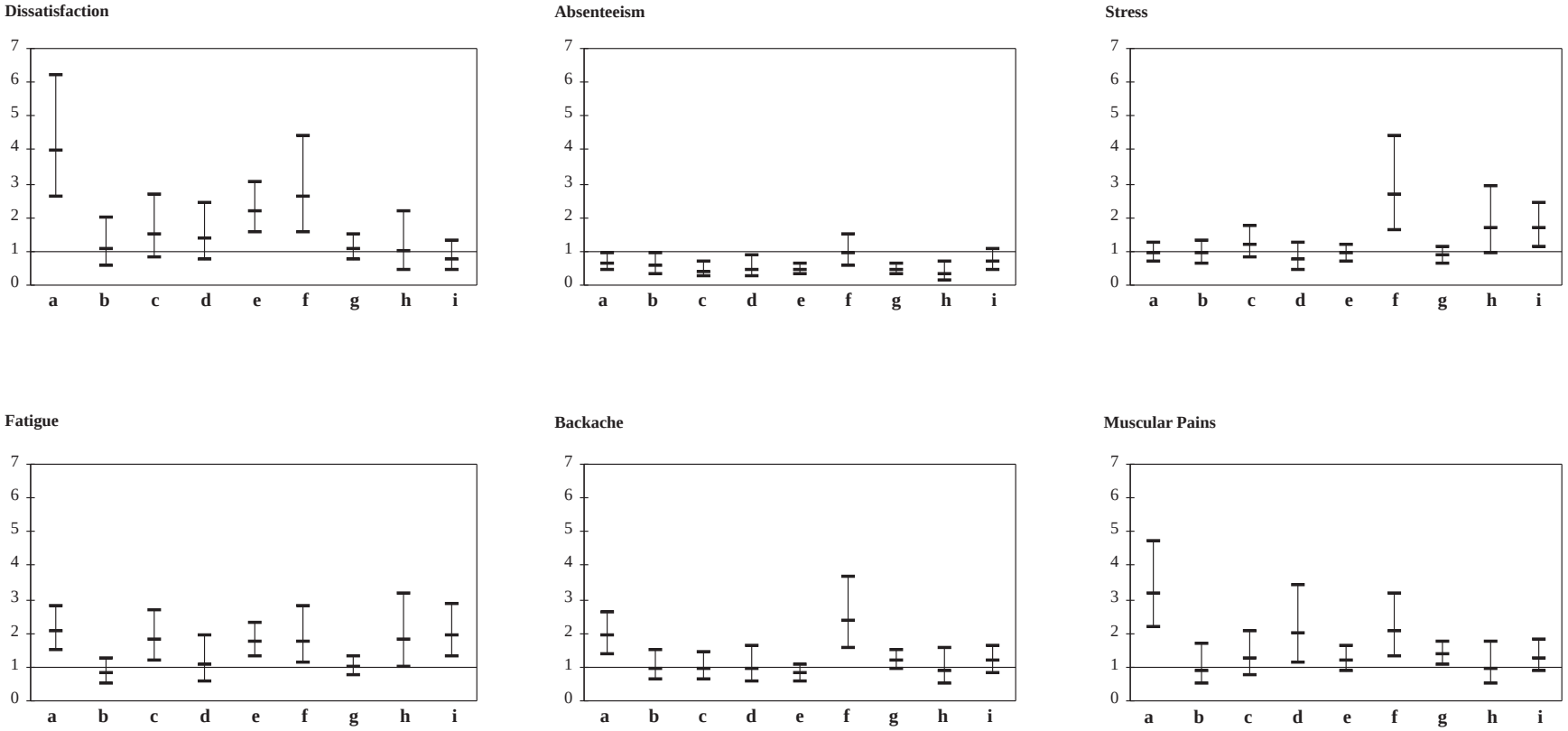


Figure 11. *Association (crude OR and 95% CI) between types of employment (precarious vs. permanents) and health-related outcomes by job category*



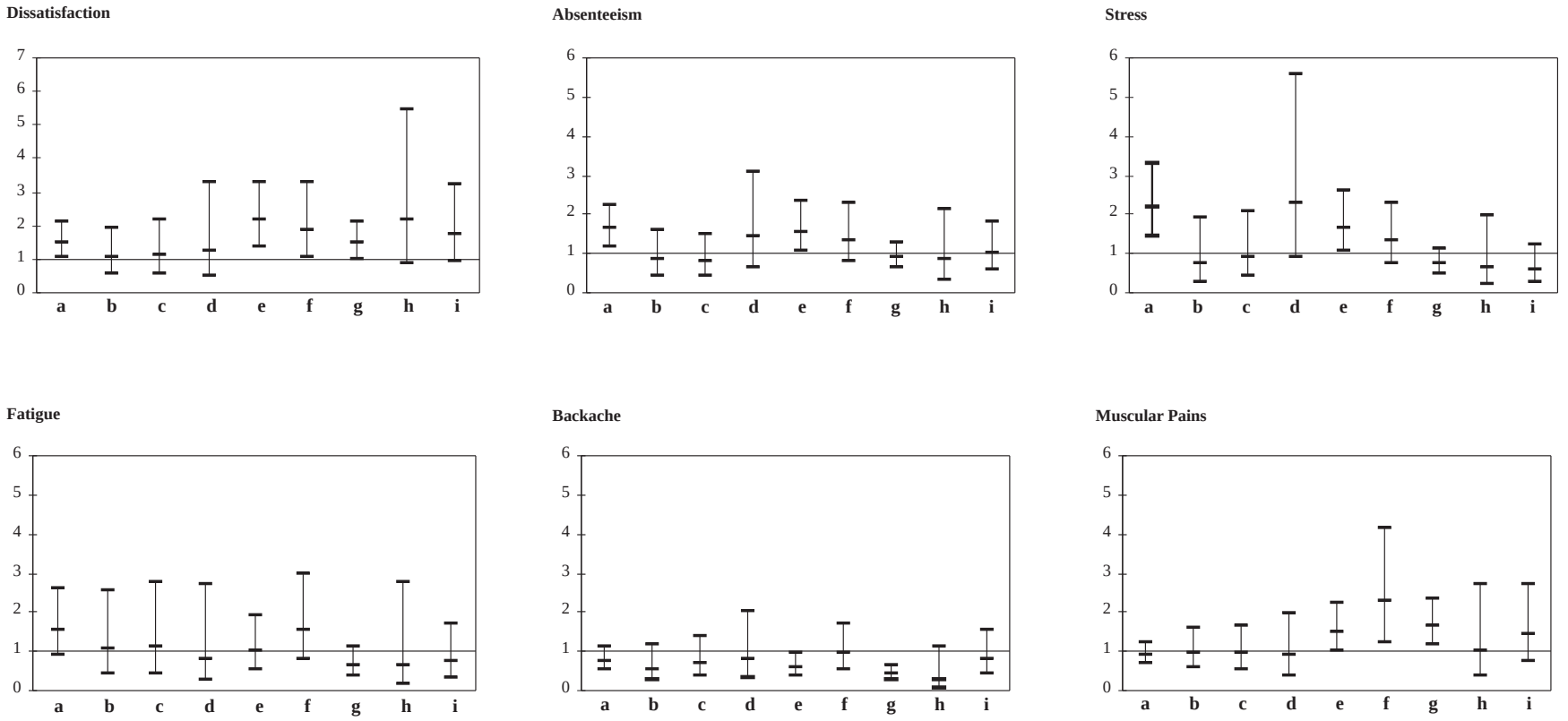
a Legislators & managers
b Professionals
c Technicians
d Clerks
e Service & sales workers
f Agricultural & fishery workers
g Craft & related trades workers
h Plant and machine workers
i Elementary occupations

Figure 12. *Association (crude OR and 95% CI) between types of employment (sole traders vs. permanents) and health-related outcomes by job category*



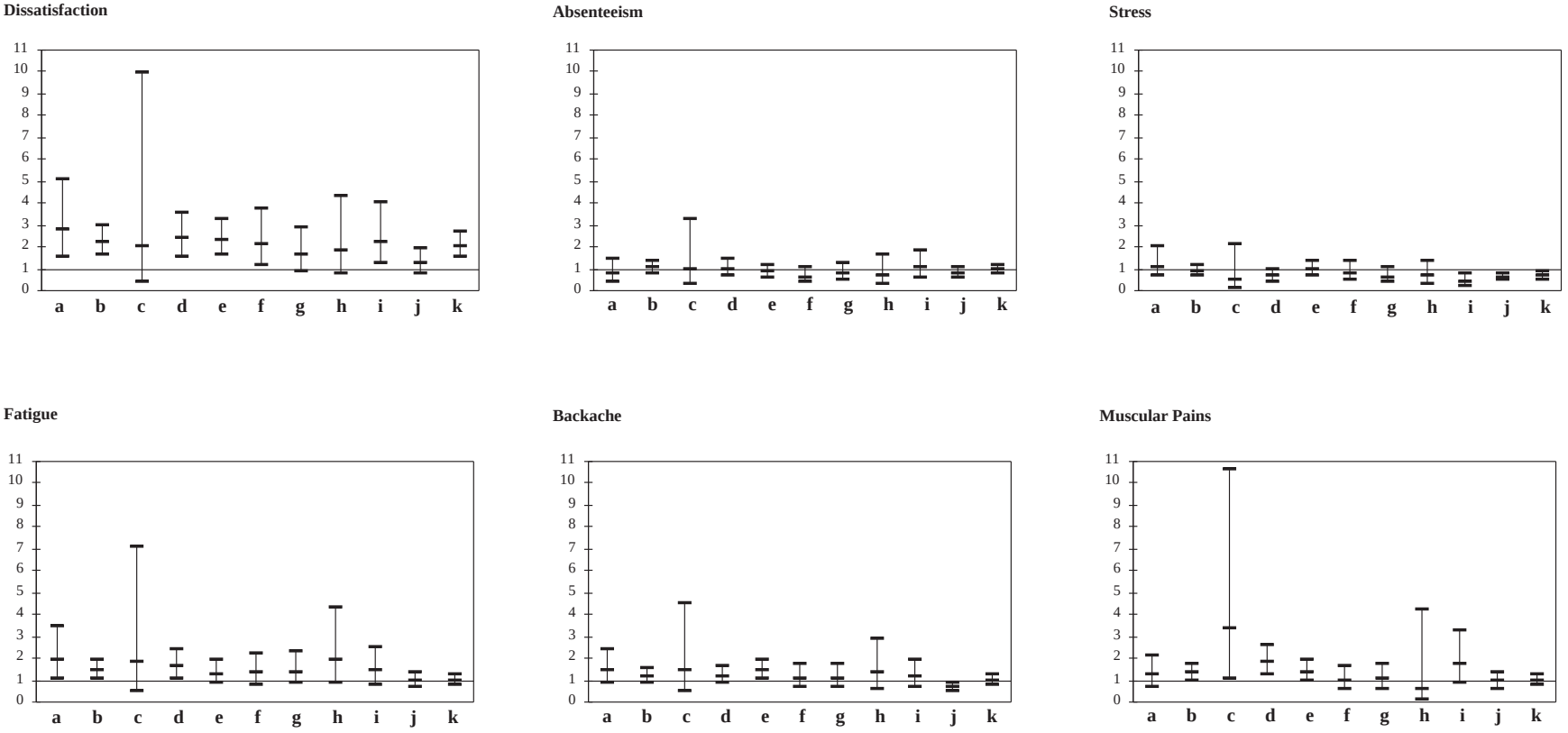
a Legislators & managers
b Professionals
c Technicians
d Clerks
e Service & sales workers
f Agricultural & fishery workers
g Craft & related trades workers
h Plant and machine workers
i Elementary occupations

Figure 13. *Association (crude OR and 95% CI) between types of employment (small employers and permanents) and health-related outcomes by job category*



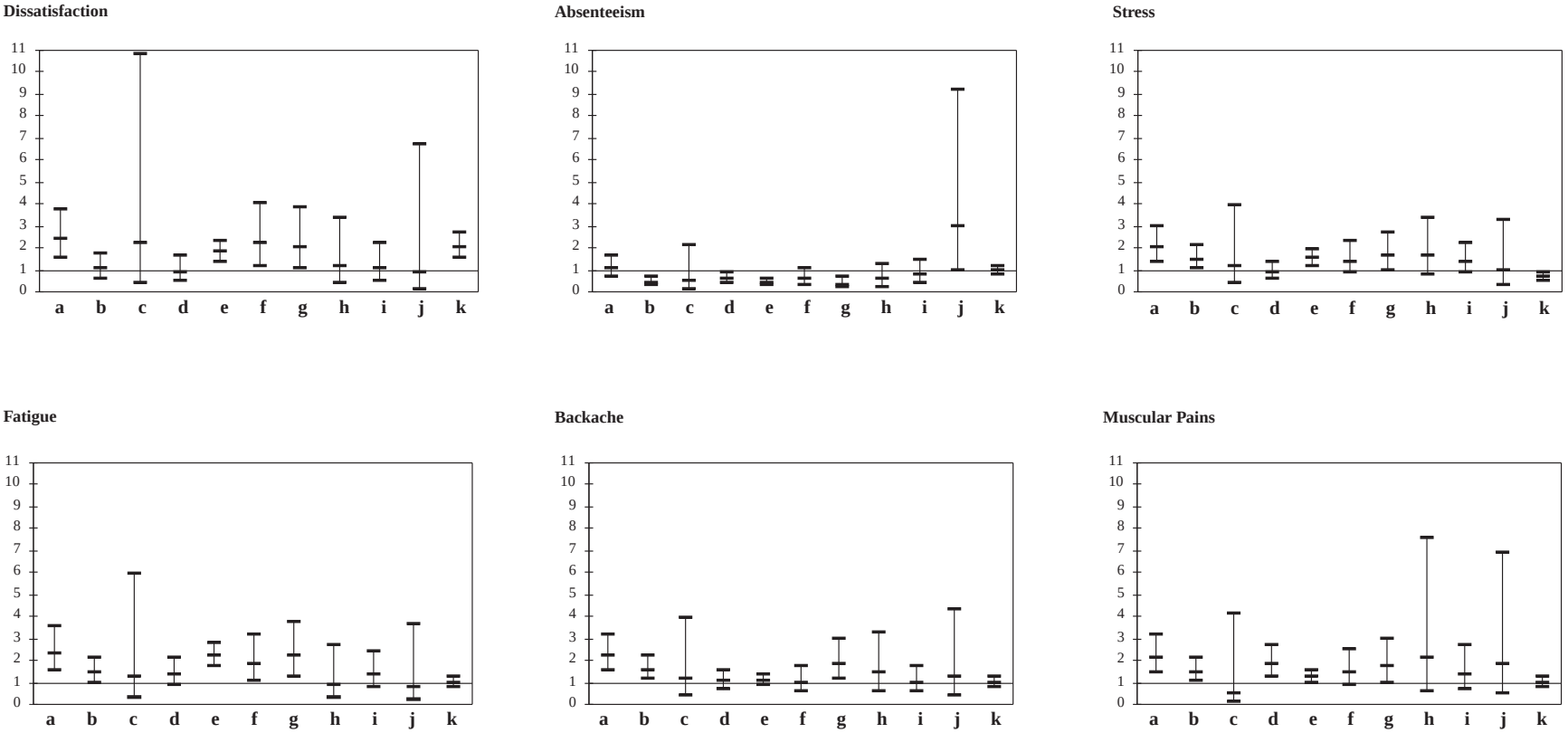
a Legislators & managers
b Professionals
c Technicians
d Clerks
e Service & sales workers
f Agricultural & fishery workers
g Craft & related trades workers
h Plant & machine workers
i Elementary occupations

Figure 14. *Association (crude OR and 95% CI) between types of employment (precarious and permanents) and health-related outcomes by economic sector*



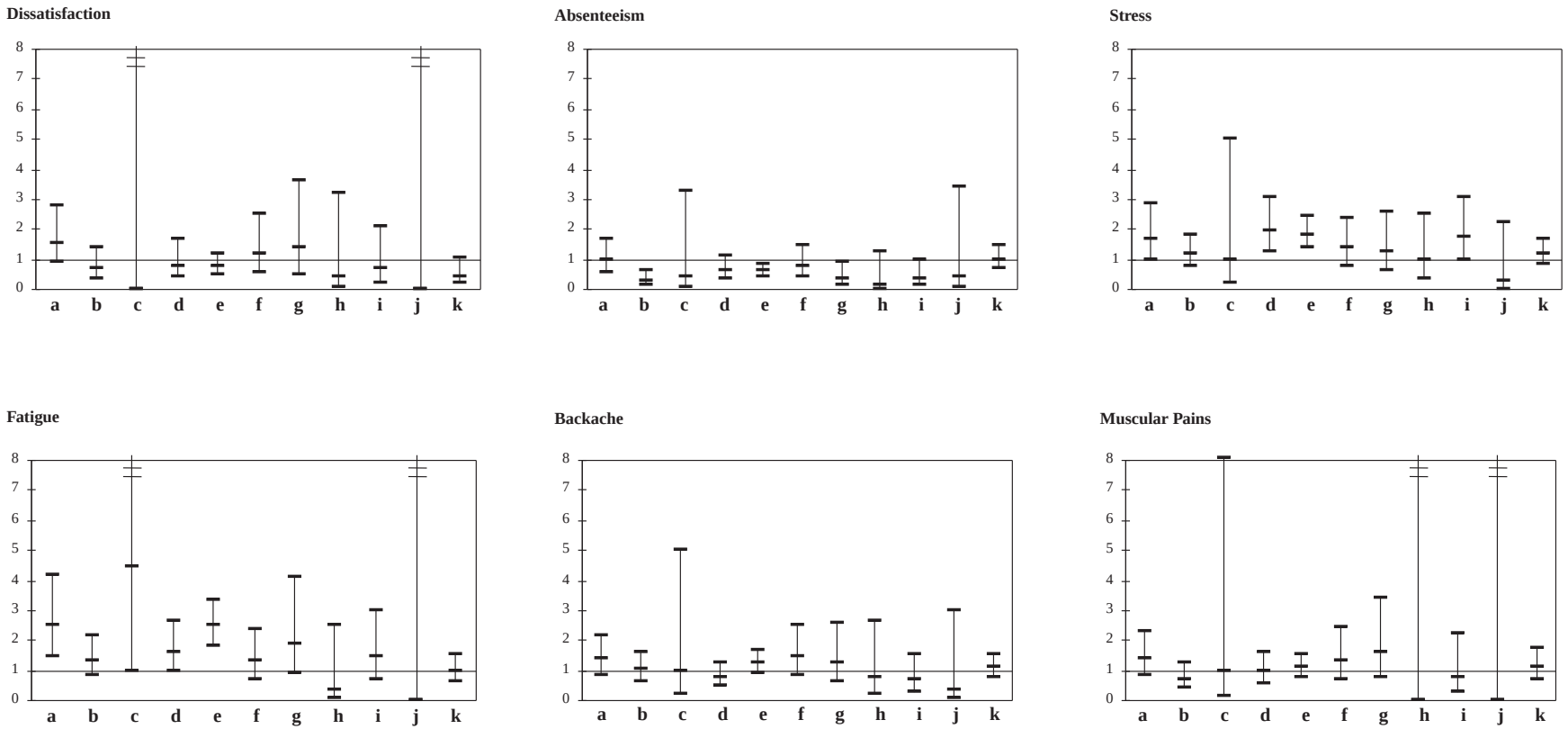
a Agriculture, hunting, forestry & fishing (A-B)
b Mining & quarrying (C)/Manufacturing (D)
c Electricity, gas & water supply (E)
d Construction (F)
e Wholesale & retail trade, repairs (G)
f Hotels & restaurants (H)
g Transportation & communication (I)
h Financial intermediation (J)
i Real estate & business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

Figure 15. *Association (crude OR and 95% CI) between types of employment (sole traders and permanents) and health-related outcomes by economic sector*



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

Figure 16. *Association (crude OR and 95% CI) between types of employment (small employers and permanents) and health-related outcomes by economic sector*



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

Figure 17. *Association (crude OR and 95% CI) between types of employment (precarious and permanent) for each outcome by country*

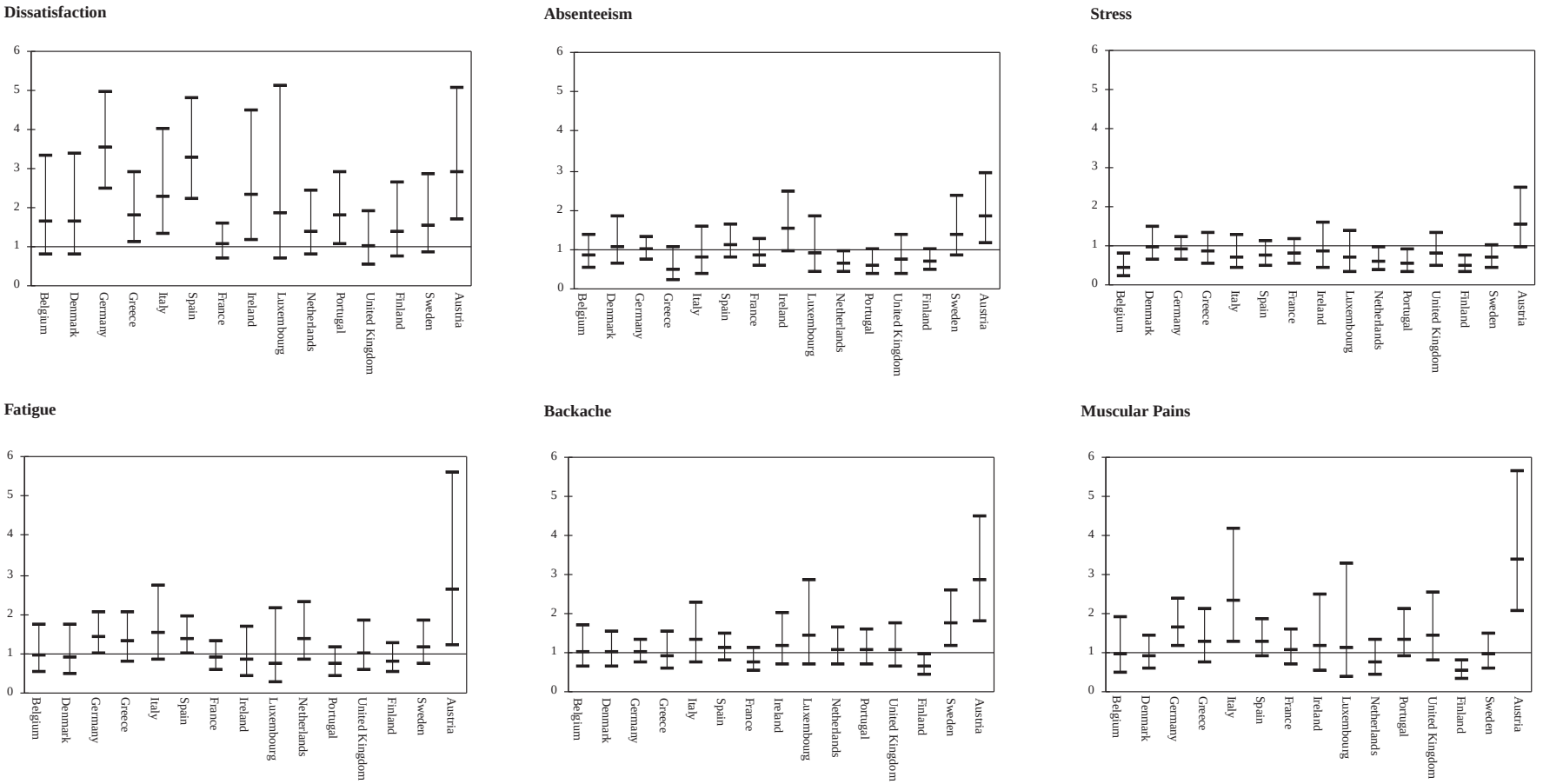


Figure 18. *Association (crude OR and 95% CI) between types of employment (sole traders and permanent) for each outcome by country*

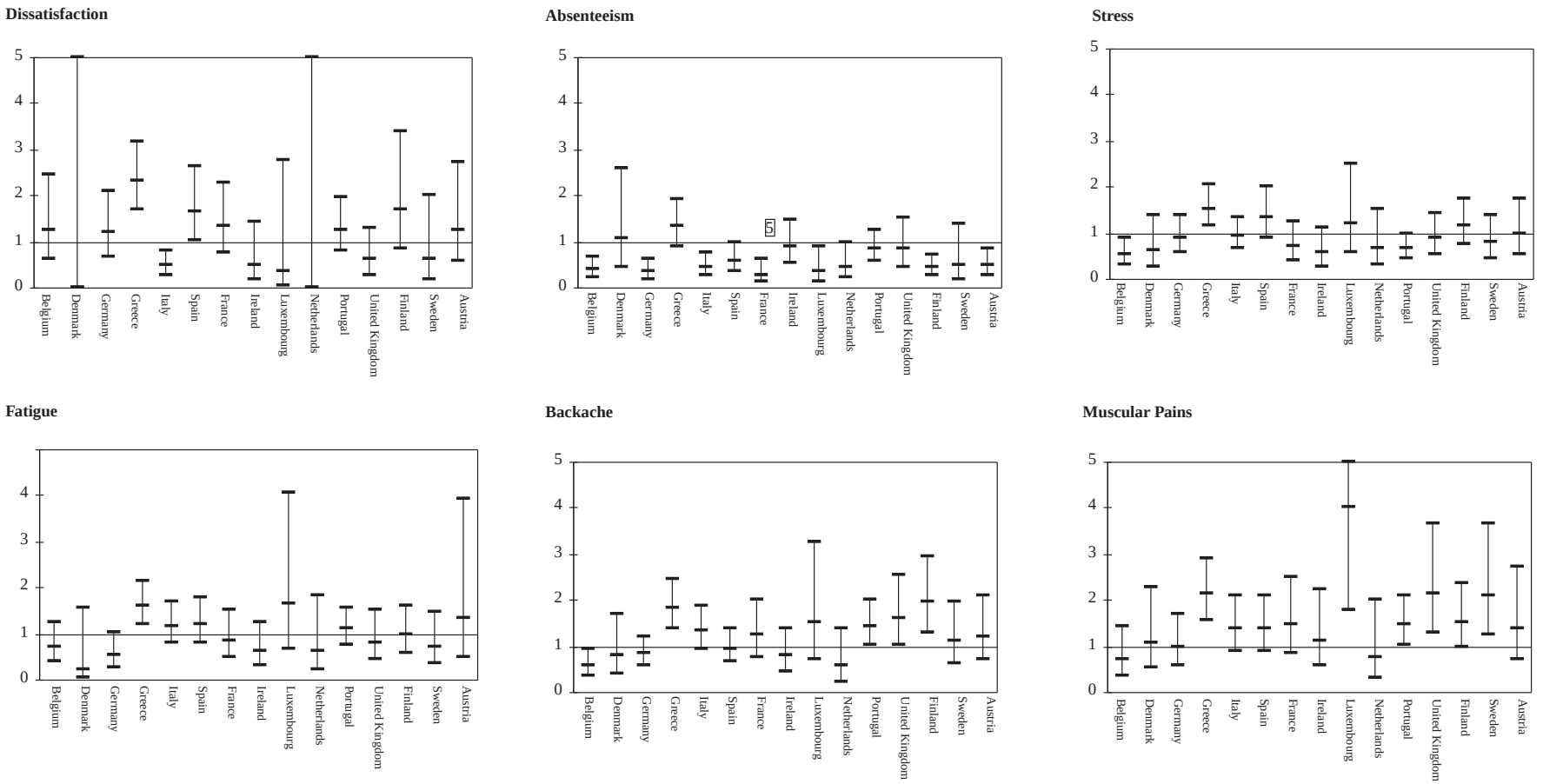
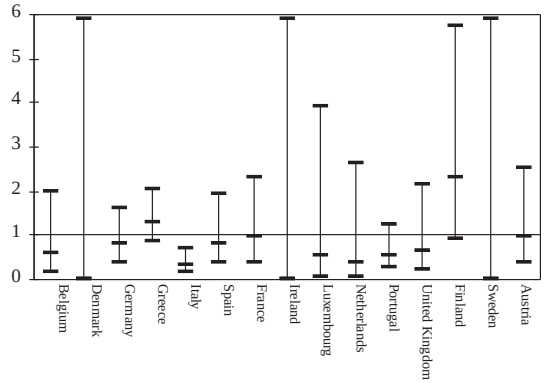
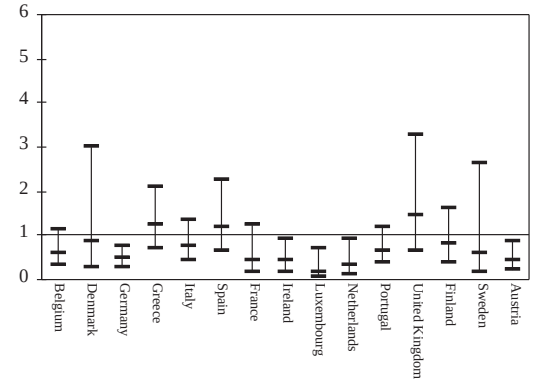


Figure 19. *Association (crude OR and 95% CI) between types of employment (small employers and permanent) for each outcome by country*

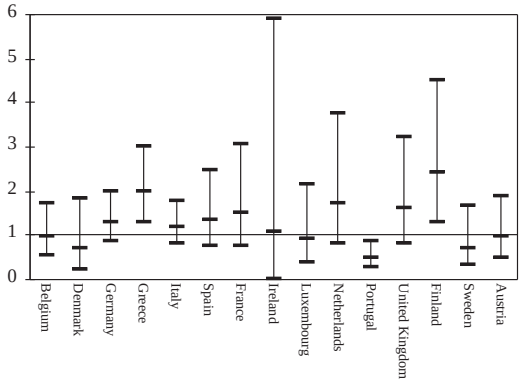
Dissatisfaction



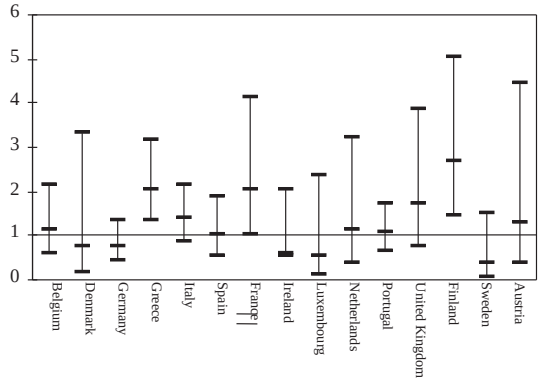
Absenteeism



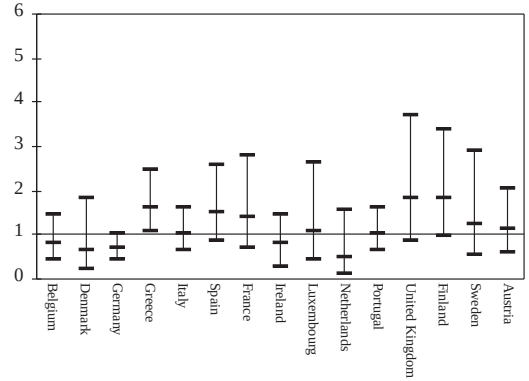
Stress



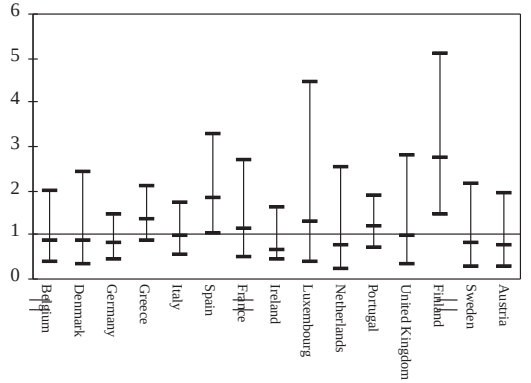
Fatigue



Backache



Muscular Pains



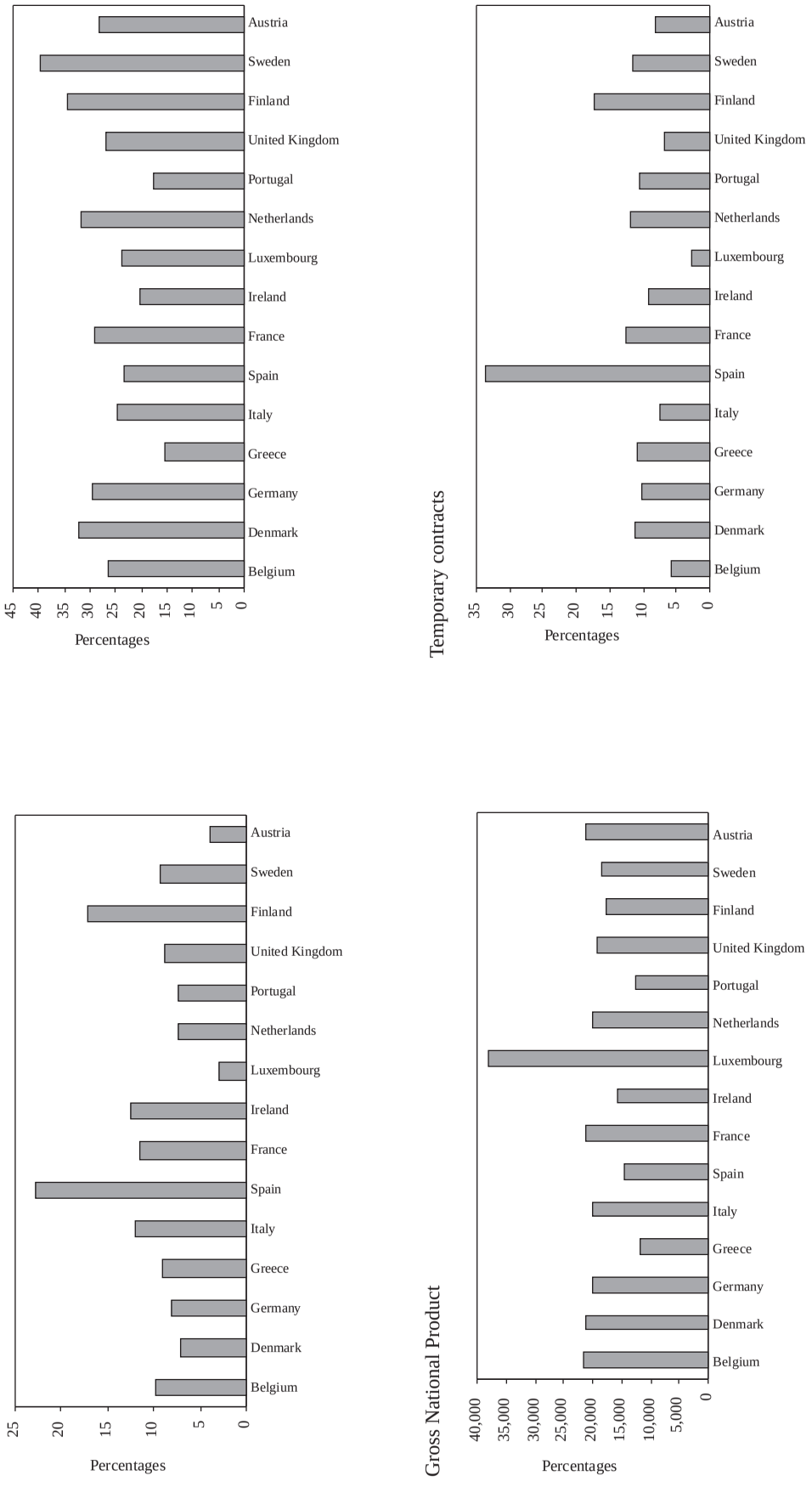
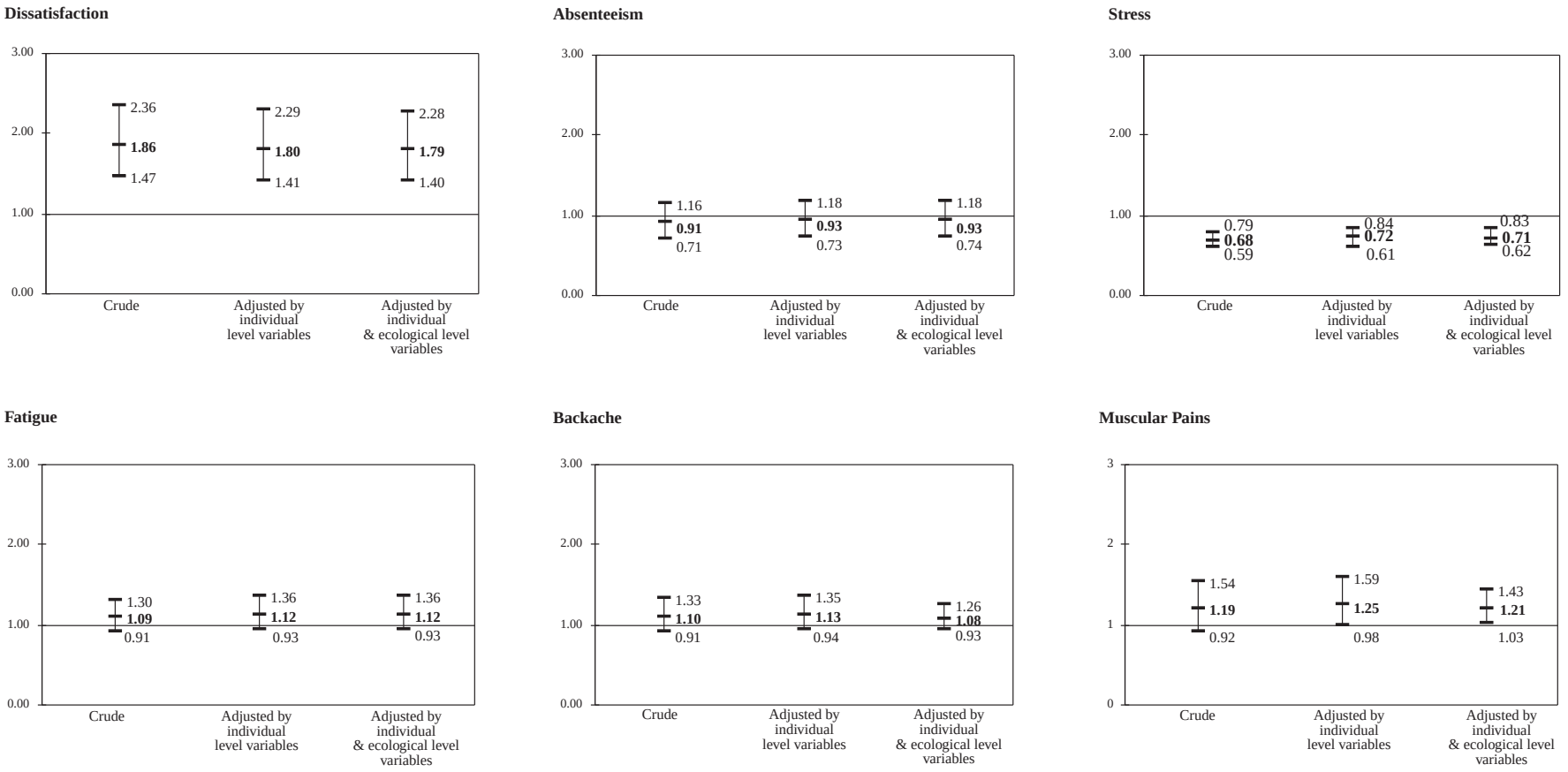


Figure 20. *Distribution of ecological variables by country*

Figure 21. *Association[1] (OR and 95% CI) between types of employment (precarious and permanents) adjusted by individual[2] and ecological[3] level variables*



(1) From multilevel models with a random intercept for each country and a random effect of employment.
(2) Age and gender.
(3) Unemployment, social protection, Gross National Product, and temporary contracts.

European Foundation for the Improvement of Living and Working Conditions

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This publication focuses on the impact of employment status on workers' health. It presents and analyses data on the 15 Member States of the European Union, collected from the Foundation's Second European Survey on Working Conditions, Eurostat, and OECD. It also offers recommendations on how to carry out further research into the relationship between health and different types of employment.

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